Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Generally, the soils in the survey area that are well suited to crops, except for those on flood plains, also are well suited to urban uses. The data concerning specific soils in the survey area can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

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

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

Crops and Pasture

Bill Yarborough, district conservationist, and Bobby Brock, agronomist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Drainage is a major consideration in managing crops and pasture. Management of drainage in conformance with regulations concerning wetlands may require special permits and extra planning. Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

Cropland Management

Most of the cultivated land in the survey area is along the Pigeon River and its major tributaries. A small acreage is on the intermountain hills between Waynesville and Canton and in the community of Ironduff. The most common crops are tobacco (fig. 9), tomatoes, and silage corn.

Water management. The soils on the flood plains are subject to flooding of varying frequencies and durations. Cullowhee and Nikwasi soils are flooded at least once every 2 years, and Rosman and Dellwood soils are only flooded once every 5 to 50 years. The loss of crops because of flooding is always a risk during the growing season on the soils of the flood plains.

Cullowhee and Nikwasi soils are on flood plains and

Figure 9.—Burley tobacco on Rosman fine sandy loam, 0 to 2 percent slopes, occasionally flooded, which produces high yields.

require drainage. Dillsboro, Saunook, Whiteoak, and Tuckasegee soils include a few wet areas resulting from seeps and springs. Subsurface tile drainage is used to drain these soils.

Managing surface water is important for cropland. Much of the cropland on toe slopes is adjacent to higher, steeper areas of pasture. Water runoff from these pastures causes a hazard of erosion on the adjacent cropland. Overland flow originating in cultivated areas should also be considered. Stripcropping, diversions, and grassed waterways help to manage surface water. Onsite investigations are essential to determine the proper management method.

Soil tilth. Soils that have good tilth are well aerated and have a high rate of water infiltration. Good tilth helps to prevent surface crusting and reduces seedling mortality. Good tilth is associated with a surface layer that is loamy and contains organic matter.

Most of the soils in the survey area that have slopes of less than 4 percent have good tilth. If the surface

layer of a soil has a content of clay that is higher and a content of organic matter that is lower in eroded areas than in uneroded areas, the soil generally has poor tilth. Erosion that results in a surface layer that is higher in content of clay and lower in content of organic matter degrades tilth. Tilth is a problem in eroded areas of Braddock and Hayesville soils. Compaction caused by machinery or excessive animal traffic also degrades tilth, especially if the soil is wet.

Cropland management should conserve soil and water and maintain or improve soil tilth and fertility. Maintaining a plant cover and leaving plant residue on the surface when planting new crops can improve or maintain soil tilth. The use of equipment should be restricted when the soil is wet.

Erosion control. Cropland soils that have slopes greater than 4 percent are the most susceptible to erosion *(18)*. Braddock, Brasstown, Junaluska, Cowee, Saunook, Whiteoak, Evard, Fannin, Hayesville, and Dillsboro soils are easily eroded if unprotected. Erosion is costly for several reasons. Topsoil, water, pesticides, fertilizers, lime, and organic matter are lost if erosion is not controlled. These losses result in reduced productivity and the pollution of adjacent streams, lakes, and reservoirs by sediments, agricultural chemicals, and nutrients. Trout streams are especially sensitive to damage caused by sediments.

Conservation tillage in a combination with stripcropping, diversions, and grassed waterways is the most effective method of erosion control currently used in the survey area. Conservation tillage provides a year-round cover of plant mulch, which prevents surface crusting and reduces evaporation during the growing season.

Stripcropping can effectively control erosion and conserve water. A system should be properly designed by professional soil conservationists. Stripcropping can include crop rotation, rotation of grasses, and the use of crop residue and cover crops. Diversions and grassed waterways should be properly integrated with stripcropping. These methods are practical on most of the cropland in the survey area that has a hazard of erosion, and they can be adapted to a wide range of slope patterns. Professional assistance in planning conservation practices is available at the office of the Haywood Soil and Water Conservation District.

Ornamental Crops

Steve West, county extension director, Cooperative Extension Service, helped prepare this section.

The ornamental crops grown in the survey area for local and regional markets include Christmas trees, mountain laurel, rhododendron, hemlock, ginseng, and other species of native trees, shrubs, and herbaceous plants used in landscaping. Also grown are hybrid trees, shrubs, and flowers, such as holly, juniper, gladiolus, and roses. All ornamental crops require intensive management and high maintenance.

The production of Christmas trees is an important industry in Haywood County and the surrounding counties. The species grown for Christmas trees in Haywood County are Fraser fir, white pine, and Norway spruce. Fraser fir is best adapted to cool sites at elevations generally above 3,000 feet. It grows best on well drained, loamy soils that have a high content of organic matter in the topsoil. Examples are Wayah, Oconaluftee, Plott, Trimont, Cheoah, Saunook, and Tuckasegee soils (fig. 10). White pine and Norway spruce are adapted to the drier, warmer sites. They also can tolerate clayey soils. Evard, Cowee, Hayesville, Brasstown, Junaluska, Whiteoak, Braddock, Dillsboro, and Saunook soils are suited to these species.

Native ornamentals, hybrid ornamentals, outdoor flowers, and many woody ornamentals grow best on well drained, loamy soils. Also, these soils should have a content of clay between 15 and 30 percent, which allows ball and burlap harvesting. The plants need to be protected from northwest winter winds, especially at high elevations. Saunook, Whiteoak, Evard, Cowee, Brasstown, and Junaluska soils are well suited to native ornamentals.

Site selection and field layout. Soils that have a clay content of less than 15 percent in the upper 2 feet should not be used for ornamental species that are ball and burlap harvested. These soils do not cling together and thus ball poorly. Soils that are wet, are in natural drainageways, or have a content of clay greater than 30 percent in the upper 2 feet should not be used for ornamental species. These soils hold excess moisture around roots, which results in poor growth and encourages phytophthora root disease. Soils that have slopes greater than 30 percent should not be used because the slope limits the use of equipment for mowing, spraying, and harvesting. Steep and very steep slopes increase labor costs and the amount of time needed for harvesting and detrimentally affect plant shape. Sites for ornamentals should be selected in areas having an adequate supply of clear water that can be used for spraying or irrigation. Disturbing as little of the planting area as possible helps to prevent excessive erosion. Areas between plants and areas between rows should remain in permanent sod.

Christmas trees should be planted in a grid pattern, usually in spaces 5 feet by 5 feet, that allows the easy access of mowing and spraying equipment. The production of Fraser fir on sites that are at elevations

Figure 10.—Fraser fir on Plott fine sandy loam, 15 to 30 percent slopes, stony. Christmas trees are an important part of the ornamental crop industry in Haywood County.

below 2,500 feet, that are on south- or west-facing slopes, or that are on soils that have a subsoil containing more than 35 percent clay is marginal. If a site has two of these conditions, it is generally eliminated as a potential site for fir production. White pine should not be grown above an elevation of 5,000 feet because of poor adaptability and blister rust. Line-out beds of conifer require soils that have less than 10 percent clay in the upper 12 inches. Soils that have more than 10 percent clay hold seedling roots too tightly, and thus roots are torn and broken during harvesting. This root damage reduces the vigor of seedlings transplanted in the field. Soils that have a surface layer of fine sandy loam, such as Rosman soils, are suited to line-out beds. Soils that have a dark, organic-rich surface layer, such as Cheoah, Plott, Oconaluftee, and Wayah soils, also are suited to line-out beds.

Access roads should be carefully planned and constructed. They should not be constructed in natural

drainageways, in wet areas, or where, because of slope, the roadbed grade would be more than 10 percent. They should be surfaced or seeded with perennial vegetation as soon as possible after construction. Lime and fertilizer should be applied regularly to maintain the sod. Cut and fill slopes should be stabilized with vegetation as soon as possible.

Fertilizers and herbicides. Most of the ornamentals grown in the survey area are nutrient specific, and no general recommendations can be made. Soil tests and leaf analysis should be regularly completed, and the results should be carefully followed. Herbicides should be applied only by banding or spot treatment. The content of organic matter and the texture of the surface layer should be considered when determining application rates.

Assistance in ornamental crop production, including information on site selection, soils, fertility, and layout, is available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Table 6 rates the soils for their ability to support ornamental crops. High, medium, and low are used to indicate the degree of the major soil limitations that affect the production of ornamental crops. A rating of *high* indicates that no soil limitations affect production. A rating of *medium* indicates that one soil limitation affects production. A rating of *low* indicates that two or more soil limitations affect production. The limitations can be overcome by increased management, which increases the cost of production. Soils that are not suited to the production of ornamental crops do not have ratings in the table.

Orchards

Site selection, erosion control, and orchard layout are the most important management considerations in planning an orchard.

Site selection. Site selection should be considered carefully. A sloping topography allows good air drainage. Good air drainage helps to prevent damage caused by frosts and freezes during bloom and bud stages. Sites that are gullied, have many ravines, or have abrupt changes in slope should not be selected. Orchards should be established near an adequate supply of water, which can be used for spraying or irrigation. Apple trees grow best on deep, well drained soils that have a loamy subsoil. Cheoah, Plott, Trimont, Dillsboro, Braddock, Tuckasegee, Saunook, Evard, and Edneyville soils are suited to apple orchards (fig. 11). Trees planted in soils that are wet, affected by seeps, or in natural drainageways produce low yields and are more susceptible to disease. Spivey and Cullasaja soils are in these undesirable areas and should not be used for orchards.

Erosion control and orchard layout. The layout of an orchard should include outlets for water flowing into the orchard from higher areas and for water flowing out of the orchard. Field borders and diversions that divert water into grassed waterways can dispose of flowing water without causing erosion. Perennial vegetation should be established between rows of trees and on all roads and erosion-control structures. Rows of trees should be planted on the contour and as nearly parallel to each other as possible. This arrangement helps to control erosion and allows easy access. Access roads are very important. These roads should be located carefully and planted with perennial vegetation as soon as possible after construction. They should be graded to allow water to safely flow off them. Short or dead-end roads, which make access with equipment difficult, and roads with sharp turns or with grades greater than 10 percent should not be constructed. Wet areas or natural drainageways should not be used as sites for roads. Water bars and culverts should be installed where needed.

Lime, fertilizer, and herbicides. Applying lime and fertilizer to an orchard helps to maintain sod and produce the desired yield. Recommendations based on soil tests and the results of leaf analysis should be used to develop a fertilizer program. Herbicides should be applied only on a band or a tree by tree basis. The content of organic matter and the texture of the surface layer affect the effectiveness of herbicides that are sprayed on the ground and should be considered before herbicides are applied. These soil properties are given in tables 15 and 16 and are discussed in the section "Detailed Soil Map Units" for each map unit.

Pasture Management

Pastures in the survey area have a variety of management concerns. Some pastures include a wide range of soil types, many of which exist side by side in individual fields. In many areas wet soils on flood plains, such as Cullowhee and Nikwasi soils, join steeper, drier soils, such as Braddock, Evard, and Fannin soils, in the same pasture. Seeps and springs occur on side slopes, on toe slopes, and in coves. Because of these conditions, drought and drowning can be hazards in the same pasture. Pastures in areas of the eroded Fannin and Hayesville soils are more droughty and are subject to compaction. Pastures on high mountain ridges and steep side slopes above an elevation of 4,000 feet are subject to extreme winter conditions, especially on north-facing slopes. Pastures on south- and west-facing slopes can be damaged by

Figure 11.—An area of Saunook loam, 15 to 30 percent slopes, stony. This soil is suited to apple orchards and has the potential to produce high yields.

frost heave. They are subject to early and late winter conditions that greatly shorten the growing season. The pastures on high mountains also receive more rainfall than those in the lower areas. These weather conditions increase the difficulty of establishing, maintaining, and managing pasture.

The best soils for pasture are on uneroded side slopes and ridges that have slopes of less than 30 percent. Evard, Brasstown, Junaluska, and Cowee soils are examples. Soils on stream terraces, such as Statler, Dillsboro, and Braddock soils, and soils in coves, such as Tuckasegee and Saunook soils, also support good pastures. These three landscape positions have the fewest limitations affecting pasture management.

Fertility. The yield of pastures in the survey area could be potentially doubled. Controlling erosion, using improved plant varieties, applying fertilizer and lime according to soil test recommendations, and avoiding overgrazing help to increase yields.

Generally, a complete fertilizer is required at the beginning of a fertility program. Nitrogen is normally the element most needed. Because there is no soil test for nitrogen, nitrogen is usually applied according to the needs of the pasture plants. Soil tests are needed to determine the proper amounts of phosphorus and potassium to be applied. After the pasture is established, the quality of yield can be greatly improved by proper applications of nitrogen. Chemical fertilizers are the most popular and convenient source of nutrients, but Haywood County has numerous dairy operations that generate manure, which can supplement a pasture fertilization program.

Properly timing applications of fertilizer is very important in maximizing pasture yields. Generally, cool-season plants should be fertilized before their period of maximum growth. In the survey area, fertilizer should be applied between March 1 and March 15 before spring growth occurs and between August 15 and August 30 before fall growth occurs. If fertilizer application is not properly timed, the number of grazing days on a pasture will be below potential.

Species. Livestock producers in the survey area should use pasture species, such as fescue, that can grow under a wide range of soil conditions and can also produce yields of high quality and quantity. Fescue is very important to the livestock industry of the survey area. It thrives on soils that are well suited to forage production but also can be established and be very productive on soils that have a high water table or clayey texture.

Fescue is an excellent companion crop to legumes, such as ladino clover and red clover, in pasture mixtures. In the survey area, a legume should be seeded with fescue to increase the palatability and nutritive value of the forage and to reduce the need for nitrogen fertilizers.

Most of the soils in the survey area support pastures of native bluegrass. Bluegrass is a preferred species for horses and sheep. Applications of high-analysis phosphate fertilizers, which promote the growth of native white clover and increase the nutritive value and quality of the forage, help to improve the pastures of bluegrass.

Orchardgrass, another important species, can grow anywhere that fescue thrives, except in wet areas, such as areas of Hemphill, Nikwasi, and Cullowhee soils. It has requirements similar to those of fescue but is more readily damaged. Overgrazing and competition from weeds reduce the lifespan of established stands.

In the past, alfalfa was grown extensively in the survey area. Because of a high population of alfalfa weevil, however, this forage plant was phased out of production. Today, because of new resistant varieties and improved pesticides, alfalfa production is increasing. Alfalfa grows best on well drained, loamy or clayey soils, such as Junaluska, Brasstown, Hayesville, Braddock, Dillsboro, Statler, Saunook, and Evard soils. It grows poorly on wet soils, such as Nikwasi, Hemphill, and Cullowhee soils. In the survey area, frequent summer rainfall causes problems in cutting and baling alfalfa hay.

Including summer grasses, such as sudangrass, switchgrass, bluestems, eastern gamagrass, and sorghum, in a forage program helps to provide silage and hay. Cattle producers can use these grasses as forage in summer, when cool-season grasses are dormant. Alfalfa can also be used for grazing in summer.

Winter cover crops, such as winter wheat or rye, can be used for limited grazing in winter and thus supplement and conserve the baled hay fed to livestock.

Livestock producers in the survey area can provide pasture and hay year-round by using cool-season grasses, alfalfa, and clovers for permanent pastures and by using grasses and cover crops for temporary forage during summer and winter, respectively.

Erosion control. Pastures in areas where slope is greater than 30 percent generally are too steep for farm equipment. Fertilizer and lime must be applied by hand, or access roads must be built for farm equipment. Applications of fertilizer and lime by hand are usually uneven and result in uneven stands of pasture plants that can support only a few cattle. If the vegetative cover on steep slopes is poor, erosion, the growth of unwanted weeds, and the encroachment of shrubs and trees at field borders are concerns. If constructing access roads is not economically feasible and applications of lime and fertilizer cannot be regularly applied by hand, the pastures will have little economic return and the soils will erode. In these areas tree production would be a better alternate land use.

Erosion is a problem in establishing and maintaining pastures on slopes greater than 4 percent. Planting on the proper dates helps to ensure a good stand in a timely manner. Cool-season species, such as fescue, orchardgrass, clovers, and bluegrass, should be planted between March 15 and May 31 or between August 1 and September 15. Alfalfa should be planted between August 1 and September 15. Warm-season species should be planted in the spring when frost is no longer a concern.

Plowing is not recommended for establishing or maintaining pasture. Plowed soil that does not have a cover of plant residue, which adsorbs the impact of raindrops, can develop a crust after rainfall. Crusting results in a high rate of seedling mortality and a severe hazard of erosion. Minimizing tillage so that plant residue remains on the surface, applying herbicides, and planting in the existing sod or stubble are recommended. The texture of the surface layer and the content of organic matter should always be considered in determining applications of herbicides.

Streambank erosion is a hazard along watercourses because of livestock traffic. The pollution of streams by sediments is especially detrimental to trout. To help control the erosion, livestock should be fenced away from streams and watering systems that use springs and wells should be installed. The fences may not be needed if a controlled grazing system is properly used.

Chemical Weed Control

The use of herbicides for weed control is a common practice on the cropland in Haywood County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect herbicide effectiveness and thus the rate of herbicide application required. Estimates of both of these properties were determined for the soils in the survey area. Table 16 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 15.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter determinations. The North Carolina Cooperative Extension Service can provide information on soil tests.

Soil Fertility

The soils in the survey area generally are low in natural fertility. They are naturally acid. Additions of lime and fertilizer are needed for the production of most kinds of crops.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for clover or for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. They are needed because phosphorus and potassium tend to build up in the soil.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 7. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. High level management assumes proper drainage where needed, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and efficient harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per

acre or less, a rate of about 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by a crop is an unnecessary expense and causes a hazard of water pollution. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that proper tillage, planting, and weed control and fertility practices are used.

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

Crops other than those shown in table 7 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of 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 use as cropland *(15)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

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

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of each map unit component is given in the section "Detailed Soil Map Units" and in table 7.

Woodland Management and Productivity

Albert Coffey, forester, Natural Resources Conservation Service; Greg Williams, North Carolina Forest Service; and Bill Champion, U.S. Forest Service, helped prepare this section.

Owners of woodland in the survey area have many objectives. These objectives include producing timber; conserving wildlife, soil, and water; preserving aesthetic values; and providing opportunities for recreational activities, such as commercial hunting. Public demand for clean water and recreational areas creates pressures and opportunities for owners of woodland.

Forests are one of the most important resources in the survey area. They provide wood products, scenic

beauty, wildlife habitat, cooler and cleaner air, and opportunities for outdoor recreation and nature study. They help to protect water quality by controlling erosion and sedimentation, and they abate noise. Timber and pulpwood production and the cutting of firewood compete with other forest uses, including forest preservation. The result is that forest managers are faced with the challenge of producing greater yields from smaller areas of forest land. Many of the woodland management techniques now being applied throughout the forest industry resemble those long practiced in agriculture. The techniques include establishing, weeding, and thinning desirable young stands; propagating more productive species and genetic varieties; complete fiber utilization and shortening periods between rotations; controlling insects, diseases, and forest weeds; and increasing growth through fertilization. Although timber crops require decades to grow, the goal of intensive woodland management is similar to the goal of intensive agriculture—to produce the greatest yield of the most valuable crop in the shortest time possible.

Commercial forests cover about 180,188 acres, or about 51 percent of the land area of Haywood County *(13)*. Commercial forest land 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-poplar, and eastern white pine are important commercial timber species in the survey area.

One of the first steps in planning intensive woodland 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 the forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on landscape position, soil properties, climate, and the effects of past land use. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. Soil properties and site characteristics determine site productivity. For example, coarse soils commonly have a low content of nutrients and a low available water capacity. Fine-textured soils may have a high content of nutrients and a high available water capacity. Where clays are compacted, however, aeration is reduced and root growth is inhibited.

Plant species differ in their degree of adaptation to various site conditions. For example, yellow pines, such as Virginia pine and pitch pine, and eastern white pine are better adapted than most upland hardwoods to the drier sites on ridges and southern exposures. The northern hardwoods are better adapted to northern exposures and coves than to the drier upland sites *(4)*. Generally, areas that have an upland hardwood site index of 70 or more are managed for hardwood and areas that have an upland hardwood site index of less than 70 are managed for eastern white pine *(7)*.

The gradient, shape, and length of slopes affect water movement and availability. Sites on concave slopes are more productive than those on convex slopes because they have a higher available water capacity. Elevation and aspect affect solar radiation and rates of evaporation. South aspects generally are warmer and drier than north and east aspects, except where south- and west-facing slopes are shaded by higher mountains (fig. 12) and are thus cooler. Trees commonly grow best on north and east aspects on the lower slopes, in sheltered coves, and on gentle concave slopes. The amount of rainfall during the growing season and the length of the growing season also influence site productivity. Areas that receive more than 60 inches of rain generally are good sites for timber production, even if the soil properties are less than desirable. In areas on high mountains, fog can supplement rainfall as much as 10 inches during the growing season. In Haywood County, the length of the growing season is about 150 days in the valleys and only about 100 days at an elevation of 6,000 feet.

When developing a management plan for timber production, the landowner's overall objectives, the present condition of the timber stand, soil type, aspect, accessibility, topography, and conditions of the timber market should be considered. A management plan includes the harvest, reproduction, and maintenance of a stand of trees.

An important part of woodland management is controlling erosion during and after logging activities. The act of removing trees is not the main cause of erosion in timber harvesting. Erosion primarily occurs in areas of access roads and skid trails, in loading areas, and in other areas where the organic surface litter has been removed.

The two main concerns in managing for erosion control at a logging site are the protection of streams (including streambanks) and the control of overland waterflow.

Several techniques can be used to help control erosion. Filter strips, which are vegetated areas between disturbed areas and streams, can be used to filter out soil eroded from the higher areas. Crossing

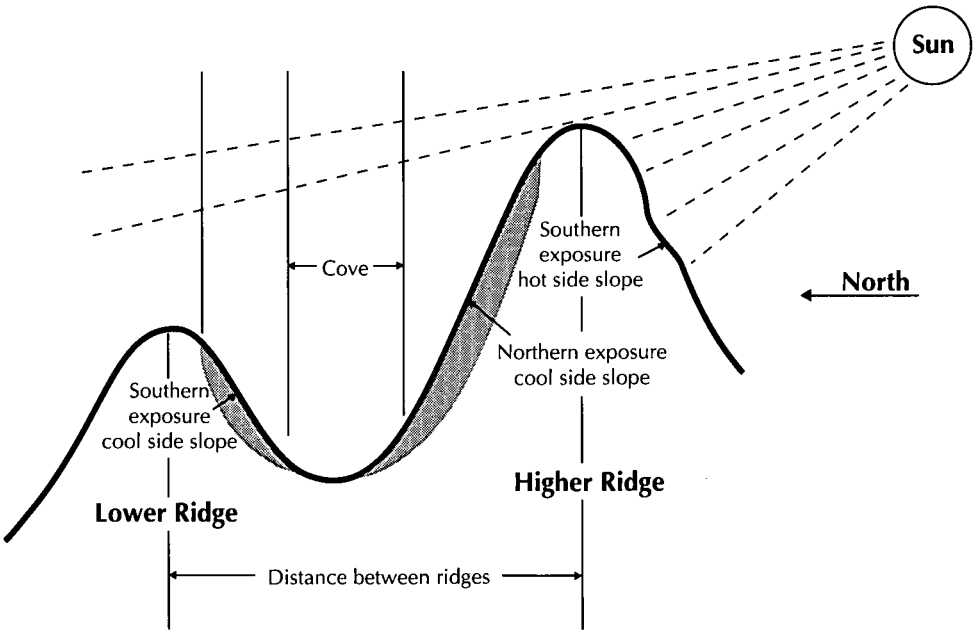

Figure 12.—The landscape of Haywood County consists mainly of steep, rugged mountainous terrain. The mountains vary in size, and in many areas the high mountains shade the low and intermediate mountains.

streams with roads or skid paths should be avoided. If crossing is necessary, streambanks should be protected by culverts, log bridges, or similar crossing structures.

Roads and trails should be constructed along the contour and have as many breaks in grade as possible. Other water-control structures, such as water bars, culverts, broad-based dips, and outsloping roads, should be used for roads. Roads should be constructed on as low a grade as practical and as narrow as practical. Logging methods cause varying degrees of erosion. Logging in nearly level, well drained areas is not as hazardous as logging in steeper areas. The heavy use of large, rubber-tired skidders in steep areas may destroy a significant amount of surface cover. Using smaller equipment, as in custom logging and cable yarding in areas where slopes are greater than 50 percent, helps to reduce the hazard of erosion. Loading areas should be as small as practical and be located away from streams.

Preparing a harvested site for reforestation can also cause erosion. As in harvesting, the forest floor should be disturbed as little as possible, the concentrated flow of water should be prevented, and streams and streambanks should be protected.

Forest Types

As a guide for the management of forest land, forest types are generally grouped as cove hardwoods, upland hardwoods, northern hardwoods, yellow pine, eastern white pine, and spruce-fir. The characteristics of a given site indicate which forest type will grow best on that site (fig. 13).

Cove hardwoods. This forest type generally occurs on deep, moist, highly productive soils in coves, on toe slopes, and on some north aspects below an elevation of about 5,000 feet. Common species are yellow-poplar (generally below an elevation of about 4,000 feet), northern red oak, white oak, black cherry (generally above an elevation of 3,000 feet), sweet birch, eastern hemlock, eastern white pine, American basswood, yellow buckeye, and white ash. The soils predominantly associated with this forest type are Tuckasegee and Cullasaja soils in drainageways in areas underlain by felsic to mafic high-grade metamorphic and igneous rocks and at the highest elevations on benches in coves; Saunook soils on the smoother landscapes in areas below Tuckasegee and Cullasaja soils; Braddock soils on rolling to hilly landscapes in areas below Tuckasegee and Cullasaja soils; Dillsboro soils in the lowest, most level areas in coves; Spivey and Whiteoak soils in narrow coves in areas underlain by low-grade metasedimentary rocks; and Whiteoak soils in broad and smooth coves. The general soil map unit associated with this forest type is Saunook.

Upland hardwoods. This forest type generally occurs on upland side slopes and ridgetops on various aspects

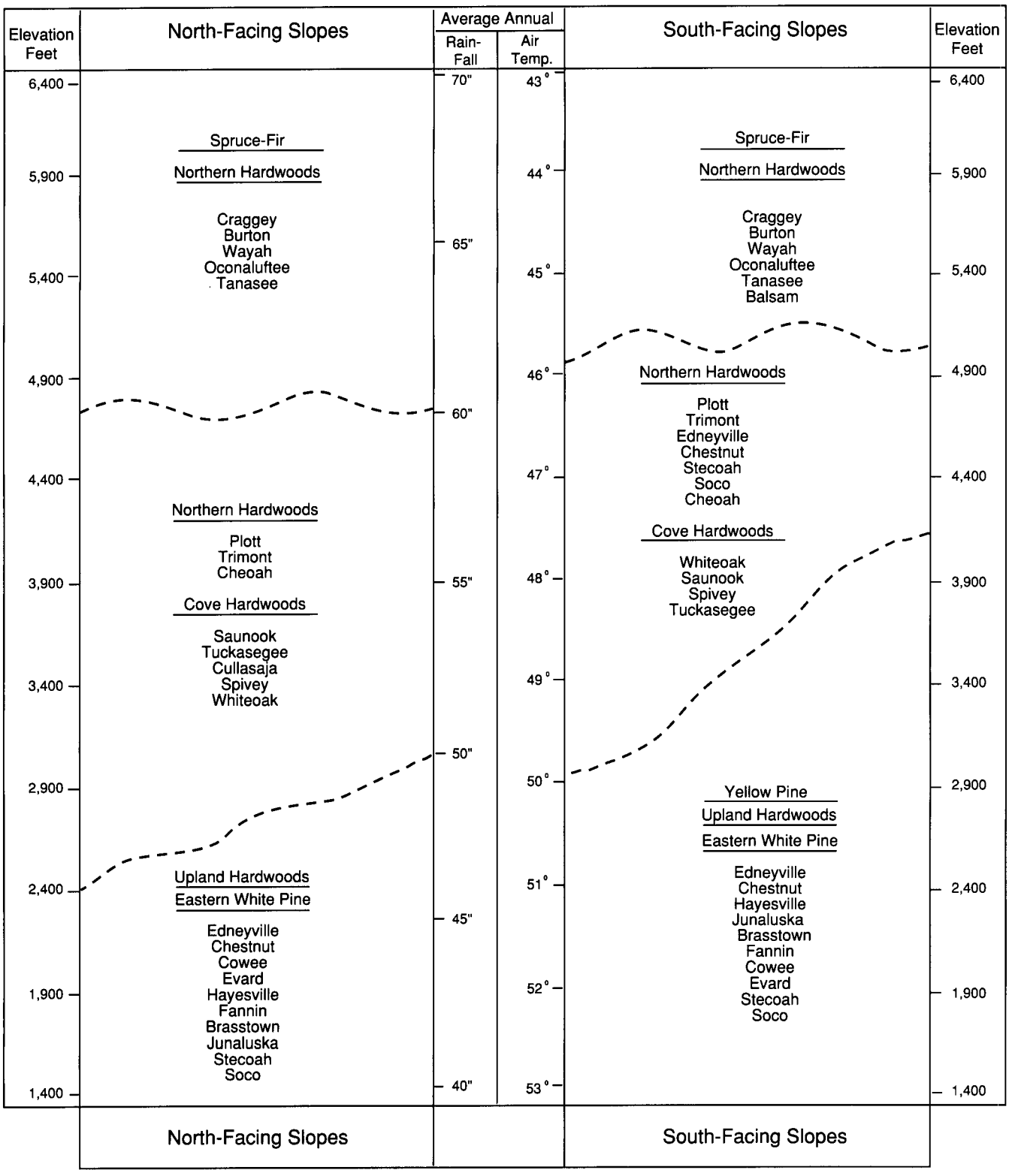

Figure 13.—The distribution of forest cover types in the survey area as related to aspect, elevation, temperature, and rainfall.

at elevations as high as 4,800 feet. Site characteristics commonly are intermediate between those of cove hardwoods and those of yellow pine. The dominant species range from northern red oak and white oak on the more moist sites to black oak, hickories, scarlet oak, and chestnut oak on the drier, warmer sites *(4, 8)*. The soils predominantly associated with this forest type are Ashe, Cleveland, Cowee, Edneyville, Evard, Chestnut, Fannin, and Hayesville soils on warm aspects below an elevation of 4,800 feet in areas underlain by felsic to mafic high-grade metamorphic and igneous rocks; Plott soils on cool aspects at elevations between 3,500 and 4,800 feet; Trimont soils on cool aspects below an elevation of 3,500 feet; Soco and Stecoah soils on warm aspects and Cheoah soils on cool aspects in areas underlain by low-grade metasedimentary rocks; and Brasstown and Junaluska soils on any aspect in areas below an elevation of 3,500 feet. The general soil map units associated with this forest type are Plott-Edneyville-Chestnut, Evard-Cowee-Hayesville-Trimont, Soco-Stecoah-Cheoah, and Brasstown-Junaluska-Whiteoak.

Northern hardwoods. This forest type generally occurs above an elevation of 3,500 feet, grading from the sites of cove hardwoods or upland hardwoods at the lowest elevations to the sites of spruce-fir at the highest elevations. Common species are American beech, sweet birch, yellow birch, sugar maple, northern red oak, and white ash. Other species requiring cool temperatures are associated with this forest type. The soils predominantly associated with this forest type are Plott and Trimont soils on cool aspects of side slopes and Tuckasegee and Cullasaja soils on benches and in drainageways of coves in areas underlain by felsic to mafic high-grade metamorphic and igneous rocks; Burton, Craggey, and Wayah soils on ridges and side slopes and Tanasee and Balsam soils in coves, in drainageways, and on benches above an elevation of 4,800 feet; and Cheoah soils on cool aspects below an elevation of 4,800 feet and Oconaluftee soils above an elevation of 4,800 feet in areas underlain by low-grade metasedimentary rocks. Trees on prominent ridgetops exhibit slow growth and poor shape because of frequent ice storms and high winds in winter. The general soil map units associated with this group are Wayah, Oconaluftee, and Plott-Edneyville-Chestnut.

Yellow pine. This forest type generally occurs on soils of low productivity on ridgetops and on the drier and warmer aspects of side slopes. Pitch pine, shortleaf pine, and Virginia pine are the dominant species. This forest type generally is below an elevation of about 3,500 feet, but pitch pine also grows at the higher elevations. Dry sites of various hardwoods, such as scarlet oak, white oak, chestnut oak, black gum, and sourwood, are also associated with this forest type. The soils predominantly associated with this type are Fannin, Evard, Cowee, and Hayesville soils in areas underlain by felsic to mafic high-grade metamorphic and igneous rocks and Brasstown and Junaluska soils in areas underlain by low-grade metasedimentary rocks. The general soil map units associated with this forest type are Evard-Cowee-Hayesville-Trimont and Brasstown-Junaluska-Whiteoak.

Eastern white pine. This forest type occurs on a wide range of sites. It generally is the best producer, by volume, on any site, except on the best sites in coves, and it does not grow at elevations above about 4,800 feet. Generally, it produces more wood than yellow pine or upland hardwoods on the drier sites and as much wood as the cove hardwoods, except on the best sites. Eastern white pine, as a species, can be grown as a component of all forest types, except the spruce-fir type. Where this species is common in the understory of hardwood forests, it becomes the overstory after the hardwoods are harvested. In the survey area, eastern white pine regenerates naturally in many areas underlain by low-grade metasedimentary rocks.

Spruce-fir. This forest type generally occurs only at elevations higher than 4,800 feet. The present acreage is limited because of past fires, insect infestation, and management practices. Red spruce is the dominant species. In recent years, the mature Fraser fir component has been killed by infestations of balsam woolly adelgids. Many Fraser fir seedlings and saplings, however, make up the understory. Red spruce also is in a period of decline. Various species of northern hardwoods and heath are interspersed in this forest type. Hardwoods commonly exhibit poor shape and stunted growth on ridgetops that are exposed to high winds and frequently to ice. In summer, this forest type frequently receives fog, which adds as much as 10 inches of moisture to the soils during the growing season. The soils predominantly associated with this forest type are Burton, Craggy, Wayah, Tanasee, and Balsam soils in areas underlain by felsic to mafic high-grade metamorphic and igneous rocks and Oconaluftee soils in areas underlain by low-grade metasedimentary rocks. The general soil map units associated with this type are Wayah and Oconaluftee.

Technical Assistance for Timber Production

The North Carolina Division of Forest Resources can assist the forest landowner in disease control, forest management, and fire control. Private consulting foresters can provide management plans that include marketing timber, and many can also assist in

developing long-term management plans for timber stands not yet ready for harvest.

The Natural Resources Conservation Service (NRCS), the Consolidated Farm Service Agency (CFSA), and the North Carolina Cooperative Extension Service work closely with woodland owners. The NRCS can assist in planning road layout and stabilization, critical area stabilization, and the design of pipes. The CFSA administers cost-share programs that aid landowners with the costs of certain practices for reforestation and timber stand improvement. The North Carolina Cooperative Extension Service provides forestry research information, holds public forestry educational programs and tours, establishes forestry demonstration plots for public education, and assists with soil fertility tests.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. The common forest understory plants are also listed. Table 8 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 8 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular woodland management activities; and *severe* if special precautions are needed to control erosion for most woodland management 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 the steepest slopes, even tracked equipment cannot be operated and more sophisticated 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 water 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, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. 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, or bedrock or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds break trees but do not uproot them; *moderate* if strong winds blow a few trees over and break many trees; and *severe* if moderate or strong winds commonly blow trees over. Ratings of moderate or severe indicate that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and as a *volume* number. The predominant common trees are listed in table 8 in the order of their observed occurrence. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions. 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 upland oaks, including northern red oak, scarlet oak, and chestnut oak, on yellow-poplar, and on eastern white pine *(3, 7, 8)*.

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. Productivity of a site can be improved through management practices, such as applying fertilizer and planting genetically improved species.

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Recreation

Bambi Teague, resource management specialist, Doris Bixby Hammett, Balsam-Highlands Task Force, and Stuart E. Coleman, resource management chief, National Park Service, helped prepare this section.

Haywood County has diverse opportunities for recreation on every type of landform. Canton and Waynesville, which are built on intermountain hills, offer parks, playgrounds, a YMCA, swimming pools, tennis courts, running tracks, and ballfields built on flood plains and stream terraces. Movie theaters, restaurants, skating rinks, a bowling alley, fitness centers, craft shops, shopping plazas, motels, bed-and-breakfast inns, and other public attractions are also available.

Maggie Valley, the central tourist attraction in Haywood County, is built on a portion of the flood plain and stream terrace of Jonathan Creek. Dellwood soils, which have a seasonal high water table and flood occasionally, occur on the flood plain. Motels, cabins, restaurants, music halls, a zoo, flea markets, shopping plazas, miniature golf courses, courses for miniature road cars, campgrounds, and other attractions are currently available in Maggie Valley. The high water table and the flooding should be considered in the design of structures and attractions such as these.

Riding stables, country inns, pay-by-the-pound trout ponds, and country clubs are mostly built in coves, on intermountain hills, and on the side slopes of low and intermediate mountains. Riding trails and homes associated with country clubs also are in areas on ridgetops.

Lake Junaluska Assembly is a recreational,

retirement, and conference center that offers concerts, accommodations, a playground, restaurants, and opportunities for swimming, sailing, fishing, and golfing. The lake floods a portion of the flood plain and terrace of Richland Creek. The facilities are built on the intermountain hills surrounding the lake.

The Pisgah National Forest covers 68,175 acres in Haywood County. The Twelve Mile Strip in the northern part of the county and the Shining Rock Wilderness Area in the southern part are intensively used. They include picnic areas, nature study areas, trails for hiking and horseback riding, waterways for canoeing, and roadways for bicycles and motor vehicles. A map of the trails is available from the Haywood Chamber of Commerce or the U.S. Forest Service. The best known trail is the Appalachian Trail, which is about 15.5 miles long in Haywood County and runs from Davenport Gap to Tricorner Knob. The Cataloochee Divide Trail is 11.5 miles long and runs from Cove Creek Gap to Pauls Gap, along the boundary of the Great Smoky Mountains National Park. The Shining Rock Wilderness Area includes the Shining Rock and Tennent Mountain, East Fork, Shining Creek, Old Butt Knob, Little East Fork, and Sorrell Creek Trails. The North Carolina Mountains-to-Sea Trail runs from Haywood Gap on the Blue Ridge Parkway to an area near Wagon Road Gap. It continues across North Carolina to the ocean.

The National forest land in Haywood County is used for camping, fishing, and hunting. The Pisgah National Forest has been designated as State game land by the North Carolina Fish and Game Commission. Game includes bear, deer, turkey, grouse, and squirrel. Most streams in the Pisgah National Forest are designated as trout waters by the Fish and Game Commission and are popular with fishermen. The U.S. Forest Service allows back-country camping throughout the National forest. It has provided a campground for tents and trailers at Sunburst along the flood plain of the East Fork of the Pigeon River.

Areas in the National forest cover all landforms, except stream terraces. The soils in these areas vary in their suitability for recreational development. Soils on intermediate and high mountains, such as Plott, Cheoah, Wayah, Oconaluftee, and Tanasee soils, have a thick, organic-rich surface layer. They are subject to compaction and severe erosion in areas of trails or in areas disturbed by machinery. The soils in the northern part of the county have unstable characteristics related to the parent rock. Some soils, such as Cheoah, Oconaluftee, Soco, Stecoah, Junaluska, and Brasstown soils, tend to slump and slide and are susceptible to severe erosion if disturbed. Cataska and Cleveland soils have bedrock near the surface and rock outcrops, which limit recreational uses besides rock climbing. Spivey and Cullasaja soils have a large amount of stones and boulders that can limit some types of recreational development. Paths and trails, access roads, and camp areas require special design to overcome these soil limitations.

About 61,225 acres of Haywood County is within the Great Smoky Mountains National Park and is not included in the survey area. Most of this acreage is in areas of the Cataloochee and Little Cataloochee Valleys. Many miles of hiking and backpacking trails traverse flood plains, coves, and the side slopes and ridgetops of mountains. The most popular trails are the Pretty Hollow Gap Trail, the Big Creek Trail, and the Cataloochee Divide Trail. Many short trails run through coves to houses that were occupied before the area became a park. Other available recreational opportunities include nature study, picnicking, horseback riding, and fishing. Camp areas for tents and trailers are provided along the flood plains of Cataloochee Creek and Big Creek.

Although the land in the National park is not included in this soil survey, the soils in the park have characteristics of fragility, rockiness, and low strength similar to those of the soils in the National forest.

The Blue Ridge Parkway runs along the southern border of Haywood County. Its highest elevation, 6,053 feet, occurs in this county at Richland Balsam. The total acreage of the parkway in Haywood County is about 3,588 acres. About 50 miles of the parkway runs through the county. The parkway offers opportunities for hiking and picnicking and scenic views from many parking overlooks. Camping areas for tents and trailers and dining and lodging facilities are available along the parkway near the Buncombe County line. Several trails originate at the parking overlooks. The most popular trail is the Graveyard Fields Loop Trail, which has views of three different waterfalls and accesses a bald mountain covered with blueberry and blackberry bushes. Many other miles of Forest Service trails and areas of federally designated wilderness are accessed via the parkway road.

In Haywood County, most of the Blue Ridge Parkway provides access to ridgetops, side slopes, and coves of intermediate and high mountains. Soils along the parkway include Plott, Tuckasegee, Wayah, Tanasee, Balsam, Burton, and Craggey soils. These soils have a thick, organic-rich surface layer that is easily compacted and eroded. Burton and Craggey soils have bedrock near the surface and are particularly fragile. If they erode, bedrock is exposed. Paths, trails, and picnic areas need a high level of management in areas of these soils. For example, land in the Graveyard Fields-Sam Knob area was burned in the 1920's and in the 1940's. The fires burned off the organic-rich surface

layer and exposed the remaining soil material to erosion. Consequently, the soils in this area have a thin surface layer and are gullied in many places. Many rock outcrops have occurred since the fires as a result of erosion. Because the area is a popular scenic attraction for tourists, a high level of management is needed to control further damage.

In table 9, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public 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 subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, 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 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

Joffrey Brooks, wildlife biologist, North Carolina Wildlife Resources Commission, and John P. Edwards, biologist, Natural Resources Conservation Service, helped prepare this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

Small game and nongame species inhabit areas throughout Haywood County. Some of the small game species and important furbearers are gray squirrel, raccoon, rabbit, fox, grouse, dove, and bobcat. Waterfowl populations are low but include a small population of wood duck that inhabits areas along the Pigeon River, lakes, and some farm ponds. The county also has a wide assortment of nongame species, including hawks, many species of songbirds, and a variety of small mammals and reptiles.

The Pisgah National Forest, areas along the Blue Ridge Parkway, and the Great Smoky Mountains National Park support most of the populations of big

game, namely deer, turkey, and black bear.

Wildlife requires food, water, and cover. The variety and abundance of wildlife that inhabit an area depend largely on the variety and abundance of these basic elements. Some wildlife species require greater amounts of food, water, and cover than others and therefore require a much larger area of living space. For example, black bear requires much more living space than deer and gray squirrel. The available amount of food, water, and desirable cover is dependent upon many factors, including soil. If possible, wildlife generally roam throughout the county and inhabit areas of the most productive soils, that is, the soils that produce the best type of food and that have a dependable water supply and desirable cover.

Some of the most productive soils on private land in Haywood County are in areas along streams and the Pigeon River and in coves. This land is used for farming and for residential, industrial, and recreational uses. These activities generally preclude the use of the land by many wildlife species. Consequently, wildlife, especially big game, must inhabit areas of less desirable soils, which support less desirable habitat. Therefore, the soils rated in table 10 as good for wildlife habitat do not necessarily support a wildlife population in Haywood County. Rosman, Saunook, Braddock, Evard, and Hayesville soils are rated good as potential habitat for woodland wildlife but are intensively used for farming and housing. These uses force out woodland wildlife. Edneyville, Chestnut, and Plott soils are rated good as potential habitat for woodland wildlife and are mostly wooded, even on privately owned land. Cattle, however, have access to these woods. The competition from grazing cattle in these areas forces big game species onto Federal lands or into areas of less desirable soils.

Small game species and numerous nongame species thrive in transition zones that are maintained in early stages of succession. Examples of transition zones are fence lines, field borders, edges of woodlots, roadsides, ditches, and the right-of-way of power lines. Transition zones can be managed with minimal expenditures of time and money. Because the survey area has numerous woodlots and small farms, thousands of miles of transition zones are available for wildlife management. Wildlife management can include controlled burning, wildlife plantings, disking, mowing, and leaving unharvested crops along field edges. If proper habitat is maintained, populations of wildlife species will thrive.

Some opportunities exist for managing large acreages of private woodland as habitat for woodland wildlife. Wildlife management plans usually begin with timber management. Table 8 can be used to determine the best way to manage woodland. Harvesting timber and reforestation can be integral parts of a wildlife management plan.

Small, irregularly shaped clearcuts (less than 20 to 25 acres in size) in large even-aged stands of timber can benefit many species of woodland wildlife, such as deer and grouse. In cutting timber or firewood, some snags or older trees should be left to provide cavity nests for such species as woodpeckers and to provide denning sites for raccoons and squirrels (fig. 14).

Unusually large trees, uncommon tree species, and some mast-bearing trees and shrubs should be left when thinning forests. Seeding road cuts and access roads with clover, sericeous lespedeza, and orchardgrass provides food and cover for wildlife and helps to control erosion. Planting cover strips of evergreens at strategic locations in a woodlot provides protection to game species from predators. A variety of habitat for a variety of wildlife is important in wildlife management. Maintaining well dispersed timber stands of different ages and maintaining a variety of tree species in each stand benefits wildlife.

A knowledge of the habits, habitat requirements, and preferred foods of different wildlife species is useful in managing wildlife. The following paragraphs discuss the important game species and furbearers of Haywood County.

Black bear. Populations of black bear require large acreages of mature forest (5,000 acres or more in size). In Haywood County, most of this land is available in the Pisgah National Forest and the Great Smoky Mountains National Park. The black bear, however, also roams throughout tracts of private land in the county.

The black bear is omnivorous and feeds on acorns, beechnuts, cherries, apples, grapes, blackberries, blueberries, greenbrier, various grasses and clovers, blackgum, hawthorns, small mammals, insects, carrion, and garbage. It also feeds on some farm crops, such as corn, and occasionally disturbs beehives. The preferred denning sites of black bear are old, large, hollow, standing trees, especially chestnut oak. Areas of Edneyville, Chestnut, Evard, Cowee, Stecoah, and Soco soils offer preferred denning sites.

The loss of habitat or living space in the mountains to housing and recreational developments is the greatest threat to populations of black bear. The black bear's living space cannot be replaced. The loss of this habitat can cause a permanent decline in the number of black bear.

White-tailed deer. Populations of white-tailed deer require areas that are 300 to 500 acres in size and that provide proper amounts of food, water, and cover. In spring and summer, deer feed on green, succulent leaves and stems of both woody and herbaceous

Figure 14.—A small clearcut area of Plott fine sandy loam, 30 to 50 percent slopes, stony. It will soon become covered in brush and provide cover and food for wildlife.

plants. In fall, acorns, honeysuckle, grapes, apples, and leaves of woody plants are important foods. In winter, acorns, honeysuckle, rhododendron leaves, and grasses are important foods. Deer prefer the acorns of white oak, which grows on warm, dry soils, such as Edneyville, Chestnut, Evard, Cowee, Stecoah, Soco, Junaluska, and Brasstown soils. In Haywood County, however, northern red oak produces mast more consistently than white oak and therefore is more important to deer for food. Northern red oak grows best on cool, moist soils, such as Plott, Tuckasegee, Wayah, Oconaluftee, and Cullasaja soils. Agricultural crops can be important food sources for deer if the crops are available within the deer's range. Deer browse areas of crops and pasture on private land in most of the agricultural communities in the county.

The population of deer on private woodland in Haywood County can be potentially increased if proper timber management practices and harvesting techniques are used.

Wild turkey. Populations of wild turkey require a variety of habitat that generally ranges over large acreages (5,000 acres in size). They feed on green, herbaceous leaves and forbs, insects, acorns, dogwood berries, and other fruits. In spring, turkey poults benefit from grassy open areas where they can have a diet high in insects, which promotes quick growth. Mature hardwood stands, such as oak-hickory stands, that include an open understory are an important part of the wild turkey's winter range. These hardwood stands occur mostly on soils on warm, dry mountainsides, such as on Edneyville, Chestnut, Evard, Cowee, Stecoah, Soco, Brasstown, and Junaluska soils.

Raccoon. Raccoon is a nocturnal and omnivorous mammal. Its diet includes fleshy fruits, acorns, corn, persimmon, blackgum, invertebrates, small mammals, snakes, lizards, salamanders, bird eggs, young birds, carrion, and garbage. When harvesting timber and firewood on large and small woodlots, leaving den trees and some mast-bearing trees and shrubs helps to improve the habitat of raccoon. It is important to protect areas of streams from damage caused by cattle or clearing operations because the raccoon's food and traffic ways commonly are located near waterways.

Mink. Mink is a predator that feeds mainly on animals associated with areas of water. It lives mainly in coves, on stream terraces, and on flood plains. Its diet includes fish, frogs, crayfish, mice, songbirds, snakes, lizards, salamanders, rabbits, squirrel, and muskrat.

Muskrat. Muskrat generally is a vegetarian that eats roots, stems, bark, fruit, and leaves of various plants. It prefers grasses, clover, and corn. Occasionally, its diet includes fish, freshwater mussels, insects, crayfish, and snails.

Squirrels. Both the gray squirrel and the red squirrel, frequently called mountain boomer, inhabit Haywood County. Generally, the gray squirrel inhabits areas below an elevation of about 4,500 feet where mast and den trees are available. These areas include all of the soils in the survey area classified in the mesic temperature regime (see table 19). The gray squirrel prefers hardwood mast to pine mast if both are plentiful. The red squirrel lives wherever mast and den trees are available but prefers areas above an elevation of about 4,500 feet where red spruce mast can make up a large part of its diet. Generally, these areas include all of the soils in the survey area classified in the frigid temperature regime. The choice foods of squirrels are acorns, beechnuts, blackgum, black cherry, corn, dogwood berries, hickory nut, mulberries, pine mast, chestnut, hazelnut, walnut, butternut, chinquapin, poplar flowers, and wild grapes.

Rabbits and quail. These two wildlife species are generally considered farm game species. Many farms lack the cover necessary to support good populations of quail and rabbits. Modern farming technology has eliminated field edges and odd corners, and fence rows no longer support briars or brush. Changes in the kinds of crops grown have also affected populations of these animals. The dominant use of fescue as a pasture and hayland crop instead of other grass-clover mixtures has adversely affected the amount of food available to rabbits and quail on farmland. On farmland, important cover components for these animals include patches of blackberry, greenbrier, and honeysuckle, fallow fields, and evergreen plantations. The favorite foods of rabbits include clover, lespedezas, and twigs and bark of several woody species. The favorite foods of quail include seeds of a variety of lespedezas, blackberries, dogwood berries, cowpeas, millet, buckwheat, waste grain, clover, alfalfa, and a variety of insects.

Fox. Both the gray fox and the red fox inhabit Haywood County. Generally, the gray fox inhabits woodland and the red fox inhabits farmland. The foxes eat mice, rats, rabbits, songbirds, and a variety of cold-blooded vertebrates. They also eat grapes, corn, acorns, apples, pokeberries, and persimmons. Generally, practices that improve the habitat of small game species also benefit the habitat of foxes. Foxes can benefit farmers because a main component of their diet is mice and other rodents.

Grouse. Ruffed grouse is commonly seen in a variety of habitats in Haywood County. It commonly eats acorns, beechnuts, wild grapes, blackberries, tender leaves, strawberries, serviceberries, dogwood berries, the buds of beech, maple, and apple, and rose hips. The grouse requires some amount of evergreen cover, such as small patches of pine in warm, dry areas or thickets of rhododendron and laurel in cool, moist areas. In forested tracts, irregularly shaped clearcuts that are 1 to 5 acres in size provide areas where grouse can feed on a variety of insects, buds, grasses, forbs, and fruits. These cleared areas can provide a variety of foods to grouse for several years after the initial cutting operations.

Bobcat. Bobcat hunts mostly at night. It feeds on rabbits, mice, snakes, squirrels, woodchucks, and birds. Woodland cover is an important part of the bobcat's habitat. The bobcat prefers areas of very thick cover in which it can hide during the day.

Woodchuck. The woodchuck, or groundhog, has a large population in Haywood County and is popularly hunted. It lives in a variety of habitats, including pastures, fallow fields, grassy roadsides, cropland, and woodland. The woodchuck prefers areas that provide its favorite foods, including grasses, clovers, and a variety of annual plants. The woodchuck also feeds on apples, garden crops, and acorns. In Haywood County, the

feeding activities of woodchucks annually cause problems for garden crops.

Populations of woodchuck are important for other wildlife. Abandoned woodchuck dens can be used as homes for rabbits, foxes, raccoons, chipmunks, and snakes. The woodchuck also is an important part of the diets of foxes, bobcats, and various birds of prey.

Game fish. Because of the high elevations and woodland cover, cool water flows in the Pigeon River and in streams throughout Haywood County. Consequently, trout, including brown, rainbow, and brook trout, is the most abundant game fish in many watercourses in the county. Brook trout is the only trout species native to the mountain waters.

Trout habitat is affected by land and water uses. Erosion control and publicly supported pollution control are important for maintaining the productivity of existing trout waters and for cleaning potential trout waters. Protecting streams and waterways from siltation and various kinds of pollution helps to preserve trout fishery and can possibly increase the recreational fishery resource in Haywood County.

Haywood County has several trout ponds. Soils associated with trout farms are soils in coves, such as Saunook, Spivey, Tuckasegee, and Whiteoak soils, that have seeps, springs, and perennial branches for water supply. These soils have good filters and thus yield clean water. Other areas, such as areas of Dellwood soils, are on sandy flood plains along fast-moving, cool streams high in oxygen content and are also associated with trout production.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 10 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Examples of grasses and legumes are fescue, lovegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and pokeberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple *(9)*.

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

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are ponds and the edges of lakes.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include meadowlark, field sparrow, quail, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, and black bear.

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

Engineering

Howard Tew, engineer, Natural Resources Conservation Service, helped prepare this section.

The soils in the survey area are on a variety of slopes, ranging from the nearly level flood plains to the very steep mountains at elevations above 6,000 feet. They are used for a wide variety of purposes, ranging from the production of burley tobacco to sites for multiunit condominiums. Many areas of the soils can be easily developed using conventional engineering designs. Other areas require considerable specialized engineering designs and construction techniques to overcome certain soil limitations. The limitations of the soils must be considered when planning any engineering activity in order to prevent construction problems. Tables 11 through 18 can be used by planners to evaluate the limitations of soils at potential construction sites.

To effectively evaluate the soils for potential engineering or construction purposes, the factors that limit the use of the soils need to be considered. In the survey area several soil characteristics can cause engineering problems. Many of the characteristics are factors inherent to mountainous terrain and climate. Some of the most important are slope, erodibility, instability (such as poor bearing strength and poor shear strength), stoniness, depth to bedrock, action of freezing and thawing, and shrink-swell potential *(14)*.

Slope. Many of the soils in the survey area are on slopes that range from 15 to 95 percent. These slopes influence soil use and management in several ways, either directly or indirectly. The steeper the slope the greater the limitation. In the steeper areas, access roads require deeper cuts and longer fill slopes, buildings require stronger foundations, and septic tank absorption fields require special design. Some areas are unsuitable for development because of steep or very steep slopes.

Rainwater that runs off steep watersheds has high peak rates and flow velocities. Designs for water-control structures in the areas that have high runoff from these watersheds must meet exacting standards *(12)*. Ponds and sediment basins can be damaged or washed out if structures are not properly designed and constructed. Downstream damage caused by the failure of a structure and subsequent liability should be considered in planning a design.

Erodibility. Slope is the main factor contributing to the erosion of many soils on mountains. Surface cover is removed during construction, exposing the soil to erosion. Unless runoff is prevented from accumulating and flowing uncontrolled across construction sites, erosion will be severe. Excavation in areas of the sloping soils on mountains results in severe erosion and damage caused by offsite sediments if erosion-control measures are not used. Cuts and fills for construction are common in steep or very steep areas. Fill slopes may contain material consisting dominantly of saprolite and rock fragments. Because the saprolite can be very infertile and very strongly acid or extremely acid, establishing vegetation in areas of fill slopes to prevent excessive erosion can be difficult.

Instability. To support loads, such as high fills, buildings, or vehicular traffic, undisturbed soils need to have a certain inherent bearing strength. Undisturbed sloping soils also need a certain degree of shear strength to support their own weight. If a loading stress exceeds the bearing or shear strength, the soil may move unpredictably. Loading stresses exceed the bearing or shear strength of unstable soils much more quickly that of stable soils. Soils, like mechanical mechanisms, move more freely when lubricated. The soil is lubricated where it has a high concentration of mica. Mica appears as a shiny sparkle in soil material that is exposed to bright light, and it feels slick and greasy. The soil can also be lubricated by water. When the soil becomes saturated with water it tends to move away from the loading forces applied to it. Whether lubricated by natural particle characteristics or by water,

soils that move provide very little shear strength. Micaceous soils or soils subject to seeps and springs provide poor sites for construction because of the hazard of slippage or landslides. Fannin soils, which occur on side slopes of intermountain hills, have a high content of mica. Planning detailed engineering tests and designs prior to building on fill slopes is often required to prevent damage caused by settling and slope-related failures.

Landscapes in the north-central part of Haywood County are unstable and underlain by low-grade metasedimentary bedrock. Some of the soils in these areas are Cataska, Cheoah, Junaluska, Brasstown, Stecoah, and Soco soils. The underlying bedrock occurs as plates. The plates provide very little shear strength and tend to slide across one another when subjected to loading forces. The low-grade metasedimentary bedrock contains strata that have a high content of sulfur in some places. Excavating some soils, such as Cataska, Cheoah, Junaluska, Brasstown, Stecoah, and Soco soils, can expose the underlying strata and thus cause extremely acid runoff and the pollution of nearby streams by sediments. The result is an increase in stream acidity, which reduces water quality and may kill aquatic life.

In areas of moderately steep and very steep, unstable soils, excavating and constructing access roads across the slope can remove the lateral support holding the soils in place. Eventually, these soils may move downslope, causing damage to roads and other structures. The landslides along Interstate Highway 40 in the north-central part of the county occurred because unstable soils lost their lateral support.

Soils on flood plains at the headwaters of the Pigeon River, such as Rosman soils, are dominantly composed of fine sands or silts, have little natural plasticity, and can become unstable when saturated with water. The soil material, unless bound together by an adhesive of clay, flows in a thick slurry if subjected to excessive loading when wet. Excavating areas of these soils is difficult and can be dangerous because side walls tend to cave in and slough. Extensively shoring the walls is needed to prevent caving. The soil instability may also be caused by the shrinking and swelling of the subsoil as the soil water content fluctuates. Soil movement is a hazard to foundations and buried pipes. Special planning and proper design of footings, foundations, and underground utilities are required prior to construction.

Stoniness. Most of the soils on mountains contain rock fragments or large stones. Some soils in coves, such as Balsam and Spivey soils, are stony throughout. Other soils in coves, such as Tuckasegee, Whiteoak, and Saunook soils, have stones only in part of the profile. Some soils on flood plains, such as Dellwood, Cullowhee, and Nikwasi soils, contain or are underlain by smooth, water-rounded rocks that range from fine gravel to large cobbles. Other soils on flood plains, such as Rosman soils, do not have any stones to a depth of 40 inches or more. In some soils on mountains, such as Stecoah and Edneyville soils, the content of rock fragments ranges from low to 35 percent, by volume. In other soils on mountains, such as Cataska soils, it is more than 35 percent. In some places, it can vary greatly throughout the soil profile.

Fill material is needed for construction and development to provide firm foundations and impervious layers. An excess amount of rock fragments in fill material hinders compaction, and undesirable settlement, resulting in damage to structures, is likely to occur. Compaction of rocky soils cannot produce the homogeneous density required for the construction of earth dams and other water-retention structures. Shallow excavations and fine grading may be difficult in soils that have an excess amount of rock fragments. In some soils, such as Ashe, Cataska, Cleveland, and Craggey soils, deeper excavations may require blasting. The removal of rock from stony soils is expensive and time consuming.

When soils are analyzed for engineering purposes, special emphasis should be placed on stone content. The unified soil classification system only evaluates textures for that fraction of the soil passing the No. 200 sieve (grain size 0.074 millimeter or less). According to this system, a soil may be designated as SC (sand that has clayey fines) or CL (clay that has low plasticity) and thus indicated as an ideal soil for fill material that will respond acceptably to compaction. This soil, however, may be excessively stony and contain scattered large boulders and thus be unsuitable for use as fill. See the pedon descriptions given in the section "Classification of the Soils" for evidence of excessive stoniness. In these descriptions, soils that contain stones or rock fragments have defined percentages of gravel, stones, cobbles, channers, and flagstones or are described as skeletal. Onsite investigation may be necessary to determine actual conditions.

Bedrock. Most of the soils in the survey area are very deep or deep. Some soils, however, have hard bedrock at a depth of 10 to 40 inches. They include Ashe, Burton, Cleveland, Cataska, and Craggey soils. Other soils have soft bedrock at a depth of 20 to 40 inches. They include Chestnut, Soco, Cowee, and Junaluska soils. Soft bedrock can be excavated with difficulty using machinery. Hard bedrock requires blasting. The surfaces of these restrictive features are undulating,

and onsite investigations are needed prior to construction to determine topography. Material excavated from layers of soft bedrock is dry, brittle, and hard to pack. These layers are designated as Cr horizons in the section "Classification of the Soils."

Freezing and thawing. In the survey area, soils on south-facing slopes are continually subject to freezing and thawing from November through March. Repeated winter cycles of freezing and thawing cause heaving and sloughing in surface soil. Fine-grained soils are affected the most, and silty soils are the most susceptible to heaving. Frost action loosens the surface soil and thus can heave it above its normal position. Subsequent thawing can result in a near liquid state in the surface soil. Soils in this condition are subject to erosion and have little load-supporting strength. In areas of these soils, unprotected slopes are subject to extreme erosion and access roads become impassable.

Sometimes a thaw does not affect all of the frozen soil. The result is an unfrozen, heaved layer of soil material over frozen soil material. Soils in this condition are subject to severe erosion when water moves laterally across the frozen soil surface.

Frost heaving in areas of susceptible soils exerts considerable force on footings and foundations. Potential frost damage should be considered in the design of structures. Frozen soil resists compaction and should not be used in fill material if compacted densities are important. Depth of frost penetration varies throughout the survey area according to elevation. On north-facing slopes, frost penetrates to greater depths. The depth of frost penetration can be as much as 36 inches in some years at elevations above 5,000 feet.

Shrink-swell potential. The clay part of a soil shrinks and swells according to changes in soil moisture content. Braddock, Dillsboro, and Hemphill soils are subject to shrinking and swelling. If a soil has a low content of clay, visual inspection may be sufficient to determine a low shrink-swell potential. If a soil exhibits shrink-swell properties, however, mechanical analysis and tests on Atterberg limits are needed for accuracy. Tables 11 and 16 identify soils subject to shrinking and swelling.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

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

Building Site Development

Table 11 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 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a 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. The depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 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. The depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the local office of the North Carolina Cooperative Extension Service or the Haywood Soil and Water Conservation District.

Access Roads

Establishing access roads in the survey area has always been a problem, and many abandoned roads scar the slopes and valley bottoms. In some areas a new road is built along the path of an old one and thus 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. Both old and new 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 second homes and real estate developments. In all of these situations, the design of a low-cost, nonpolluting, and essentially self-maintaining road is needed (fig. 15). The trend is no longer to abandon unused roads but to maintain most roads through low or intermittent service.

The U.S. Forest Service has supported research and demonstrations on designs for forest access roads for more than 50 years at the Coweeta Hydrologic Laboratory in the Nantahala Mountains in Macon County, North Carolina. Early work demonstrated methods of roadbank stabilization that use brush and native grasses or weeds. Through a series of logging demonstrations, the design of a minimum standard, intermittent-use road was developed and tested. Features of this design are as follows:

1. All exposed soil is revegetated as construction progresses.
2. The exposure of bare soil is minimized by using

Figure 15.—A well designed access road minimizes soil erosion and the pollution of streams, helps to control runoff, and requires only minimal maintenance.

vertical cuts and by reducing roadbed width with the elimination of the inside ditch line.

3. Soils and geology are identified on maps, and construction practices are modified where unstable sites are located.

4. The siltation of permanent and intermittent streams is reduced by maintaining a filter strip of undisturbed soil between the road and the stream channel and by building at right angles across channels, always using bridges, open pipe, or stream-crossing fords with geotextile and gravel.

5. 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.

6. A covering is provided for loose soil in fills to help control erosion at critical points, such as stream crossings and dip outlets. Excelsior and burlap sheets or scattered branches, brush, cut weeds, or grass help to protect the soil until new grass is established.

7. Surface water is removed from the roadbed by outsloping and broad-based dips. Inside ditch lines are used only as needed to intercept subsurface flow out of the cutbank. Ditch lines that carry storm water tend to undermine the cutbank, become gullies, and require maintenance.

8. 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.

9. Maximum grade is restricted to 8 percent wherever possible.

10. Where roadbeds are not graveled, grass is planted on the entire roadway. Although traffic may kill grass in part of the roadbed, the rest of the roadbed will remain protected against erosion. Gravel is used on the steeper grades, on problem soils, or in high-traffic areas. Large, washed rock (3 inch nominal diameter) provides an effective erosion-control pavement on light-traffic roads. Gravel bonds best to the roadbed if it is added immediately after construction, when the soil is loose.

11. Required maintenance for access roads is increased by traffic in winter and early spring, when the soils are 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.

Although not every user follows these practices, the road design developed and tested at Coweeta Hydrologic Laboratory has influenced Federal, State, and forest industry guidelines and has helped to reduce erosion in areas of access roads and minimize the impact of sediments to land downslope from the roads and to mountain streams. The U.S. Forest Service incorporates features of the design in timber sale contracts and road construction specifications. Elements of the design also appear in guidelines for reducing nonpoint source pollution. Attachments to the example of a timber sale contract provided by the North Carolina Forest Service to private landowners and consulting foresters include many of the guidelines for access roads.

Forest industries adopted early the concept that a low-cost, intermittent-use road is a permanent and sound economic investment, and they tended away from the cycle of building and rebuilding temporary roads. In 1985, the Soil 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 usable access roads while minimizing environmental impact and cost.

Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

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

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

The animal waste lagoons commonly used in farming

operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench 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 may be obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as 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 13 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 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 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the 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* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the 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. These soils 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 13, 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 as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale, siltstone, and soft granite saprolite, are not considered to be sand and gravel.

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

Plant growth is affected by toxic material, such as material with a high content of sulfur, and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and proper applications of lime and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a 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 releases a variety of plant nutrients as it decomposes.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the soil maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about

5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, mica, or sulfur. The depth to a high water table affects the amount of usable material. It also affects trafficability.

Soils that have a high content of mica, such as Fannin soils, are poorly suited to use in the construction of embankments. The problems resulting from the high content of mica include difficulty in compaction, poor trafficability, susceptibility to erosion, and low shear strength. Also, piping commonly is a problem if these soils are used to impound water.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

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.

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. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to help control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. Maintenance of terraces and diversions is adversely affected by a restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, 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 *(19)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

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 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 18.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-

weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

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

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

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE)

to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.
8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very 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 to very 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 permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil listed in table 17 is assigned to two hydrologic groups, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams or by runoff from adjacent slopes. Shallow water standing or

flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential 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 dissolves 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 in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soil Mechanics Laboratory, Fort Worth, Texas, and by the North Carolina Department of Transportation and Highway Safety, Materials and Test Unit, Raleigh, North Carolina.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are Unified classification—D 2487 (ASTM); AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in the survey area.

Factors of Soil Formation

Soils are formed by processes of the environment acting upon geologic parent materials. The major parent materials in the survey area are felsic to mafic high-grade metamorphic and igneous rocks, low-grade metasedimentary rocks, and colluvium and alluvium derived from these rocks. The characteristics of a soil are determined by the combined influence of parent material, climate, plant and animal life, relief, and time. These five factors are responsible for the profile development and chemical properties of the different soils *(5)*.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. In the survey area, the parent material is a major factor in determining what kind of soil forms and can be correlated with geologic formations to some degree. The general soil map can be used as an approximate guide to the geology of the survey area.

The soils in the Wayah, Plott-Edneyville-Chestnut, Evard-Cowee-Hayesville-Trimont, and Saunook general soil map units formed in materials weathered from felsic to mafic high-grade metamorphic and igneous rocks, such as hornblende gneiss, gneiss, mica gneiss, and granite. The soils in the Soco-Stecoah-Cheoah, Brasstown-Junaluska-Whiteoak, and Oconaluftee general soil map units formed in materials weathered from low-grade metasedimentary rocks, such as metasandstone, phyllite, and slate. The soils in the Dillsboro-Dellwood-Braddock general soil map unit formed in materials weathered from alluvium deposited by streams.

Climate

Climate, particularly precipitation and temperature, affects the physical, chemical, and biological relationships in soil. It influences the rate at which rocks weather and organic matter decomposes. The amount of leaching in a soil is related to the amount of rainfall and the movement of water through the soil. The effects of climate also control the kinds of plants and animals living in and on the soil. Temperature influences the rate of growth of organisms and the speed of chemical and physical reactions in the soil.

Climate varies greatly according to differences in elevation and landscape position. Localized microclimates are important in the soil-forming processes in the survey area. The climate in any specific place is influenced by elevation, aspect, and the moisture-rich winds from the Gulf of Mexico. Annual rainfall varies significantly throughout the survey area. In some areas where the amount of rainfall is high, the monthly precipitation may exceed the monthly evapotranspiration during most years. In the areas of high mountains that have higher amounts of rainfall and cooler temperatures, the soils are brown, are medium textured, and have a surface layer with a high content of organic matter. In the areas of low mountains that have warmer temperatures, the soils, except those that are seasonally wet, have a lower content of organic matter in the surface layer, are redder, and contain more clay in the subsoil than the soils of high mountains.

Plant and Animal life

Plants and animals influence the formation and differentiation of soil horizons. The type and number of organisms in and on the soil are determined in part by climate and in part by the nature of the soil material, relief, and the age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic material.

Animals convert complex compounds into simpler forms, add organic matter to the soil, and modify certain chemical and physical properties of the soil. In the survey area, most of the organic material accumulates on the surface. It is acted upon by micro-organisms, fungi, earthworms, and other forms of life and by direct chemical reaction. It is mixed with the uppermost

mineral part of the soil by the activities of earthworms and other small invertebrates.

Plants largely determine the kinds and amounts of organic matter that are added to a soil under normal conditions and the way in which the organic matter is added. In this survey area, plants do not bring enough bases to the surface to counteract the acidification resulting from the microbial decomposition of organic matter. Generally, the soils in the survey area all developed under a hardwood forest. Trees took up elements from the subsoil and added organic matter to the soil by depositing leaves, roots, twigs, and other plant remains on the surface. The material deposited on the surface was acted upon by organisms and underwent chemical reaction.

Generally, organic material decomposes more rapidly in the soils on low mountains that have moderate temperatures and receive direct sunlight. The content of organic matter, however, is lower in these soils that in the soils at the cooler, higher elevations. The soils on high mountains or on aspects that are shaded from direct sunlight do not become as warm as the soils on low mountains and thus can maintain a high content of organic matter in the surface layer.

Relief

Relief causes differences in drainage, surface runoff, soil temperature, and the extent of geologic erosion. Relief in the survey area varies greatly. It is a result of mountain building, slope retreat, and dissection of the original land surface by major streams and tributaries. Slopes in the survey area range from 0 to 95 percent.

Soils in steeply sloping areas have a higher rate of runoff, which reduces the percolation of water through the profile. A high water table generally is associated with nearly level or gently sloping soils. Soils in alluvial and colluvial areas, such as Dellwood and Saunook soils, are commonly less sloping and receive runoff from the surrounding uplands.

Soil creep is an important factor in soil formation on mountainous terrain. Generally, the upper part of most soils on side slopes formed in material that is slowly moving downslope from higher areas. 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 as distance down the slope increases, especially in concave areas. Maximum soil thickness occurs in colluvial areas in coves and along toe slopes and in thick deposits of alluvium on flood plains *(10)*.

Time

The length of time that soil material has been exposed to the soil-forming processes accounts for some differences between soils. The formation of a well defined soil profile, however, also depends on other factors. Less time is required for a profile to develop in a warm climate than in a cool climate.

The soils in the survey area vary considerably in age. The length of time that a soil has been forming is reflected in the profile. The young soils in the survey area are the result of two contrasting processes. On the steeper slopes, natural erosion and soil creep continually remove surface materials, exposing the less weathered underlying materials. The eroded materials are frequently deposited on the flood plains, and thus a new surface is created. In both cases, the development of the subsoil is weak. The oldest soils, such as Braddock, Dillsboro, and Hayesville soils, that have a developed clayey subsoil are on intermountain hills and high stream terraces. In these areas, the surface does not rapidly erode and new material is not frequently deposited.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(16)*. 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 laboratory measurements on samples taken from the soil. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid climate, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizon development, plus *udult*, the suborder of the Ultisols that occurs in humid climates).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the underlying material within a series. The Cowee series is an example of fine-loamy, mixed, mesic Typic Hapludults in the survey area.

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described, and coordinates commonly are identified by the State plane grid system or by longitude and latitude. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(20)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(16)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Ashe Series

The Ashe series consists of moderately deep, somewhat excessively drained, moderately rapidly permeable soils. These soils are adjacent to rock outcrops on narrow ridges and south- and west-facing side slopes of low and intermediate mountains. They formed in residuum affected by soil creep that weathered from felsic or intermediate high-grade metamorphic or igneous rock, such as granite, granite gneiss, hornblende gneiss, and mica gneiss. Slope ranges from 30 to 95 percent. Elevation ranges from 2,500 to 4,800 feet. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Ashe soils are commonly adjacent to Chestnut, Cleveland, Cullasaja, Edneyville, and Tuckasegee soils. Chestnut soils are moderately deep to soft bedrock. Cleveland soils are shallow to hard bedrock. Edneyville, Cullasaja, and Tuckasegee soils are very deep. Tuckasegee and Cullasaja soils formed in colluvium on toe slopes, on benches, and in drainageways.

Typical pedon of Ashe gravelly sandy loam in an area of Rock outcrop-Ashe-Cleveland complex, 30 to 95 percent slopes; about 0.6 mile east of Crabtree-Ironduff School on Secondary Road 1503 to a farm road, 0.55 mile north on the farm road, 300 feet west in a wooded area (State plane coordinates 699,000 feet N., 834,000 feet E.):

Oe—1 inch to 0; partially decomposed leaves and twigs.

A—0 to 2 inches; dark brown (10YR 4/3) gravelly sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; many very fine to medium pores; many very fine to medium and common coarse roots; about 15 percent gravel and 3 percent cobbles, by volume; common fine flakes of mica; very strongly acid; clear smooth boundary.

Bw1—2 to 18 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; few very fine to medium pores; few very fine and common fine and medium roots; about 10 percent gravel and 3 percent cobbles, by volume; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Bw2—18 to 28 inches; dark yellowish brown (10YR 4/6) gravelly sandy loam; weak fine subangular blocky structure; friable; few fine pores; few very fine and fine roots; common fine flakes of mica; about 20 percent gravel and 5 percent cobbles, by volume; very strongly acid; abrupt smooth boundary.

R—28 inches; unweathered, felsic high-grade metamorphic or igneous bedrock.

The thickness of the solum ranges from 14 to 31 inches. The depth to hard bedrock ranges from 20 to 40 inches. Gravel and cobbles make up 15 to 35 percent of the A horizon and 5 to 35 percent of the other horizons. Flakes of mica are few or common. The soils range from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 6. Where it has value of 3 and chroma of 2 or 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The C horizon is saprolite that weathered from felsic or intermediate high-grade metamorphic or igneous rock, such as granite, granite gneiss, hornblende gneiss, or mica gneiss. It is multicolored or has colors similar to those of the Bw horizon. It is sandy loam, fine sandy loam, loam, loamy sand, or loamy fine sand in the fine-earth fraction.

The R horizon is unweathered, felsic or intermediate high-grade metamorphic or igneous bedrock.

Balsam Series

The Balsam series consists of very deep, well drained, moderately rapidly permeable soils. These soils are in drainageways, in coves, and on fans and benches of high mountains. They formed in colluvial materials weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite gneiss, mica gneiss, and hornblende gneiss. Slope ranges from 8 to 50 percent. Elevation is more than 4,800 feet. The soils are loamy-skeletal, mixed, frigid Typic Haplumbrepts.

Balsam soils are commonly adjacent to Burton, Craggey, Tanasee, and Wayah soils. Burton soils are moderately deep, and Craggey soils are shallow. Burton, Craggey, and Wayah soils formed in residuum on ridges and side slopes. Tanasee and Wayah soils are coarse-loamy.

Typical pedon of Balsam cobbly loam in an area of Tanasee-Balsam complex, 30 to 50 percent slopes, very stony; about 4.6 miles east along the Blue Ridge Parkway from the intersection of U.S. Highway 19/23 and the parkway at Balsam Gap, 100 feet west of the parkway in a wooded area (State plane coordinates 632,500 feet N., 794,000 feet E.):

Oe—1 inch to 0; mat of roots and partially decomposed twigs, leaves, and needles.

A1—0 to 12 inches; black (10YR 2/1) cobbly loam, dark brown (10YR 3/3) dry; weak fine and medium granular structure; very friable; many fine to coarse roots; about 10 percent gravel, 15 percent cobbles, and 10 percent stones, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

A2—12 to 17 inches; very dark grayish brown (10YR 3/2) cobbly loam, brown (10YR 4/3) dry; weak fine and medium granular structure; very friable; many fine, common medium, and few coarse roots; about 10 percent gravel, 15 percent cobbles, and 15 percent stones, by volume; few fine flakes of mica; strongly acid; clear wavy boundary.

Bw1—17 to 35 inches; yellowish brown (10YR 5/6) very cobbly loam; weak fine and medium subangular blocky structure; friable; few fine and medium roots; about 15 percent gravel, 30 percent cobbles, and 15 percent stones, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bw2—35 to 60 inches; dark yellowish brown (10YR 4/6) very cobbly sandy loam; weak fine subangular blocky structure; friable; few fine and medium roots; about 15 percent gravel, 30 percent cobbles, and 20 percent stones, by volume; few fine flakes of mica; strongly acid.

The thickness of the solum ranges from 40 to 72 inches. Gravel, cobbles, and stones make up 35 to 70 percent, by volume, of the profile. Flakes of mica are few or common. The soils range from extremely acid to moderately acid unless limed.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It ranges from 10 to 20 inches in thickness.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 4 to 8. It is fine sandy loam, sandy loam, or loam in the fine-earth fraction.

The BC horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, sandy loam, coarse sandy loam, or loam in the fine-earth fraction.

The C horizon, if it occurs, is variable in color. It is fine sandy loam, sandy loam, coarse sandy loam, loamy sand, or loamy coarse sand in the fine-earth fraction.

The Balsam soils in map units TeC2 and TeD2 are considered taxadjuncts to the series because they have a surface layer that is slightly thinner than that defined for the series.

Braddock Series

The Braddock series consists of very deep, well drained, moderately permeable soils (fig. 16). These soils are on high stream terraces, foot slopes, and colluvial fans. They formed in colluvium or old alluvium derived from materials weathered from a mixture of felsic to mafic high-grade metamorphic or igneous rock. Slope ranges from 2 to 30 percent. Elevation ranges from 2,000 to 3,000 feet. The soils are clayey, mixed, mesic Typic Hapludults.

Braddock soils are commonly adjacent to Dillsboro, Hayesville, and Saunook soils. Dillsboro soils have a dark surface layer and a subsoil that has hue of 5YR to 10YR. Hayesville soils formed in residuum on ridges and side slopes. They have a C horizon of saprolite. Saunook soils formed in colluvium in coves and drainageways. They are fine-loamy.

Typical pedon of Braddock clay loam, 2 to 8 percent slopes, eroded; about 1.0 mile south of Clyde on Secondary Road 1819 to the intersection of Secondary Road 1819 and Secondary Road 1823, about 0.2 mile north on Secondary Road 1819, about 160 feet west in a field (State plane coordinates 665,000 feet N., 837,000 feet E.):

Ap—0 to 6 inches; yellowish red (5YR 4/6) clay loam, yellowish red (5YR 5/6) dry; moderate medium granular structure; friable; few very fine pores; many very fine and fine roots; about 5 percent rounded cobbles, by volume; few fine flakes of mica; slightly acid; abrupt smooth boundary.

Bt—6 to 31 inches; red (2.5YR 4/6) clay; moderate fine and medium angular blocky structure; firm; common very fine pores; common very fine and few fine roots; few distinct dark red (2.5YR 3/6) clay films on faces of peds and in pores; few fine flakes of mica; slightly acid; gradual wavy boundary.

BC—31 to 40 inches; red (2.5YR 4/8) clay loam; few fine prominent yellow (10YR 7/8) mottles; massive; friable; few very fine roots; common fine flakes of mica; strongly acid; gradual wavy boundary.

C1—40 to 49 inches; yellowish red (5YR 5/8) loam; few fine distinct yellow (10YR 7/8) and few fine distinct red (2.5YR 4/8) mottles; massive; friable; common fine flakes of mica; strongly acid; gradual irregular boundary.

C2—49 to 60 inches; multicolored loam; massive; friable; many fine flakes of mica; moderately acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is more than 60 inches. Gravel and cobbles make up 0 to 15 percent, by volume, of the A horizon, 0 to 35 percent of the B horizon, and 0 to 50 percent of the C horizon. Flakes of mica are few or common. The soils range from extremely acid to strongly acid unless limed.

The A or Ap horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6.

The Bt horizon has hue of 10R or 2.5YR, value of 3 to 5, and chroma of 6 to 8. It is clay loam or clay in the fine-earth fraction.

The BC horizon, if it occurs, has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam or sandy clay loam in the fine-earth fraction.

The C horizon is multicolored or has hue of 2.5YR to 7.5YR, value of 4 to 8, and chroma of 3 to 8. It is sandy clay loam, clay loam, or loam in the fine-earth fraction.

Brasstown Series

The Brasstown series consists of deep, well drained, moderately permeable soils. These soils are on ridges and side slopes of intermountain hills and low mountains. They formed in residuum affected by soil creep that weathered from low-grade metasedimentary rock, such as phyllite, slate, quartzite, and thinly bedded metasandstone. Slope ranges from 8 to 50 percent. Elevation ranges from 1,500 to 3,500 feet. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Brasstown soils are commonly adjacent to Junaluska, Soco, Spivey, Stecoah, and Whiteoak soils. Junaluska and Soco soils are moderately deep to soft bedrock. Soco and Stecoah soils are coarse-loamy. Spivey and Whiteoak soils formed in colluvium in coves and drainageways.

Typical pedon of Brasstown channery loam in an area of Brasstown-Junaluska complex, 30 to 50 percent slopes; about 2.0 miles west from the Harmon Den Exit of Interstate Highway 40 on U.S. Forest Service Road 288 to Hicks Cemetery, 150 feet northwest of the road in a wooded area (State plane coordinates 746,000 feet N., 803,000 feet E.):

Oi—1 inch to 0; leaves and twigs.

A—0 to 4 inches; brown and dark brown (10YR 4/3) channery loam, light yellowish brown (10YR 6/4) dry; weak medium granular structure; very friable; common medium pores; common very fine and fine and few medium and coarse roots; about 15 percent channers, by volume; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

E—4 to 7 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; very friable; many very fine and fine and common medium pores; common very fine to medium and few coarse roots; about 10 percent channers, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt1—7 to 13 inches; yellowish red (5YR 4/6) loam; weak fine and medium subangular blocky structure; friable; common very fine and few fine and medium pores; common very fine and fine and few medium roots; few distinct yellowish red (5YR 5/8) clay films on faces of peds; about 5 percent channers, by volume; few fine flakes of mica; very strongly acid; gradual irregular boundary.

Bt2—13 to 31 inches; red (2.5YR 4/6) loam; moderate fine and medium blocky structure; friable; common very fine and few fine and medium pores; few very fine to coarse roots; few distinct yellowish red (5YR 5/8) clay films on faces of peds; about 5 percent channers, by volume; few fine flakes of mica; very strongly acid; gradual irregular boundary.

CB—31 to 45 inches; yellowish red (5YR 5/6) silt loam; few distinct red (2.5YR 4/6) mottles; massive; very friable; few very fine to medium roots; about 10 percent channers, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

Cr—45 to 60 inches; weathered, multicolored low-grade metasedimentary bedrock that can be dug with difficulty with a spade.

The thickness of the solum ranges from 26 to 55 inches. The depth to soft bedrock is 40 to 60 inches. Rock fragments, dominantly channers and a few flagstones, make up 5 to 35 percent, by volume, of the profile. Flakes of mica are few or common. The soils range from extremely acid to moderately acid unless limed.

The A horizon has hue of 7.5YR and 10YR, value of 3 to 5, and chroma of 2 to 6. Where it has value of 3 and chroma of 2 or 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, loam, or silt loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, clay loam, sandy clay loam, or silt loam in the fine-earth fraction.

The CB or BC horizon has colors similar to those of the Bt horizon. It is loam, fine sandy loam, or silt loam in the fine-earth fraction.

The C horizon, if it occurs, is multicolored saprolite. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The Cr horizon is multicolored, weathered, fractured low-grade metasedimentary rock that is partially consolidated but can be dug with difficulty with a spade.

Burton Series

The Burton series consists of moderately deep, well drained, moderately rapidly permeable soils. These soils are on ridges and side slopes of high mountains. They formed in residuum affected by soil creep that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite gneiss, mica gneiss, and hornblende gneiss. Slope ranges from 8 to 30 percent. Elevation is more than 4,800 feet. The soils are coarse-loamy, mixed, frigid Typic Haplumbrepts.

Burton soils are commonly adjacent to Balsam, Craggey, Tanasee, and Wayah soils. Balsam and Tanasee soils formed in colluvium in drainageways and coves. Balsam, Tanasee, and Wayah soils are very

deep. Craggey soils are shallow to hard bedrock.

Typical pedon of Burton gravelly loam in an area of Burton-Craggey-Rock outcrop complex, windswept, 8 to 30 percent slopes, stony; at Reinhart Knob on the Blue Ridge Parkway, 300 feet east of the parkway along the trail, 10 feet south of the trail in a wooded area (State plane coordinates 806,000 feet N., 806,000 feet E.):

Oe—1 inch to 0; partially decomposed needles, leaves, and twigs.

A1—0 to 7 inches; black (10YR 2/1) gravelly loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; very friable; many fine and medium and few coarse roots; about 10 percent gravel, 2 percent cobbles, and 3 percent stones, by volume; common fine flakes of mica; extremely acid; gradual wavy boundary.

A2—7 to 14 inches; very dark grayish brown (10YR 3/2) gravelly loam, brown (10YR 4/3) dry; weak medium granular structure; very friable; many fine and medium and few coarse roots; about 11 percent gravel, 2 percent cobbles, and 2 percent stones, by volume; common fine flakes of mica; very strongly acid; clear smooth boundary.

Bw—14 to 26 inches; dark yellowish brown (10YR 4/6) gravelly sandy loam; weak fine and medium subangular blocky structure; friable; few fine to coarse roots; about 10 percent gravel, 5 percent cobbles, and 2 percent stones, by volume; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—26 to 32 inches; yellowish brown (10YR 5/4) cobbly sandy loam; massive; very friable; few fine roots; about 15 percent gravel, 10 percent cobbles, and 2 percent stones, by volume; common fine flakes of mica; strongly acid; clear wavy boundary.

R—32 inches; unweathered, felsic to mafic high-grade metamorphic or igneous bedrock.

The thickness of the solum ranges from 20 to 39 inches. The depth to hard bedrock ranges from 20 to 40 inches. Gravel, cobbles, and stones make up 5 to 35 percent, by volume, of the A and B horizons and as much as 50 percent of the C horizon. Flakes of mica are few or common. The soils range from extremely acid to moderately acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It ranges from 10 to 20 inches in thickness.

The Bw horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 4 to 8. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction. The BC horizon has colors and textures similar to those of the Bw horizon.

The C horizon, if it occurs, is saprolite consisting of fine sandy loam, sandy loam, loam, loamy sand, or loamy fine sand in the fine-earth fraction. It is multicolored or has colors similar to those of the Bw horizon.

The R horizon is unweathered, felsic to mafic high-grade metamorphic or igneous bedrock, such as granite gneiss, mica gneiss, and hornblende gneiss.

Cataska Series

The Cataska series consists of shallow, excessively drained, moderately rapidly permeable or rapidly permeable soils. These soils are on main ridges, spur ridges, and south- and west-facing side slopes of low and intermediate mountains. They formed in residuum affected by soil creep that weathered from low-grade metasedimentary rock, such as slate, phyllite, and metasandstone. Slope ranges from 50 to 95 percent. Elevation ranges from 1,500 to 4,800 feet. The soils are loamy-skeletal, mixed, mesic, shallow Typic Dystrochrepts.

Cataska soils are commonly adjacent to Soco, Spivey, Stecoah, and Whiteoak soils. Soco soils are moderately deep to soft bedrock. Stecoah soils are deep to soft bedrock. Spivey and Whiteoak soils are very deep. They formed in colluvium in drainageways and coves.

Typical pedon of Cataska channery silt loam in an area of Soco-Cataska-Rock outcrop complex, 50 to 95 percent slopes; about 1.75 miles west of the Harmon Den Exit on Interstate Highway 40 to U.S. Forest Service road, 0.25 mile north along the road parallel to Ground Hog Creek to a dead end, 300 feet north in a wooded area along a trail (State plane coordinates 756,000 feet N., 804,000 feet E.):

Oe—1 inch to 0; partially decomposed leaves, twigs, and needles.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; common very fine and fine and few medium and coarse pores; many very fine to medium and common coarse roots; about 20 percent channers and 3 percent flagstones, by volume; very strongly acid; clear smooth boundary.

Bw—3 to 16 inches; yellowish brown (10YR 5/6) very channery silt loam; weak fine subangular blocky structure; friable; few fine and medium pores; common very fine to medium roots; about 35 percent channers and 15 percent flagstones, by volume; very strongly acid; gradual wavy boundary.

Cr—16 to 29 inches; multicolored, weathered, highly fractured low-grade metasedimentary bedrock; yellowish brown (10YR 5/6) silt loam in fractures;

partially consolidated but can be dug with difficulty with a spade.
R—29 inches; unweathered, fractured low-grade metasedimentary bedrock.

The thickness of the solum ranges from 12 to 20 inches. The depth to soft bedrock is 12 to 20 inches. Hard, tilted, fractured, thinly bedded low-grade metasedimentary bedrock is at a depth of 20 to 40 inches. Channers and flagstones make up 15 to 35 percent of the A horizon and 35 to 80 percent of the B horizon. The quantity of flakes of mica ranges from none to common. The soils are extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. Where it has value of 3 and chroma of 2 or 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam or silt loam.

The Cr horizon is tilted, weathered, highly fractured low-grade metasedimentary rock that has soil material between the fractures. It can be dug with difficulty with a spade.

The R horizon is unweathered, fractured low-grade metasedimentary bedrock.

Cheoah Series

The Cheoah series consists of deep, well drained, moderately rapidly permeable soils. These soils are on north- and east-facing side slopes of intermediate mountains. They formed in residuum affected by soil creep that weathered from low-grade metasedimentary rock, such as slate, phyllite, and thinly bedded metasandstone. Slope ranges from 30 to 95 percent. Elevation ranges from 3,500 to 4,800 feet. The soils are coarse-loamy, mixed, mesic Typic Haplumbrepts.

Cheoah soils are commonly adjacent to Soco, Spivey, Stecoah, and Whiteoak soils. Spivey and Whiteoak soils are very deep. They formed in colluvium in drainageways and coves. Stecoah and Soco soils have an ochric epipedon. They are on the warmer aspects.

Typical pedon of Cheoah channery loam, 50 to 95 percent slopes; about 4.0 miles southwest of Maggie Valley on U.S. Highway 19 to Secondary Road 1300, about 2.0 miles west-northwest on Secondary Road 1300 to Long Branch Road, 0.4 mile west on Long Branch Road to a gravel road, 0.3 mile southeast on the gravel road, 100 feet southwest of the road in a wooded area (State plane coordinates 669,000 feet N., 763,000 feet E.):

Oe—2 inches to 0; partially decomposed leaves and twigs.
A—0 to 15 inches; black (10YR 2/1) channery loam, dark brown (10YR 3/3) dry; weak fine granular structure; very friable; many very fine to medium and common coarse roots; about 15 percent channers and 3 percent flagstones, by volume; few fine flakes of mica; moderately acid; gradual wavy boundary.
Bw—15 to 35 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; few fine to coarse roots; about 4 percent channers and 7 percent flagstones, by volume; few fine flakes of mica; moderately acid; gradual wavy boundary.
CB—35 to 47 inches; yellowish brown (10YR 5/4) channery loam; massive; friable; about 25 percent channers and 5 percent flagstones, by volume; few fine flakes of mica; strongly acid; gradual irregular boundary.
C—47 to 51 inches; olive brown (2.5Y 4/4) very channery fine sandy loam; massive; friable; about 30 percent channers and 15 percent flagstones, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.
Cr—51 to 60 inches; olive brown (2.5Y 4/4), weathered low-grade metasedimentary bedrock that is partially consolidated but can be dug with difficulty with a spade.

The thickness of the solum ranges from 30 to 59 inches. The depth to soft, fractured bedrock is 40 to 60 inches. The depth to hard bedrock is more than 60 inches. Channers and flagstones commonly make up 15 to 30 percent, by volume, of the profile but range from 5 to 35 percent. Flakes of mica are few or common. The soils range from extremely acid to strongly acid in the A horizon and from extremely acid to moderately acid in the B and C horizons.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It ranges from 10 to 20 inches in thickness.

The Bw horizon and the CB or BC horizon, if it occurs, have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. They are fine sandy loam, loam, or silt loam in the fine-earth fraction.

The C horizon is multicolored or has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is loam, silt loam, sandy loam, or fine sandy loam in the fine-earth fraction.

The Cr horizon is weathered low-grade metasedimentary rock that is partly consolidated and can be dug with difficulty with a spade.

Chestnut Series

The Chestnut series consists of moderately deep, well drained, moderately rapidly permeable soils. These

soils are on south- and west-facing ridges and side slopes of intermediate mountains. They formed in residuum affected by soil creep that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite, granite gneiss, hornblende gneiss, and schist. Slope ranges from 8 to 95 percent. Elevation ranges from 3,500 to 4,800 feet. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Chestnut soils are commonly adjacent to Ashe, Cleveland, Cullasaja, Edneyville, Plott, and Tuckasegee soils. Ashe soils are moderately deep to hard bedrock. Cleveland soils are shallow to hard bedrock. Edneyville soils are very deep to soft bedrock. Cullasaja, Plott, and Tuckasegee soils are very deep. Cullasaja and Tuckasegee soils formed in colluvium on toe slopes, on benches, and in coves. Plott soils have an umbric epipedon. They are in landscape positions above those of the Chestnut soils or are on north- or east-facing slopes.

Typical pedon of Chestnut gravelly loam in an area of Edneyville-Chestnut complex, 30 to 50 percent slopes, stony; about 1.0 mile north of the intersection of U.S. Highway 19/23 and Eagles Nest Road, along Eagles Nest Road to the entrance gate of Eagles Nest Development, 1.5 miles beyond gate along a private paved road to the first access road on the right, 200 feet north of the intersection in a wooded area (State plane coordinates 659,000 feet N., 801,000 feet E.):

A—0 to 4 inches; dark brown (10YR 3/3) gravelly loam, light yellowish brown (10YR 6/4) dry; weak fine and medium granular structure; very friable; common very fine and fine pores; many very fine to medium roots; about 15 percent gravel, by volume; few fine flakes of mica; extremely acid; clear smooth boundary.

Bw—4 to 21 inches; dark yellowish brown (10YR 4/6) gravelly loam; weak fine and medium subangular blocky structure; friable; few very fine and fine pores; common very fine to medium roots; about 18 percent gravel, by volume; common fine flakes of mica; extremely acid; gradual wavy boundary.

C—21 to 30 inches; yellowish brown (10YR 5/6) gravelly sandy loam; common medium distinct dark yellowish brown (10YR 7/4) and common medium distinct strong brown (7.5YR 5/8) mottles; massive; friable; common fine and few medium flakes of mica; about 30 percent gravel, by volume; extremely acid; gradual wavy boundary.

Cr—30 to 60 inches; weathered, multicolored high-grade metamorphic or igneous bedrock that is partially consolidated but can be dug with difficulty with a spade.

The thickness of the solum ranges from 17 to 39 inches. The depth to soft bedrock ranges from 20 to 40 inches (fig. 17). Gravel and cobbles make up 5 to 35 percent of the profile. Flakes of mica are few or common. The soils range from extremely acid to moderately acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 2 to 6. Where it has value and chroma of 2 or 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction. Some pedons have thin subhorizons of sandy clay loam.

The C horizon is similar in color to the Bw horizon or is multicolored. It is saprolite consisting of sandy loam, fine sandy loam, or loamy sand in the fine-earth fraction.

The Cr horizon is weathered, felsic to mafic high-grade metamorphic or igneous rock that is partially consolidated but can be dug with difficulty with a spade.

Cleveland Series

The Cleveland series consists of shallow, somewhat excessively drained, moderately rapidly permeable soils (fig. 18). These soils are adjacent to rock outcrops on spur ridges and south- and west-facing side slopes of low and intermediate mountains. They formed in residuum affected by soil creep that weathered from felsic to intermediate high-grade metamorphic or igneous rock, such as granite, granite gneiss, and hornblende gneiss. Slope ranges from 30 to 95 percent. Elevation ranges from 2,500 to 4,800 feet. The soils are loamy, mixed, mesic Lithic Dystrochrepts.

Cleveland soils are commonly adjacent to Ashe, Chestnut, Cullasaja, Edneyville, and Tuckasegee soils. Ashe soils are moderately deep to hard bedrock. Chestnut soils are moderately deep to soft bedrock. Cullasaja, Edneyville, and Tuckasegee soils are very deep. Cullasaja and Tuckasegee soils formed in colluvium in drainageways and coves.

Typical pedon of Cleveland gravelly sandy loam in an area of Rock outcrop-Ashe-Cleveland complex, 30 to 95 percent slopes; about 0.6 mile east of Crabtree-Ironduff School on Secondary Road 1503, about 0.55 mile north on a farm road, 350 feet west in a wooded area (State plane coordinates 699,000 feet N., 834,000 feet E.):

Oi—1 inch to 0; slightly decomposed leaves and twigs.

A—0 to 3 inches; dark yellowish brown (10YR 3/4) gravelly sandy loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; common very fine to medium pores; many very fine to medium and few coarse roots; about 15 percent gravel, 2 percent cobbles, and 1 percent stones, by

volume; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bw—3 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine subangular blocky structure; friable; few fine and medium pores; common fine to coarse roots; about 5 percent gravel, 1 percent cobbles, and 1 percent stones, by volume; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

R—12 inches; unweathered, felsic high-grade metamorphic or igneous bedrock.

The thickness of the solum ranges from 10 to 20 inches. The depth to hard bedrock is 10 to 20 inches. Gravel, cobbles, and stones make up 15 to 35 percent, by volume, of the A horizon and 5 to 35 percent of the other horizons. The control section has few or common flakes of mica. The soils range from very strongly acid to moderately acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 4. Where it has value and chroma of 2 or 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The R horizon is unweathered, felsic to mafic high-grade metamorphic or igneous bedrock.

Cowee Series

The Cowee series consists of moderately deep, well drained, moderately permeable soils. These soils are on ridges and side slopes of intermountain hills and low mountains. They formed in residuum affected by soil creep that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite, hornblende gneiss, and schist. Slope ranges from 15 to 95 percent. Elevation ranges from 2,500 to 3,500 feet. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Cowee soils are commonly adjacent to Chestnut, Edneyville, Evard, Fannin, Hayesville, and Saunook soils. Edneyville and Chestnut soils are coarse-loamy. Fannin soils are micaceous. Hayesville soils are clayey. Evard and Saunook soils are very deep. Saunook soils formed in colluvium in coves and drainageways.

Typical pedon of Cowee gravelly sandy loam in an area of Evard-Cowee complex, 50 to 95 percent slopes, stony; about 4.0 miles east of Canton on U.S. Highway 19/23 to Secondary Road 1200, about 0.1 mile north on Secondary Road 1200 to Secondary Road 1438, about 0.3 mile west on Secondary Road 1438 to Ashebrooke Estates Road, 0.6 mile on the left fork, 100 feet east of the road in a wooded area (State plane coordinates 676,000 feet N., 875,000 feet E.):

Oi—5 inches to 1 inch; leaves and twigs.

Oe—1 inch to 0; partially decomposed leaves and twigs and mat of roots.

A—0 to 3 inches; dark yellowish brown (10YR 4/4) gravelly loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; many very fine to coarse pores; many very fine to coarse roots; about 15 percent gravel, by volume; few fine flakes of mica; moderately acid; clear smooth boundary.

E—3 to 6 inches; strong brown (7.5YR 5/6) gravelly loam; weak fine granular structure; very friable; many very fine to coarse pores; many very fine to coarse roots; about 15 percent gravel, by volume; few fine flakes of mica; moderately acid; clear smooth boundary.

BE—6 to 11 inches; yellowish red (5YR 5/8) gravelly loam; weak medium subangular blocky structure; friable; common very fine to coarse pores; common very fine to coarse roots; about 25 percent gravel, by volume; common fine flakes of mica; moderately acid; clear wavy boundary.

Bt—11 to 24 inches; red (2.5YR 4/8) clay loam; weak medium subangular blocky structure; friable; few very fine to medium pores; few very fine to medium roots; few faint red (2.5YR 4/6) clay films on faces of peds; about 10 percent gravel, by volume; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—24 to 28 inches; red (2.5YR 4/8) sandy clay loam; common pockets of multicolored saprolite of sandy loam; weak medium subangular blocky structure; friable; few very fine pores; few very fine roots; about 10 percent gravel, by volume; common fine flakes of mica; moderately acid; abrupt wavy boundary.

Cr—28 to 60 inches; weathered, multicolored high-grade metamorphic or igneous bedrock that is partially consolidated but can be dug with difficulty with a spade.

The thickness of the solum ranges from 15 to 39 inches. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. Gravel and cobbles make up 5 to 35 percent, by volume, of the profile. Flakes of mica are few or common. The soils range from extremely acid to moderately acid unless limed.

The A horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 2 to 6. Where it has value of 2 or 3, the horizon is less than 6 inches thick.

The E horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy loam, or fine sandy loam in the fine-earth fraction.

The BE horizon or the BA horizon, if it occurs, has

hue of 5YR or 7.5YR, value of 4 to 6, chroma of 4 to 8. The texture is loam, sandy loam, or fine sandy loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 6 to 8. The Bt horizon is loam, clay loam, or sandy clay loam in the fine-earth fraction.

The BC horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, fine sandy loam, loam, or sandy clay loam in the fine-earth fraction.

The C horizon, if it occurs, is multicolored or has colors similar to those of the BC horizon. It is sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The Cr horizon is weathered, felsic to mafic high-grade metamorphic or igneous rock that is partially consolidated but can be dug with difficulty with a spade.

Craggey Series

The Craggey series consists of shallow, somewhat excessively drained, moderately rapidly permeable soils. These soils are near rock outcrops on ridgetops and side slopes of high mountains. They formed in residuum affected by soil creep that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite, mica gneiss, and hornblende gneiss. Slope ranges from 8 to 95 percent. Elevation is more than 4,800 feet. The soils are loamy, mixed, frigid Lithic Haplumbrepts.

Craggey soils are commonly adjacent to Balsam, Burton, Tanasee, and Wayah soils. Balsam, Tanasee, and Wayah soils are very deep. Balsam and Tanasee soils formed in colluvium in drainageways and coves. Burton soils are moderately deep to hard bedrock.

Typical pedon of Craggey gravelly sandy loam in an area of Burton-Craggey-Rock outcrop complex, windswept, 8 to 30 percent slopes, stony; about 4.8 miles northwest of the intersection of the Blue Ridge Parkway and North Carolina Highway 215 along the parkway, about 600 feet northeast of Spot Knob Overlook on the parkway in a wooded area (State plane coordinates 591,000 feet N., 823,000 feet E.):

Oe—1 inch to 0; partially decomposed leaves and twigs covered with moss.

A1—0 to 6 inches; very dark brown (10YR 2/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many very fine to medium roots; about 8 percent gravel, 3 percent cobbles, and 5 percent stones, by volume; common fine flakes of mica; extremely acid; gradual wavy boundary.

A2—6 to 15 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 4/3) dry; weak fine and medium granular structure; very friable; few very fine to medium roots; about 3 percent gravel, 3 percent cobbles, and 5 percent stones, by volume; common fine flakes of mica; extremely acid; abrupt wavy boundary.

R—15 inches; unweathered granite gneiss bedrock.

The thickness of the solum ranges from 10 to 20 inches. The depth to hard bedrock is 10 to 20 inches. Gravel, cobbles, and stones make up 5 to 35 percent, by volume, of the profile. The quantity of flakes of mica ranges from none to common. The soil is extremely acid to moderately acid.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It ranges from 10 to 20 inches in thickness.

The R horizon is unweathered, felsic to mafic high-grade metamorphic or igneous bedrock, such as granite, granite gneiss, mica gneiss, and hornblende gneiss.

Cullasaja Series

The Cullasaja series consists of very deep, well drained, moderately rapidly permeable soils. These soils are in coves and drainageways and on benches, fans, and toe slopes of intermediate mountains. They formed in colluvial materials weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite, mica gneiss, hornblende gneiss, and schist. Slope ranges from 15 to 70 percent. Elevation ranges from 3,500 to 4,800 feet. The soils are loamy-skeletal, mixed, mesic Typic Haplumbrepts.

Cullasaja soils are commonly adjacent to Ashe, Chestnut, Cleveland, Edneyville, Plott, and Tuckasegee soils. Ashe, Chestnut, Cleveland, Edneyville, and Plott soils are coarse-loamy. They formed in residuum on ridges and side slopes. Tuckasegee soils are fine-loamy.

Typical pedon of Cullasaja very cobbly loam in an area of Tuckasegee-Cullasaja complex, 15 to 30 percent slopes, very stony; about 4 miles west of Waynesville along U.S. Highway 19/23 to the Blue Ridge Parkway, about 2 miles east along the parkway to Redbank Branch, 300 feet northwest of the Blue Ridge Parkway, 20 feet east of a stream at the edge of an apple orchard (State plane coordinates 638,000 feet N., 796,000 feet E.):

A1—0 to 14 inches; black (10YR 2/1) very cobbly loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium granular structure; very friable; common very fine and fine pores; common very fine and fine roots; about 10 percent gravel, 30 percent cobbles, and 15 percent stones, by volume;

common fine flakes of mica; very strongly acid; gradual smooth boundary.

A2—14 to 20 inches; dark brown (10YR 3/3) very cobbly loam, weak fine subangular blocky structure; friable; common very fine and fine pores; common very fine and fine roots; about 10 percent gravel, 35 percent cobbles, and 15 percent stones, by volume; common fine flakes of mica; very strongly acid; clear wavy boundary.

Bw—20 to 60 inches; dark yellowish brown (10YR 4/6) very cobbly loam; weak fine and medium subangular blocky structure; friable; few very fine and fine pores; few very fine to medium roots; about 40 percent cobbles and 15 percent stones, by volume; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. Gravel, cobbles, stones, and boulders make up 35 to 60 percent, by volume, of the A horizon and the upper part of the B horizon and 35 to 80 percent of the lower horizons. Flakes of mica are few or common in the control section. The thickness of the umbric epipedon ranges from 10 to 20 inches. The soils are very strongly acid to moderately acid.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3.

The Bw horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 6. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The C horizon, if it occurs, is multicolored or has hue of 5YR to 10YR, value of 3 to 6, and chroma of 4 to 8. It is sandy loam, loamy sand, or loamy fine sand in the fine-earth fraction.

Cullowhee Series

The Cullowhee series consists of somewhat poorly drained, moderately rapidly permeable soils on flood plains. These soils formed in recent alluvium that is loamy in the upper part and is moderately deep to sandy strata containing more than 35 percent, by volume, rock fragments. Slope ranges from 0 to 2 percent. Elevation ranges from 1,500 to 3,000 feet. The soils are coarse-loamy over sandy or sandy-skeletal, mixed, mesic Aquic Haplumbrepts.

Cullowhee soils are commonly adjacent to Dellwood, Hemphill, and Nikwasi soils. Dellwood soils are moderately well drained. They are sandy-skeletal. Hemphill soils are very poorly drained and are on low stream terraces. They have a clay subsoil. Nikwasi soils are poorly drained and very poorly drained.

Typical pedon of Cullowhee sandy loam in an area of Cullowhee-Nikwasi complex, 0 to 2 percent slopes, frequently flooded; about 1.5 miles north on Secondary Road 1334 from its intersection with North Carolina Highway 209 at Fines Creek, about 1.0 mile northeast on Secondary Road 1334 from its intersection with Secondary Road 1338, about 150 feet south of the road in a field (State plane coordinates 831,000 feet N., 728,000 feet E.):

Ap—0 to 10 inches; dark brown (10YR 3/3) sandy loam, brown (10YR 5/3) dry; weak fine granular structure; very friable; common fine and few medium pores; few very fine and fine roots; about 5 percent gravel and 1 percent cobbles, by volume; few fine flakes of mica; moderately acid; abrupt smooth boundary.

Bw1—10 to 14 inches; brown (10YR 5/3) sandy loam; common medium distinct dark yellowish brown (10YR 4/6) and common medium distinct strong brown (7.5YR 4/6) irregularly shaped iron accumulations with clear boundaries throughout; massive; friable; few fine and medium pores; few fine roots; about 5 percent gravel and 1 percent cobbles, by volume; common fine flakes of mica; slightly acid; gradual wavy boundary.

Bw2—14 to 31 inches; brown (10YR 5/3) sandy loam; many medium and coarse faint grayish brown (10YR 5/2) irregularly shaped iron depletions with clear boundaries throughout; massive; very friable; about 5 percent gravel and 1 percent cobbles, by volume; common fine flakes of mica; slightly acid; clear wavy boundary.

Cg—31 to 60 inches; gray (10YR 5/1) very gravelly loamy sand; single grained; loose; about 25 percent gravel and 15 percent cobbles, by volume; few fine flakes of mica; slightly acid.

The thickness of the solum ranges from 15 to 35 inches. Sandy C horizons that contain more than 35 percent gravel and cobbles, by volume, are at a depth of 20 to 40 inches. Gravel and cobbles make up 0 to 15 percent, by volume, of the A and B horizons. Flakes of mica are few or common in the control section. The soils range from strongly acid to slightly acid unless limed.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Iron depletions with chroma of 2 or less are within a depth of 20 inches. The horizon is loam, sandy loam, or fine sandy loam in the fine-earth fraction.

The C horizon, if it occurs, has colors similar to those of the Bw horizon. The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. In some pedons the upper part of these horizons is sandy loam, loamy sand, or fine sandy loam in the fine-earth fraction. Between depths of 20 to 40 inches, the

horizons are sand, loamy sand, coarse sand, or loamy coarse sand in the fine-earth fraction and contain more than 35 percent rock fragments, by volume.

Dellwood Series

The Dellwood series consists of moderately well drained, rapidly permeable soils. These soils formed in dominantly coarse textured alluvium on flood plains of fast-flowing, high-energy streams. They are shallow to sandy material that has more than 35 percent, by volume, gravel and cobbles (fig. 19). Slope ranges from 0 to 3 percent. Elevation ranges from 2,000 to 3,000 feet. The soils are sandy-skeletal, mixed, mesic Fluventic Haplumbrepts.

Dellwood soils are commonly adjacent to Cullowhee and Nikwasi soils. Cullowhee and Nikwasi soils are coarse-loamy over sandy or sandy-skeletal material. Cullowhee soils are somewhat poorly drained, and Nikwasi soils are poorly drained and very poorly drained.

Typical pedon of Dellwood cobbly sandy loam, 0 to 3 percent slopes, occasionally flooded; about 1.6 miles south of Balsam Road in Hazelwood on Secondary Road 1147, about 200 feet east of the road in a hayfield (State plane coordinates 638,000 feet N., 807,500 feet E.):

Ap—0 to 8 inches; dark brown (10YR 3/3) cobbly sandy loam, brown (10YR 4/3) dry; weak fine granular structure; very friable; many very fine and fine, common medium, and few coarse roots; about 10 percent gravel and 12 percent cobbles, by volume; few fine flakes of mica; strongly acid; clear smooth boundary.

A—8 to 14 inches; dark brown (10YR 3/3) very gravelly loamy sand; weak fine granular structure; very friable; many very fine and fine roots; about 35 percent gravel, 20 percent cobbles, and 5 percent stones, by volume; moderately acid; gradual wavy boundary.

AC—14 to 24 inches; dark yellowish brown (10YR 3/4) extremely gravelly coarse sand; single grained; loose; few very fine roots; about 40 percent gravel and 25 percent cobbles, by volume; moderately acid; gradual wavy boundary.

C1—24 to 33 inches; dark yellowish brown (10YR 4/4) extremely gravelly coarse sand; single grained; loose; about 40 percent gravel, 20 percent cobbles, and 5 percent stones, by volume; common fine flakes of mica; moderately acid; gradual wavy boundary.

C2—33 to 50 inches; yellowish brown (10YR 5/8) extremely gravelly coarse sand; single grained; loose; about 40 percent gravel, 20 percent cobbles, and 5 percent stones, by volume; common fine flakes of mica; slightly acid; gradual wavy boundary.

C3—50 to 60 inches; dark yellowish brown (10YR 4/4) extremely gravelly coarse sand; single grained; loose; about 40 percent gravel, 20 percent cobbles, and 5 percent stones, by volume; common fine flakes of mica; moderately acid.

The thickness of the solum and the depth to coarse textured material containing more than 35 percent, by volume, rounded gravel are 8 to 20 inches. Gravel and cobbles make up 15 to 35 percent, by volume, of the Ap horizon or the upper part of the A horizon, 15 to 60 percent of the lower part of the A horizon, and 35 to 80 percent of the C horizon. The quantity of flakes of mica ranges from none to common. The soils range from very strongly acid to neutral.

The A or Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. It ranges from 10 to 20 inches in thickness. The content of organic matter ranges from 5 to 8 percent.

The AC horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 to 4. It is sand, coarse sand, loamy sand, or loamy coarse sand in the fine-earth fraction.

Some pedons have a thin Bw horizon between depths of 10 and 20 inches. This horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It has less than 35 percent gravel and cobbles, by volume. The texture is fine sandy loam or sandy loam in the fine-earth fraction.

The C horizon is multicolored or has hue of 7.5YR or 10YR and value and chroma of 3 to 6. It is sand, coarse sand, or loamy coarse sand in the fine-earth fraction.

Dillsboro Series

The Dillsboro series consists of very deep, well drained, moderately permeable soils. These soils are in coves, on benches, on toe slopes, on colluvial fans, and on high stream terraces. They formed in old alluvium or colluvium, or both, consisting of materials weathered from felsic to mafic high-grade metamorphic or igneous rock. Slope ranges from 2 to 15 percent. Elevation ranges from 2,000 to 3,500 feet. The soils are clayey, mixed, mesic Humic Hapludults.

Dillsboro soils are commonly adjacent to Braddock, Saunook, and Statler soils. Braddock soils have a subsoil with hue of 2.5YR or 10R. They are eroded and are slightly higher on the landscape than the Dillsboro soils. Saunook and Statler soils are fine-loamy. Saunook soils formed in colluvium on colluvial fans and in coves. Statler soils are on low stream terraces.

Typical pedon of Dillsboro loam, 2 to 8 percent slopes; about 3 miles north of the intersection of U.S.

Highway 19 and U.S. Highway 276 in Dellwood, along U.S. Highway 276 to Secondary Road 1313, about 0.8 mile northwest on Secondary Road 1313, about 200 feet west of the road in a field (State plane coordinates 681,000 feet N., 800,000 feet E.):

Ap—0 to 9 inches; dark yellowish brown (10YR 3/4) loam, brownish yellow (10YR 5/4) dry; moderate fine and medium granular structure; friable; many very fine and fine pores; common very fine and fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

Bt—9 to 44 inches; strong brown (7.5YR 4/6) clay; moderate fine and medium angular blocky structure; firm; many very fine pores; common very fine roots; few faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

BC—44 to 60 inches; strong brown (7.5YR 5/6) clay loam; weak medium subangular blocky structure; very friable; few fine flakes of mica; very strongly acid.

The solum is more than 60 inches thick. The depth to bedrock is greater than 72 inches. Gravel and cobbles make up 0 to 15 percent, by volume, of the profile. Flakes of mica are few or common. The soils range from very strongly acid to moderately acid unless limed.

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

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is clay or clay loam.

The BC horizon has colors similar to those of the Bt horizon. It is loam, sandy clay loam, or clay loam.

The C horizon, if it occurs, is variable in color. It is loamy or sandy.

Edneyville Series

The Edneyville series consists of very deep, well drained, moderately rapidly permeable soils. These soils are on ridges and south- and west-facing side slopes of intermediate mountains (fig. 20). They formed in residuum affected by soil creep that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite, granite gneiss, mica gneiss, and hornblende gneiss. Slope ranges from 8 to 95 percent. Elevation ranges from 3,500 to 4,800 feet. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Edneyville soils are commonly adjacent to Ashe, Chestnut, Cleveland, Cullasaja, Plott, and Tuckasegee soils. The moderately deep Ashe and the shallow Cleveland soils occur near rock outcrops. Chestnut soils are moderately deep to soft bedrock. Plott soils have an umbric epipedon. They are on north- or east-facing slopes or in landscape positions above those of the Edneyville soils. Cullasaja and Tuckasegee soils do not have a C horizon of saprolite. They formed in colluvium in coves and drainageways.

Typical pedon of Edneyville gravelly loam in an area of Edneyville-Chestnut complex, 50 to 95 percent slopes, stony; about 4.0 miles west of Waynesville on U.S. Highway 23/74 to Secondary Road 1157, about 0.7 mile northwest on Secondary Road 1157 to Secondary Road 1218, about 0.7 mile north on Secondary Road 1218 to end of the road, 300 feet northeast of the road in a wooded area (State plane coordinates 647,000 feet N., 786,000 feet E.):

Oi—1 inch to 0; leaves and twigs.

A—0 to 3 inches; brown (10YR 4/3) gravelly loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; common very fine and fine pores; many very fine to medium roots; about 12 percent gravel, 3 percent cobbles, and 3 percent stones, by volume; few fine flakes of mica; strongly acid; clear smooth boundary.

Bw—3 to 34 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; few very fine and fine pores; common very fine to medium roots; about 10 percent gravel, 3 percent cobbles, and 5 percent stones, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—34 to 60 inches; multicolored saprolite of gravelly loamy sand; massive; very friable; few very fine to medium roots; about 15 percent gravel and 3 percent cobbles, by volume; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 20 to 55 inches. The depth to bedrock is more than 60 inches. Gravel and stones commonly make up 5 to 25 percent, by volume, of the profile but can make up as much as 35 percent. Flakes of mica are few or common. The soils range from very strongly acid to moderately acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Where it has value of 3 and chroma of 2 or 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The BC horizon, if it occurs, has colors and textures similar to those of the Bw horizon.

The C horizon has colors similar to those of the Bw horizon or is multicolored. It is saprolite consisting of fine sandy loam, sandy loam, or loamy sand in the fine-earth fraction.

Evard Series

The Evard series consists of very deep, well drained, moderately permeable soils (fig. 21). These soils are on ridges and side slopes of intermountain hills and low mountains. They formed in residuum affected by soil creep that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite, granite gneiss, and hornblende gneiss. Slope ranges from 15 to 95 percent. Elevation ranges from 2,500 to 3,500 feet. The soils are fine-loamy, oxidic, mesic Typic Hapludults.

Evard soils are commonly adjacent to Chestnut, Cowee, Edneyville, Fannin, Hayesville, Saunook, and Trimont soils. Edneyville and Chestnut soils are coarse-loamy. They are on the cooler aspects or the higher slopes. Cowee soils are moderately deep to soft bedrock. Fannin soils are micaceous. Hayesville soils are clayey. Saunook and Trimont soils have a dark surface layer. Saunook soils formed in colluvium in coves and drainageways. Trimont soils are on the cooler aspects.

Typical pedon of Evard gravelly loam in an area of Evard-Cowee complex, 30 to 50 percent slopes; about 1 mile west of the intersection of U.S. Highway 19/23 and Eagles Nest Road at Hazelwood, along Eagles Nest Road to Secondary Road 1178, about 0.5 mile southwest on Secondary Road 1178 to the first road past Layfield Road, 150 feet northwest on this road, 40 feet north of the road in a wooded area (State plane coordinates 657,000 feet N., 802,000 feet E.):

Oe—1 inch to 0; partially decomposed leaves and twigs.

A—0 to 2 inches; dark brown (7.5YR 3/4) gravelly loam, yellowish brown (10YR 5/4) dry; weak fine granular structure; very friable; many very fine and fine pores; many very fine and fine, common medium, and few coarse roots; about 15 percent gravel and 1 percent cobbles, by volume; few fine flakes of mica; very strongly acid; clear smooth boundary.

BE—2 to 11 inches; strong brown (7.5YR 4/6) loam; weak medium granular structure; friable; many fine pores; common very fine to medium and few coarse roots; about 7 percent gravel, 1 percent cobbles, and 1 percent stones, by volume; few fine and medium flakes of mica; very strongly acid; gradual wavy boundary.

Bt—11 to 27 inches; yellowish red (5YR 5/6) loam; weak fine and medium subangular blocky structure; friable; common fine and medium pores; few very fine and medium and common fine roots; few faint reddish brown (5YR 5/4) clay films on faces of peds; about 5 percent gravel, 2 percent cobbles, and 1 percent stones, by volume; common fine and few medium flakes of mica; very strongly acid; gradual wavy boundary.

BC—27 to 40 inches; red (2.5YR 5/6) loam; weak medium subangular blocky structure; friable; few fine and medium pores; few fine to coarse roots; about 8 percent gravel, 2 percent cobbles, and 1 percent stones, by volume; common fine and few medium flakes of mica; very strongly acid; gradual irregular boundary.

C—40 to 60 inches; multicolored saprolite of gravelly sandy loam; massive; friable; about 15 percent gravel, 5 percent cobbles, and 3 percent stones, by volume; common fine and medium flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to more than 40 inches. The depth to bedrock is more than 60 inches. Rock fragments that are gravel to stone sized make up 5 to 20 percent of the A and E horizons, 0 to 15 percent of the B horizon, and 0 to 30 percent of the C horizon. Flakes of mica are few or common in the control section. The soils range from very strongly acid to moderately acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. Where it has value and chroma of 3, the horizon is less than 7 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The BE horizon and the BA horizon, if it occurs, have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. They are fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is loam, sandy clay loam, or clay loam.

The BC horizon has hue of 2.5YR to 7.5YR and value and chroma of 4 to 6. It is sandy loam, fine sandy loam, or sandy clay loam.

The C horizon is multicolored or has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 6 to 8. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

Fannin Series

The Fannin series consists of very deep, well drained, moderately permeable, micaceous soils. These soils are on main ridges, spur ridges, and side slopes of intermountain hills and low mountains. They formed in residuum affected by soil creep that weathered from high-grade metamorphic or igneous rock having a high content of mica, such as mica gneiss and mica schist. Slope ranges from 30 to 50 percent. Elevation ranges

from 2,500 to 3,500 feet. The soils are fine-loamy, micaceous, mesic Typic Hapludults.

Fannin soils are commonly adjacent to Cowee, Evard, and Hayesville soils. Evard and Cowee soils contain less than 40 percent mica in the subsoil. Cowee soils are moderately deep to soft bedrock. Hayesville soils are clayey.

Typical pedon of Fannin loam, 30 to 50 percent slopes, eroded; about 0.2 mile north of the intersection of Secondary Road 1334 and Secondary Road 1336 in the Fines Creek Community on Secondary Road 1336, about 350 yards east in a pasture (State plane coordinates 731,000 feet N., 829,000 feet E.):

Ap—0 to 3 inches; reddish brown (5YR 4/4) loam, yellowish red (5YR 4/6) dry; moderate medium granular structure; friable; common very fine and few fine and medium pores; many very fine and few medium roots; many fine flakes of mica; mildly alkaline; clear smooth boundary.

Bt—3 to 18 inches; red (2.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; common very fine and few fine and medium pores; few very fine to medium roots; common prominent yellowish red (5YR 4/6) clay films on faces of peds and in root channels; many fine flakes of mica; strongly acid; gradual wavy boundary.

BC—18 to 31 inches; red (2.5YR 4/6) sandy loam; common medium distinct reddish yellow (5YR 6/8) and brown (7.5YR 5/4) mottles; weak medium subangular blocky structure; friable; few very fine to medium pores; few very fine to medium roots; few prominent yellowish red (5YR 4/6) clay films in cracks and pores; many fine flakes of mica; very strongly acid; gradual irregular boundary.

C—31 to 60 inches; multicolored saprolite of sandy loam; massive; friable; few large pores; few medium and large roots; few prominent yellowish red (5YR 4/6) clay films, as much as 1 thick, in cracks and pores; many fine and few medium flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 44 inches. The depth to bedrock is more than 6 feet. Gravel and cobbles make up 0 to 15 percent, by volume, of the profile. Flakes of mica are common or many in the A horizon and are many in the B and C horizons. The soils range from very strongly acid to moderately acid unless limed.

The A or Ap horizon has hue of 5YR, value of 3 to 5, and chroma of 4 to 8.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, clay loam, or sandy clay loam.

The BC horizon has colors similar to those of the Bt horizon. It is loam, fine sandy loam, or sandy loam.

The C horizon is multicolored saprolite that weathered from mica gneiss or mica schist. It is fine sandy loam, loam, or sandy loam.

Hayesville Series

The Hayesville series consists of very deep, well drained, moderately permeable soils. These soils are on ridges and side slopes of intermountain hills and low mountains. They formed in material weathered from felsic high-grade metamorphic or igneous rock, such as granite, mica gneiss, and schist. Slope ranges from 2 to 30 percent. Elevation ranges from 2,500 to 3,500 feet. The soils are clayey, kaolinitic, mesic Typic Kanhapludults.

Hayesville soils are commonly adjacent to Braddock, Cowee, Evard, Fannin, and Saunook soils. Braddock soils are in a mixed family. They are on high stream terraces. Cowee, Evard, and Saunook soils are fine-loamy. Saunook soils formed in colluvium in coves and drainageways. Fannin soils are micaceous.

Typical pedon of Hayesville clay loam, 8 to 15 percent slopes, eroded; about 1.5 miles west of Clyde on U.S. Highway 19/23 to its intersection with Jones Cove Road, 0.6 mile south on Jones Cove Road to a private drive, 0.15 mile northeast on the private drive to a dead end, 100 feet north in a pasture (State plane coordinates 668,000 feet N., 830,000 feet E.):

Ap—0 to 4 inches; reddish brown (5YR 4/4) clay loam, light reddish brown (5YR 6/4) dry; moderate fine and medium granular structure; very friable; common fine and very fine pores; common very fine and fine roots; about 5 percent quartz gravel, by volume; common fine flakes of mica; neutral; clear smooth boundary.

Bt—4 to 24 inches; red 2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; few very fine and fine pores; few very fine and fine roots; about 2 percent quartz gravel, by volume; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—24 to 32 inches; red (2.5YR 5/8) clay loam; weak medium subangular blocky structure; friable; few very fine and fine pores; few very fine and fine roots; common fine flakes of mica; about 7 percent quartz gravel, by volume; very strongly acid; gradual wavy boundary.

C1—32 to 52 inches; white (7.5YR 8/0) saprolite of loam; massive; very friable; about 5 percent quartz gravel, by volume; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C2—52 to 60 inches; multicolored saprolite of fine sandy loam; massive; very friable; about 7 percent

Figure 16.—Braddock soils are very deep, red, and clayey. They contain variable amounts of rounded gravel and cobbles.

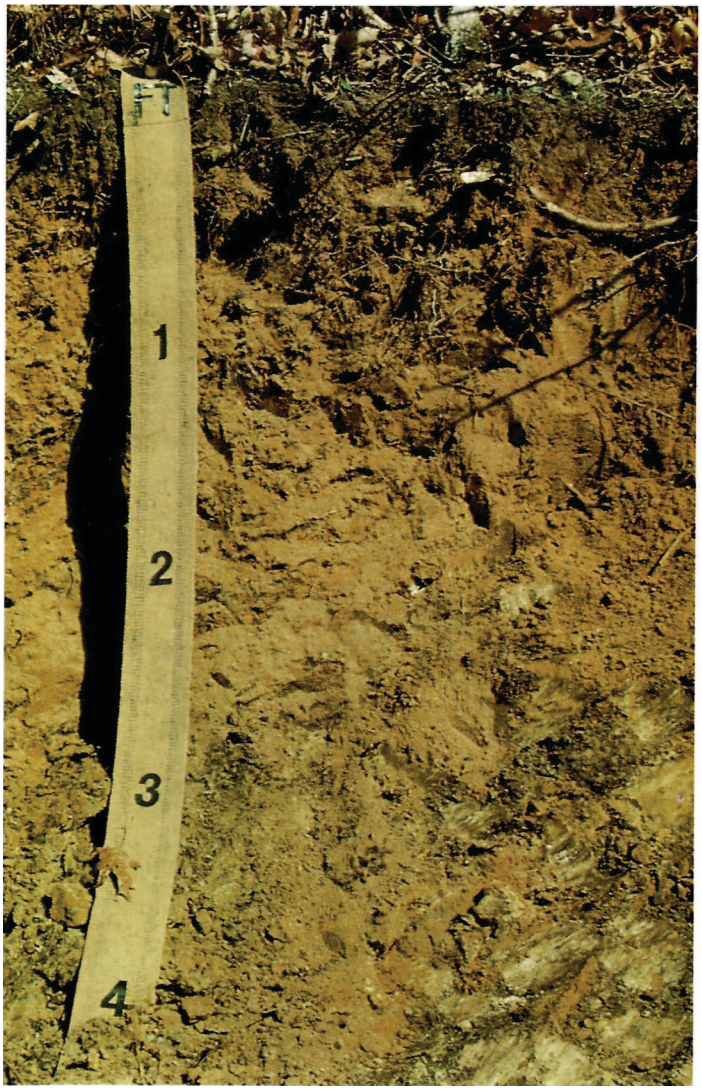

Figure 17.—The moderately deep Chestnut soils have a brown subsoil and soft bedrock within a depth of 20 to 40 inches.

Figure 18.—Cleveland soils are shallow and have hard bedrock at a depth of 10 to 20 inches.

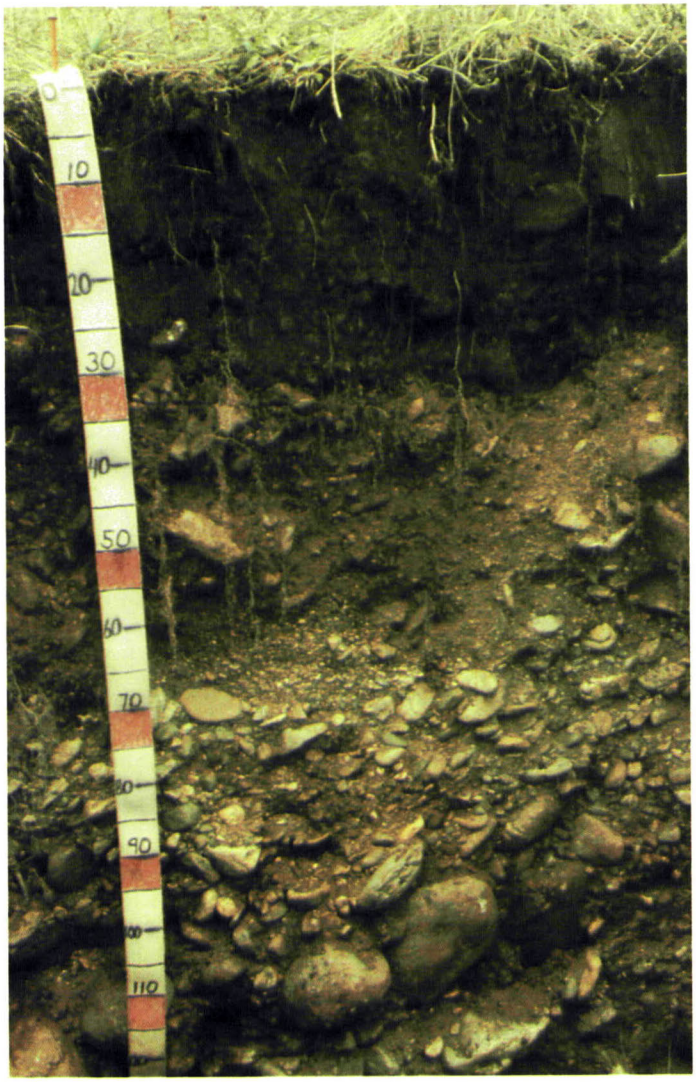

Figure 19.—Dellwood soils formed from material that was deposited by streams and consisted mainly of sand, gravel, and cobbles.

Figure 20.—The very deep Edneyville soils are brown. They formed mainly from residuum in the intermediate mountains.

Figure 21.—Evard soils are very deep. They have a red, moderately permeable subsoil.

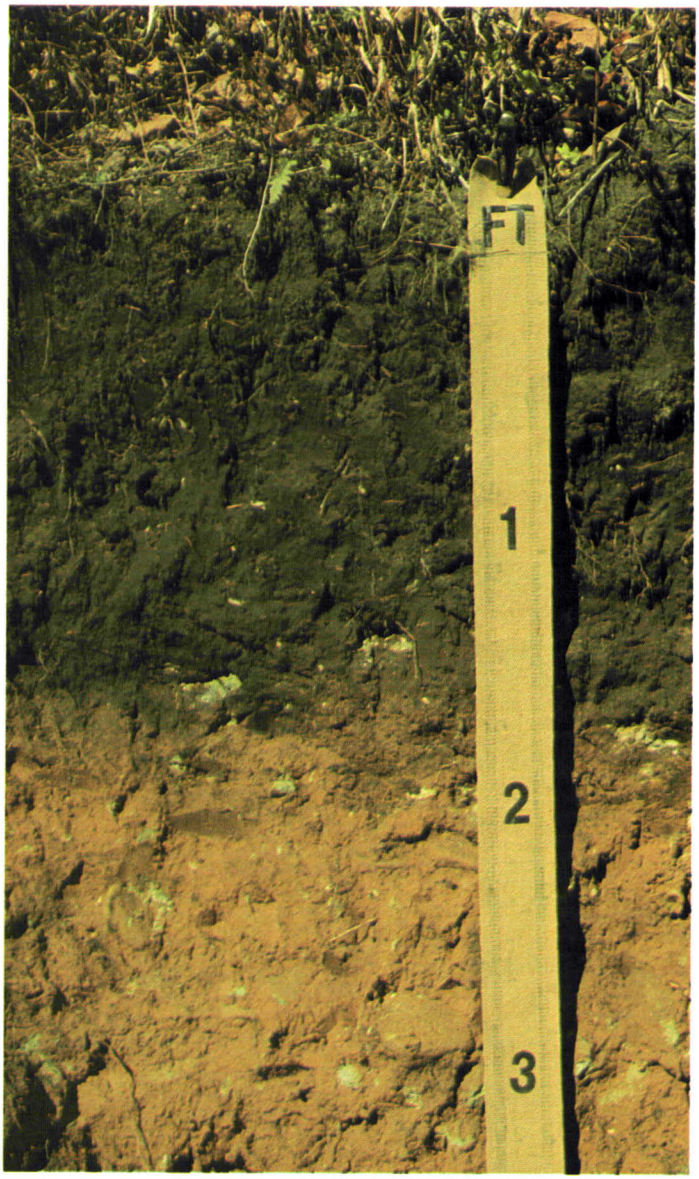

Figure 22.—Tuckasegee soils are very deep. They have a thick, dark surface layer because they formed in cool, moist areas in coves.

quartz gravel, by volume; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 30 to 45 inches. Gravel and cobbles make up 0 to 15 percent, by volume, of the profile. Flakes of mica are few or common. The soils range from very strongly acid to moderately acid unless limed.

The A or Ap horizon has hue of 5YR, value of 3 to 5, and chroma of 3 to 6.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam or clay.

The BC horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. It is loam, sandy clay loam, or clay loam.

The C horizon is saprolite that is variable in color. It is fine sandy loam, sandy loam, or loam.

Hemphill Series

The Hemphill series consists of very deep, very poorly drained, slowly permeable soils on low stream terraces. These soils formed in old alluvium of materials weathered from intermediate or mafic high-grade metamorphic or igneous rock, such as hornblende gneiss and amphibolite. Slope ranges from 0 to 3 percent. Elevation ranges from 2,000 to 3,000 feet. The soils are fine, mixed, mesic Typic Umbraqualfs.

Hemphill soils are commonly adjacent to Cullowhee, Nikwasi, Rosman, and Statler soils. Cullowhee and Nikwasi soils are coarse-loamy over sandy or sandy-skeletal material. They are on small flood plains. Cullowhee soils are somewhat poorly drained, and Nikwasi soils are poorly drained and very poorly drained. Rosman soils are coarse-loamy. They are well drained and moderately well drained and are on large flood plains. Statler soils are fine-loamy. They are well drained and are on low stream terraces.

Typical pedon of Hemphill loam, 0 to 3 percent slopes, rarely flooded; about 5.0 miles east of Waynesville on U.S. Highway 276 to Bethel, 1.4 miles south on Lake Logan Road, 300 feet east of the roadway in a pasture (State plane coordinates 649,000 feet N., 838,000 feet E.):

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, dark brown (10YR 3/3) dry; weak medium granular structure; friable; common very fine and fine roots of grass; slightly acid; clear smooth boundary.

AB—8 to 12 inches; very dark gray (10YR 3/1) clay loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few very fine and fine roots of grass; moderately acid; gradual wavy boundary.

Btg1—12 to 25 inches; dark gray (10YR 4/1) clay; moderate coarse prismatic structure; firm, sticky, plastic; few very fine and fine roots of grass; many distinct almost continuous clay films on faces of peds; strongly acid; gradual wavy boundary.

Btg2—25 to 47 inches; dark gray (10YR 4/1) clay; weak medium prismatic structure; firm, sticky, plastic; common distinct almost continuous clay films on faces of peds; few thin lenses and pockets of sandy loam in the lower part; few fine and medium flakes of mica; very strongly acid; gradual wavy boundary.

Cg—47 to 62 inches; dark gray (10YR 4/1) fine sandy loam; massive; very friable; many fine and medium flakes of mica; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. Gravel and cobbles make up 0 to 15 percent, by volume, of the profile. Flakes of mica are few or common in the A, Ap, AB, BA, and Btg horizons and range from few to many in the BCg and Cg horizons. The soils range from very strongly acid to slightly acid unless limed.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3.

The AB horizon or the BA horizon, if it occurs, has the same colors as the A or Ap horizon. It is sandy clay loam, silty clay loam, or clay loam.

The Btg horizon commonly has hue of 7.5YR to 2.5Y or is neutral in hue, has value of 2 to 6, and has chroma of 0 to 2. In some pedons it has hue of 5GY, 5G, 5BG, or 5B, value of 4 to 7, and chroma of 1. It is silty clay, silty clay loam, clay loam, or clay.

The BCg or CBg horizon, if it occurs, commonly has hue of 7.5YR to 5Y or is neutral in hue, has value of 4 to 6, and has chroma of 0 to 2. In some pedons it has hue of 5GY, 5G, 5BG, or 5B, value of 4 to 7, and chroma of 1. It is sandy loam, fine sandy loam, loam, sandy clay loam, silt loam, silty clay loam, silty clay, clay loam, or clay.

The Cg horizon has colors similar to those of the BCg horizon. It is variable in texture, ranging from sand to clay loam.

Humaquepts

Humaquepts consist of very deep, somewhat poorly drained and poorly drained, moderately rapidly permeable soils in coves and drainageways of high mountains. These soils commonly are near Tanasee soils. They formed in colluvium derived from material weathered from felsic to mafic high-grade metamorphic or igneous rock. Slopes range from 2 to 8 percent.

Because of the variability of Humaquepts, a typical pedon is not described. The depth to bedrock is more than 60 inches. The soils are extremely acid to strongly

acid. Gravel, cobbles, and stones make up 5 to 20 percent, by volume, of the soil material within a depth of 20 inches and as much as 35 percent of the soil material below a depth of 20 inches.

The A horizon has hue of 7.5YR, value of 2, and chroma of 0 or has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is loam or fine sandy loam in the fine-earth fraction.

The Bw horizon, if it occurs, has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. It is loam or sandy loam in the fine-earth fraction.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 3 to 5, and chroma of 1 or 2. It is loamy sand or sandy loam in the fine-earth fraction.

Junaluska Series

The Junaluska series consists of moderately deep, well drained, moderately permeable soils. These soils are on ridges and side slopes of intermountain hills and low mountains. They formed in residuum affected by soil creep that weathered from low-grade metasedimentary rock, such as phyllite, quartzite, and thinly bedded metasandstone. Slope ranges from 8 to 50 percent. Elevation ranges from 1,500 to 3,500 feet. The soils are fine-loamy, mixed, mesic Typic Hapludults.

Junaluska soils are commonly adjacent to Brasstown, Soco, Spivey, Stecoah, and Whiteoak soils. Brasstown soils are deep to soft bedrock. Brasstown, Soco, and Stecoah soils are on ridges and side slopes. Soco and Stecoah soils are coarse-loamy. Spivey and Whiteoak soils are very deep. They formed in colluvium in coves and drainageways.

Typical pedon of Junaluska channery loam in an area of Brasstown-Junaluska complex, 15 to 30 percent slopes; about 2 miles northwest on Interstate Highway 40 from the Fines Creek Exit to a gravel service road, 0.15 mile along the gravel road to an iron gate on south side of Interstate Highway 40, about 0.5 mile along U.S. Forest Service road, 100 feet northeast of the road in a wooded area (State plane coordinates 727,000 feet N., 803,000 feet E.):

Oi—1 inch to 0; leaves and twigs.

A—0 to 2 inches; dark yellowish brown (10YR 4/4) channery loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; many very fine and fine and common medium pores; many very fine to coarse roots; about 18 percent channers and 2 percent flagstones, by volume; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt—2 to 25 inches; red (2.5YR 5/6) loam; weak medium subangular blocky structure; friable; common very fine and few fine and medium pores; common very fine to medium roots; few faint red (2.5YR 4/6) clay films on faces of peds; about 6 percent channers and 2 percent flagstones, by volume; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—25 to 28 inches; yellowish red (5YR 5/6) silt loam; weak fine subangular blocky structure; friable; few very fine to medium pores; few very fine to medium roots; about 10 percent channers and 3 percent flagstones, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

Cr—28 to 60 inches; weathered, multicolored low-grade metasedimentary bedrock that is partially consolidated but can be dug with difficulty with a spade.

The thickness of the solum ranges from 15 to 39 inches. The depth to soft bedrock is 20 to 40 inches. Channers and flagstones commonly make up 5 to 20 percent, by volume, of the profile but range from 5 to 35 percent. Flakes of mica are few or common. The soils range from extremely acid to moderately acid unless limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. Where it has value of 3, the horizon is less than 6 inches thick.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. It is clay loam, loam, sandy clay loam, or silty clay loam in the fine-earth fraction.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon. It is silt loam, loam, or fine sandy loam in the fine-earth fraction.

The C horizon, if it occurs, is multicolored saprolite. It is loam, fine sandy loam, sandy loam, or loamy fine sand in the fine-earth fraction.

The Cr horizon is multicolored, weathered, fractured low-grade metasedimentary rock that is partially consolidated but can be dug with difficulty with a spade.

Nikwasi Series

The Nikwasi series consists of poorly drained and very poorly drained, moderately rapidly permeable soils on flood plains. These soils formed in recent alluvium of loamy material that is moderately deep to sandy strata containing more than 35 percent, by volume, gravel and cobbles. Slope ranges from 0 to 2 percent. Elevation ranges from 1,500 to 3,000 feet. The soils are coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Cumulic Humaquepts.

Nikwasi soils are commonly adjacent to Cullowhee, Dellwood, and Hemphill soils. Cullowhee soils are somewhat poorly drained, and Dellwood soils are moderately well drained. Hemphill soils are poorly

drained and are on low stream terraces. They have a clay subsoil.

Typical pedon of Nikwasi loam in an area of Cullowhee-Nikwasi complex, 0 to 2 percent slopes, frequently flooded; about 0.6 mile west on Secondary Road 1164 from its intersection with U.S. Highway 19/23, about 150 feet southeast of the intersection of Secondary Roads 1164 and 1165, in a pasture (State plane coordinates 649,000 feet N., 804,000 feet E.):

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; weak medium granular structure; very friable; few fine pores; many very fine and fine roots; about 2 percent gravel, by volume; common fine flakes of mica; very strongly acid; clear smooth boundary.

A—6 to 21 inches; very dark gray (10YR 3/1) loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; very friable; few fine pores; common very fine and few fine roots; common fine flakes of mica; about 2 percent gravel, by volume; very strongly acid; gradual wavy boundary.

AC—21 to 28 inches; very dark grayish brown (10YR 3/2) loamy sand; massive; very friable; about 5 percent gravel, by volume; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Cg—28 to 60 inches; dark grayish brown (10YR 4/2) very gravelly loamy sand; single grained; loose; about 30 percent gravel and 10 percent cobbles, by volume; many fine flakes of mica; moderately acid.

Loamy alluvial sediments are 24 to 40 inches thick over sandy strata containing more than 35 percent, by volume, rock fragments, mainly gravel and cobbles. Gravel and cobbles make up 0 to 15 percent, by volume, of the A horizon and more than 35 percent of the Cg horizon. Flakes of mica range from few to many. The soils range from very strongly acid to moderately acid unless limed.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3.

The AC horizon has colors similar to those of the A horizon. It is loamy sand, loamy coarse sand, sand, or coarse sand.

The Cg horizon has hue of 2.5Y or 10YR, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. It is sand, loamy sand, coarse sand, or loamy coarse sand in the fine-earth fraction.

Oconaluftee Series

The Oconaluftee series consists of very deep, well drained, moderately rapidly permeable soils. These soils are on ridges and side slopes of high mountains. They formed in residuum affected by soil creep that weathered from low-grade metasedimentary rock, such as slate, phyllite, and thinly bedded metasandstone. Slope ranges from 15 to 95 percent. Elevation is more than 4,800 feet. The soils are coarse-loamy, mixed, frigid Typic Haplumbrepts.

Oconaluftee soils are commonly adjacent to Burton, Cheoah, and Wayah soils. Burton and Wayah soils formed in material weathered from felsic to mafic high-grade metamorphic or igneous rock. Cheoah soils are mesic. They are on ridges and side slopes at elevations below 4,800 feet.

Typical pedon of Oconaluftee channery loam, 50 to 95 percent slopes; about 2.5 miles west of Maggie Valley on U.S. Highway 19 to its intersection with the Blue Ridge Parkway at Soco Gap, 2.6 miles southwest on the parkway, 460 feet west of the parkway at the west end of Bunches Bald Tunnel, in a wooded area (State plane coordinates 670,000 feet N., 750,000 feet E.):

Oe—2 inches to 0; partially decomposed leaves, twigs, and roots.

A1—0 to 8 inches; black (10YR 2/1) channery loam, very dark brown (10YR 2/2) dry; weak fine granular structure; very friable; common very fine and fine pores; many fine and medium roots; about 25 percent channers and flagstones, by volume; common fine flakes of mica; extremely acid; clear wavy boundary.

A2—8 to 19 inches; dark brown (10YR 3/3) channery loam; weak medium granular structure; very friable; few very fine and fine pores; common fine and medium roots; about 20 percent channers and flagstones, by volume; common fine flakes of mica; very strongly acid; clear wavy boundary.

Bw—19 to 35 inches; dark yellowish brown (10YR 4/4) channery fine sandy loam; weak medium subangular blocky structure; friable; few very fine pores; few fine and medium roots; about 20 percent channers and flagstones, by volume; common fine flakes of mica; strongly acid; gradual wavy boundary.

C—35 to 60 inches; multicolored saprolite of channery fine sandy loam; massive; friable; few very fine pores; few fine and medium roots; about 20 percent channers and flagstones, by volume; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. Rock fragments, dominantly channers and a few flagstones, make up 15 to 35 percent of the A horizon and 5 to 35 percent of the other horizons. Flakes of

mica are few or common. The soils range from extremely acid to moderately acid.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3.

The AB horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is loam or fine sandy loam in the fine-earth fraction.

The Bw horizon and the BC horizon, if it occurs, have hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 8. They are loam, fine sandy loam, or silt loam in the fine-earth fraction.

The C horizon is saprolite that is multicolored or variable in color and weathered from low-grade metasedimentary rock. It is loam, fine sandy loam, silt loam, or sandy loam in the fine-earth fraction.

Plott Series

The Plott series consists of very deep, well drained, moderately rapidly permeable soils. These soils are on ridges and north- and east-facing side slopes of intermediate mountains. They formed in residuum affected by soil creep that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite gneiss, hornblende gneiss, and mica gneiss. Slope ranges from 8 to 95 percent. Elevation ranges from 3,500 to 4,800 feet. The soils are coarse-loamy, mixed, mesic Typic Haplumbrepts.

Plott soils are commonly adjacent to Chestnut, Cullasaja, Edneyville, and Tuckasegee soils. Edneyville and Chestnut soils have an ochric epipedon. They are on south- and west-facing aspects. Tuckasegee and Cullasaja soils do not have a C horizon of saprolite. They formed in colluvium in coves and drainageways.

Typical pedon of Plott fine sandy loam, 50 to 95 percent slopes, stony; about 2.1 miles east on the Blue Ridge Parkway from the intersection of U.S. Highway 19/23 and the parkway, 100 feet southwest of the road in a wooded area (State plane coordinates 638,000 feet N., 792,000 feet E.):

Oi—4 to 3 inches; slightly decomposed twigs and leaves.

Oe—3 inches to 0; partially decomposed leaves and twigs intermingled with mat of roots.

A—0 to 11 inches; very dark brown (10YR 2/2) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; very friable; many very fine and common fine pores; many very fine and fine, common medium, and few coarse roots; about 5 percent gravel and cobbles, by volume; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BA—11 to 14 inches; dark yellowish brown (10YR 3/4) loam; weak fine subangular blocky structure; very friable; common very fine and few fine and medium pores; common fine and medium and few coarse roots; about 5 percent gravel and cobbles, by volume; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bw—14 to 26 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; few very fine and fine pores; few very fine and fine roots; few fine flakes of mica; about 10 percent gravel and cobbles, by volume; very strongly acid; gradual wavy boundary.

BC—26 to 38 inches; yellowish brown (10YR 5/6) sandy loam; massive; friable; about 5 percent gravel and cobbles, by volume; common fine flakes of mica; strongly acid; gradual wavy boundary.

C—38 to 60 inches; multicolored saprolite of sandy loam; massive; very friable; about 5 percent gravel and cobbles, by volume; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. The depth to bedrock is more than 60 inches. Gravel and cobbles commonly make up 5 to 15 percent, by volume, of the A horizon and as much as 35 percent of the other horizons. Flakes of mica are few or common. The soils range from extremely acid to moderately acid unless limed.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It ranges from 10 to 20 inches in thickness.

The BA horizon or the AB horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 8. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The BC horizon or the CB horizon, if it occurs, has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The C horizon is multicolored or variable in color. It is saprolite that weathered from felsic to mafic high-grade metamorphic or igneous rock. The texture is fine sandy loam, sandy loam, or loamy sand in the fine-earth fraction.

Rosman Series

The Rosman series consists very deep, well drained to moderately well drained, moderately rapidly permeable soils on flood plains. These soils formed in loamy alluvium. Slope ranges from 0 to 2 percent. Elevation ranges from 2,000 to 3,000 feet. The soils are coarse-loamy, mixed, mesic Fluventic Haplumbrepts.

Rosman soils are commonly adjacent to Hemphill and Statler soils. Hemphill and Statler soils are on low stream terraces. Hemphill soils are very poorly drained, and Statler soils are well drained.

Typical pedon of Rosman fine sandy loam, 0 to 2 percent slopes, occasionally flooded; about 1.0 mile east of Clyde along Thickety Road to Dogwood Acres Road, 0.1 mile west of Dogwood Acres Road on Thickety Road, 125 feet northwest of the road in a field (State plane coordinates 673,000 feet N., 841,000 feet E.):

Ap—0 to 11 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; moderate medium and strong granular structure; very friable; few very fine pores; common very fine and fine roots; neutral; abrupt wavy boundary.

Bw—11 to 38 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; very friable; few very fine pores; few very fine roots; slightly acid; clear wavy boundary.

C—38 to 60 inches; dark yellowish brown (10YR 3/4) fine sandy loam; massive; very friable; slightly acid.

The thickness of the solum ranges from 35 to 60 inches or more. Gravel and cobbles make up 0 to 15 percent, by volume, of the profile. Some pedons have strata containing 15 to 50 percent gravel and cobbles, by volume, below a depth of 40 inches. Flakes of mica are few or common in the 10- to 40-inch control section and range from few to many below a depth of 40 inches. The soils range from strongly acid to neutral in the A horizon and the upper part of the B horizon and from strongly acid to slightly acid in the lower part of the B horizon and in the C horizon.

The A or Ap horizon has hue of 10YR and value and chroma of 2 or 3. It ranges from 10 to 20 inches in thickness.

The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it has few to many iron depletions with chroma of 2 or less below a depth of 20 inches. The texture is loam, fine sandy loam, sandy loam, or silt loam.

The C horizon has hue of 7.5YR, value of 3 to 5, and chroma of 4 to 6; hue of 10YR, value of 3 to 5, and chroma of 2 to 6; or hue of 2.5Y and value and chroma of 4 to 6. It is loam, loamy sand, sandy loam, or fine sandy loam in the fine-earth fraction.

Saunook Series

The Saunook series consists of very deep, well drained, moderately permeable soils. These soils are in coves and drainageways and on benches, fans, and toe slopes of intermountain hills and low mountains. They formed in colluvium derived from materials of felsic to mafic high-grade metamorphic or igneous rock. Slope ranges from 2 to 50 percent. Elevation ranges from 2,500 to 3,500 feet. The soils are fine-loamy, mixed, mesic Humic Hapludults.

Saunook soils are commonly adjacent to Braddock, Cowee, Dillsboro, Evard, Hayesville, and Trimont soils. Cowee, Evard, Hayesville, and Trimont soils may be underlain by saprolite. They formed in residuum on ridges and side slopes. Trimont soils are on the cooler aspects. Braddock and Dillsboro soils are clayey. They are on high stream terraces.

Typical pedon of Saunook loam, 15 to 30 percent slopes, stony; about 1.0 mile east of Waynesville on U.S. Highway 276, about 0.6 mile south on Secondary Road 1130, about 0.1 mile southeast on a private road, 120 feet north of the road in an apple orchard (State plane coordinates 648,000 feet N., 822,000 feet E.):

Ap—0 to 9 inches; dark brown (10YR 3/3) loam, brown (10YR 4/3) dry; weak fine and medium granular structure; very friable; common very fine and fine pores; many fine and few medium and coarse roots; about 3 percent gravel and 3 percent cobbles, by volume; few fine flakes of mica; moderately acid; abrupt smooth boundary.

Bt1—9 to 28 inches; dark yellowish brown (10YR 4/6) loam; weak medium subangular blocky structure; friable; few fine and common medium pores; common fine and few medium and coarse roots; few faint clay films on faces of peds and in pores; about 4 percent gravel, 3 percent cobbles, and 1 percent stones, by volume; common fine flakes of mica; slightly acid; gradual wavy boundary.

Bt2—28 to 34 inches; dark yellowish brown (10YR 4/6) cobbly loam; weak medium subangular blocky structure; friable; common medium pores; few fine roots; few faint clay films on faces of peds and in pores; about 10 percent gravel, 15 percent cobbles, and 5 percent stones, by volume; common fine flakes of mica; slightly acid; gradual wavy boundary.

BC—34 to 65 inches; yellowish brown (10YR 5/6) cobbly sandy loam; weak fine subangular blocky structure; very friable; about 10 percent gravel, 12 percent cobbles, and 3 percent stones, by volume; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The content of gravel, cobbles, and stones is 0 to 15 percent in the A horizon and as much as 35 percent in the Bt horizon. The BC horizon and C horizon, if it occurs, have as much as 60 percent gravel, cobbles, and stones. Flakes of mica are few or common. Reaction ranges from extremely acid to moderately acid in the surface layer unless limed. It

ranges from very strongly acid to slightly acid in the other horizons.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 2 to 4 or has hue of 7.5YR, value of 3, and chroma of 2 to 4. It ranges from 6 to 15 inches in thickness.

The Bt horizon dominantly has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. In some pedons the lower part of this horizon has hue of 5YR, value of 4 to 6, and chroma of 4 to 8. The horizon is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The BC horizon has colors similar to those of the Bt horizon. It is fine sandy loam, sandy loam, loam, or sandy clay loam in the fine-earth fraction.

The C horizon, if it occurs, is colluvial material that is variable in color and is loamy in the fine-earth fraction.

Soco Series

The Soco series consists of moderately deep, well drained, moderately rapidly permeable soils. These soils are on ridges and side slopes of low and intermediate mountains. They formed in residuum affected by soil creep that weathered from low-grade metasedimentary rock, such as phyllite, slate, and thinly bedded metasandstone. Slope ranges from 30 to 95 percent. Elevation ranges from 1,500 to 4,800 feet. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Soco soils are commonly adjacent to Brasstown, Cataska, Cheoah, Junaluska, Spivey, Stecoah, and Whiteoak soils. Brasstown and Junaluska soils are fine-loamy. They have a subsoil with hue of 2.5YR to 7.5YR. Cataska soils are loamy-skeletal. They are shallow to soft bedrock. Cheoah soils have an umbric epipedon. They are on cool aspects at elevations between 3,500 and 4,800 feet. Cheoah and Stecoah soils are deep to soft bedrock. Spivey and Whiteoak soils are very deep. They formed in colluvium in coves and drainageways.

Typical pedon of Soco channery loam in an area of Soco-Stecoah complex, 50 to 95 percent slopes; about 6.3 miles west on U.S. Forest Service Road 288 from the Harmon Den Exit on Interstate Highway 40, about 150 feet northeast of the road in a wooded area (State plane coordinates 745,000 feet N., 794,000 feet E.):

A—0 to 2 inches; dark yellowish brown (10YR 4/4) channery loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; common very fine to medium pores; many very fine to medium roots; about 15 percent channers and 3 percent flagstones, by volume; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

Bw—2 to 19 inches; yellowish brown (10YR 5/4) flaggy loam; weak fine subangular blocky structure; friable; common very fine and fine pores; many very fine to medium roots; about 5 percent channers and 18 percent flagstones, by volume; few fine flakes of mica; extremely acid; gradual wavy boundary.

BC—19 to 26 inches; yellowish brown (10YR 5/6) flaggy sandy loam; massive; friable; few very fine pores; common very fine to medium roots; about 5 percent channers and 25 percent flagstones, by volume; few fine flakes of mica; extremely acid; gradual wavy boundary.

Cr—26 to 60 inches; weathered, multicolored low-grade metasedimentary bedrock that is partially consolidated but can be dug with difficulty with a spade.

The thickness of the solum ranges from 17 to 39 inches. The depth to soft bedrock ranges from 20 to 40 inches. Channers and flagstones commonly make up 10 to 25 percent, by volume, of the profile but range from 5 to 35 percent. Flakes of mica are few or common. The soils range from extremely acid to strongly acid unless limed.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. Where it has value of 3 and chroma of 2 or 3, the horizon is less than 7 inches thick.

The Bw and BC horizons have hue of 10YR, value of 4 to 6, and chroma of 4 to 8. They are fine sandy loam, loam, or silt loam in the fine-earth fraction.

The C horizon, if it occurs, is multicolored saprolite that weathered from low-grade metasedimentary rock. It is fine sandy loam, loam, or silt loam.

The Cr horizon is weathered, multicolored low-grade metasedimentary rock that is partially consolidated but can be dug with difficulty with a spade.

Spivey Series

The Spivey series consists of very deep, well drained, moderately permeable or moderately rapidly permeable soils. These soils are in coves and drainageways and on benches, fans, and toe slopes of low and intermediate mountains. They formed in colluvial material derived from low-grade metasedimentary rock, such as phyllite, slate, and metasandstone. Slope ranges from 30 to 50 percent. Elevation ranges from 2,500 to 4,800 feet. The soils are loamy-skeletal, mixed, mesic Typic Haplumbrepts.

Spivey soils are commonly adjacent to Cheoah, Soco, Stecoah, and Whiteoak soils. Cheoah, Soco, and Stecoah soils are coarse-loamy. They formed in residuum on ridges and side slopes. Whiteoak soils are fine-loamy and have less than 35 percent rock fragments.

Typical pedon of Spivey cobbly loam in an area of

Spivey-Whiteoak complex, 30 to 50 percent slopes, extremely bouldery; about 0.5 mile south along Campbell Creek Road from U.S. Highway 19 in Maggie Valley, 2.3 miles along a private road parallel to the right hand fork of Campbell Creek, about 300 feet west of the road in a wooded area (State plane coordinates 657,500 feet N., 772,500 feet E.):

A—0 to 13 inches; very dark brown (10YR 2/2) cobbly loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium granular structure; very friable; common very fine and fine pores; many very fine and fine, common medium, and few coarse roots; about 10 percent gravel, 20 percent cobbles, and 15 percent stones, by volume; strongly acid; clear smooth boundary.

Bw1—13 to 32 inches; dark yellowish brown (10YR 4/4) very cobbly loam; weak fine subangular blocky structure; friable; common very fine and fine pores; common very fine and few fine and medium roots; about 10 percent gravel, 20 percent cobbles, and 15 percent stones, by volume; strongly acid; gradual wavy boundary.

Bw2—32 to 60 inches; yellowish brown (10YR 5/6) very cobbly loam; weak fine and medium subangular blocky structure; friable; few very fine and fine pores; few fine and medium roots; about 15 percent gravel, 25 percent cobbles, and 20 percent stones, by volume; gradual wavy boundary; strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. Rock fragments make up 40 to 70 percent, by volume, of the A horizon and the upper part of the Bw horizon and from 30 to 60 percent of the lower part of the Bw horizon. Rock fragments include channers, gravel, cobbles, flagstones, stones, and boulders. The soils are strongly acid to extremely acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The thickness of the umbric epipedon ranges from 10 to 20 inches.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

Statler Series

The Statler series consists of very deep, well drained, moderately permeable soils on low stream terraces. These soils formed in old alluvium washed from material weathered from felsic to mafic high-grade metamorphic or igneous rock. Slope ranges from 0 to 3 percent. Elevation ranges from 2,000 to 3,000 feet. The soils are fine-loamy, mixed, mesic Humic Hapludults.

Statler soils are commonly adjacent to Dillsboro, Hemphill, and Rosman soils. Dillsboro soils are clayey. They are on high stream terraces. Hemphill soils are very poorly drained and are on low stream terraces. They have a clay subsoil. Rosman soils are well drained and moderately well drained and are on flood plains. They are coarse-loamy.

Typical pedon of Statler loam, 0 to 3 percent slopes, rarely flooded; about 1.0 mile east of Clyde on Thickety Road to Dogwood Acres Road, 0.1 mile west of Dogwood Acres Road on Thickety Road, 450 feet northwest of the road in a field (State plane coordinates 674,000 feet N., 840,000 feet E.):

Ap—0 to 9 inches; dark brown (10YR 3/3) loam, yellowish brown (10YR 5/4) dry; moderate medium granular structure; very friable; few very fine and fine pores; common very fine and fine roots; about 2 percent rounded quartz gravel, by volume; few fine flakes of mica; moderately acid; abrupt smooth boundary.

Bt1—9 to 23 inches; dark yellowish brown (10YR 4/6) loam; moderate medium subangular blocky structure; friable; common fine and medium pores; few very fine and fine roots; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; about 5 percent rounded quartz gravel, by volume; common fine flakes of mica; slightly acid; gradual wavy boundary.

Bt2—23 to 40 inches; dark yellowish brown (10YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few fine and medium pores; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; about 5 percent rounded quartz gravel, by volume; few fine flakes of mica; slightly acid; clear wavy boundary.

BC—40 to 53 inches; yellowish brown (10YR 5/6) loam; massive; friable; common fine and medium pores; about 2 percent rounded quartz gravel, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

CB—53 to 60 inches; yellowish brown (10YR 5/8) fine sandy loam; massive; friable; few very fine pores; about 2 percent rounded quartz gravel, by volume; few fine flakes of mica; moderately acid.

The thickness of the solum ranges from about 30 to more than 60 inches. Gravel and cobbles make up 0 to 15 percent, by volume, of the profile. Flakes of mica are few or common. The soils range from strongly acid to moderately acid unless limed.

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

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam, clay loam, or sandy clay loam. In some pedons the lower part of this horizon has iron accumulations in shades of brown and

yellow or iron depletions in shades of gray. Iron depletions with chroma of 2 or less are more than 24 inches below the upper boundary of the Bt horizon.

The BC horizon and the CB horizon, if it occurs, have colors similar to those of the lower part of the Bt horizon. They are fine sandy loam, loam, or clay loam.

The C horizon, if it occurs, has the same colors and textures as the BC horizon. In some pedons this horizon has iron accumulations in shades of brown and yellow or iron depletions in shades of gray.

Stecoah Series

The Stecoah series consists of deep, well drained, moderately rapidly permeable soils. These soils are on ridges and side slopes of low and intermediate mountains. They formed in residuum affected by soil creep that weathered from low-grade metasedimentary rock, such as phyllite, slate, and thinly bedded metasandstone. Slope ranges from 30 to 95 percent. Elevation ranges from 2,500 to 4,800 feet. The soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Stecoah soils are commonly adjacent to Brasstown, Cataska, Cheoah, Junaluska, Soco, Spivey, and Whiteoak soils. Brasstown and Junaluska soils are fine-loamy. They have a subsoil that has hue of 2.5YR to 7.5YR. Cataska soils are loamy-skeletal and are shallow to soft bedrock. Cheoah soils have an umbric epipedon. They are on cool aspects at elevations between 3,500 and 4,800 feet. Soco soils are moderately deep to soft bedrock. Spivey and Whiteoak soils are very deep. They formed in colluvium in coves and drainageways.

Typical pedon of Stecoah channery loam in an area of Soco-Stecoah complex, 50 to 95 percent slopes; about 3.75 miles west on U.S. Forest Service Road 208 from the Harmon Den Exit on Interstate Highway 40, about 0.9 mile southwest on U.S. Forest Service Road 453, about 50 feet west of the road in a clearcut area (State plane coordinates 748,000 feet N., 799,000 feet E.):

Oe—1 inch to 0; partially decomposed roots, leaves, twigs, and needles.

A—0 to 2 inches; dark brown (10YR 3/3) channery loam, brown (10YR 5/3) dry; weak fine granular structure; very friable; many very fine and fine pores; many very fine and fine roots; about 12 percent channers and 3 percent flagstones, by volume; few fine flakes of mica; extremely acid; clear smooth boundary.

Bw—2 to 27 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; very friable; few fine and medium roots; few fine flakes of mica; extremely acid; gradual wavy boundary.

BC—27 to 32 inches; yellowish brown (10YR 5/6) fine sandy loam; massive; very friable; few fine and medium roots; few fine flakes of mica; extremely acid; gradual wavy boundary.

C—32 to 44 inches; multicolored saprolite of sandy loam; massive; very friable; few fine flakes of mica; extremely acid; gradual wavy boundary.

Cr—44 inches; weathered, multicolored bedrock that is partially consolidated but can be dug with difficulty with a spade.

The thickness of the solum ranges from 24 to 50 inches. The depth to soft bedrock ranges from 40 to 60 inches. Channers and flagstones commonly make up 5 to 20 percent, by volume, of the profile but can make up as much as 35 percent. Flakes of mica are few or common. The soils range from extremely acid to strongly acid unless limed.

The A horizon has hue of 10YR and value and chroma of 2 to 4. Where it has value and chroma of 2 or 3, the horizon is less than 7 inches thick.

The Bw and BC horizons have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. They are loam, fine sandy loam, or silt loam in the fine-earth fraction.

The C horizon is multicolored saprolite that weathered from low-grade metasedimentary rock. It is fine sandy loam, sandy loam, loam, or silt loam in the fine-earth fraction.

The Cr horizon is multicolored, weathered low-grade metasedimentary rock that is partially consolidated but can be dug with difficulty with a spade.

Tanasee Series

The Tanasee series consists of very deep, well drained, moderately rapidly permeable soils. These soils are in coves and drainageways and on fans and benches of high mountains. They formed in colluvial material weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite gneiss, mica gneiss, and hornblende gneiss. Slope ranges from 8 to 50 percent. Elevation is more than 4,800 feet. The soils are coarse-loamy, mixed, frigid Typic Haplumbrepts.

Tanasee soils are commonly adjacent to Balsam, Burton, Craggey, and Wayah soils. Balsam soils are loamy-skeletal. They are in coves and drainageways. Burton, Craggey, and Wayah soils formed in residuum on ridges and side slopes. Burton soils are moderately deep, and Craggey soils are shallow. Wayah soils have a C horizon of saprolite.

Typical pedon of Tanasee sandy loam in an area of

Tanasee-Balsam complex, 15 to 30 percent slopes, very stony; about 15 miles south of Waynesville on U.S. Highway 276 and North Carolina Highway 215, about 6.2 miles west-northwest on the Blue Ridge Parkway from its intersection with North Carolina Highway 215, about 150 feet southwest of the parkway in a wooded area (State plane coordinates 604,000 feet N., 817,000 feet E.):

Oe—1 inch to 0; mat of roots and partially decomposed twigs, leaves, and needles.
A1—0 to 7 inches; black (10YR 2/1) sandy loam, very dark brown (10YR 2/2) dry; weak fine and medium granular structure; very friable; many fine to coarse roots; about 2 percent gravel, 5 percent cobbles, and 1 percent stones, by volume; few fine flakes of mica; extremely acid; gradual wavy boundary.
A2—7 to 13 inches; very dark brown (10YR 2/2) sandy loam, dark brown (10YR 3/3) dry; weak fine and medium granular structure; friable; common fine to coarse roots; about 2 percent gravel, 5 percent cobbles, and 1 percent stones, by volume; few fine flakes of mica; very strongly acid; gradual wavy boundary.
Bw—13 to 31 inches; yellowish brown (10YR 5/8) sandy loam; weak fine and medium subangular blocky structure; very friable; common fine to coarse roots; about 5 percent gravel, 7 percent cobbles, and 2 percent stones, by volume; common fine flakes of mica; very strongly acid; gradual wavy boundary.
C1—31 to 51 inches; dark yellowish brown (10YR 4/6) cobbly loamy coarse sand; massive; very friable; few fine and medium roots; about 15 percent gravel, 10 percent cobbles, and 5 percent stones, by volume; common fine and medium flakes of mica; very strongly acid; gradual wavy boundary.
C2—51 to 65 inches; multicolored saprolite of gravelly loamy sand; massive; very friable; about 13 percent gravel and 3 percent cobbles, by volume; common fine and medium flakes of mica; very strongly acid.

The thickness of the solum ranges from 24 to 57 inches. Gravel, cobbles, and stones commonly make up 5 to 35 percent, by volume, of the profile in the upper 40 inches and as much as 60 percent below a depth of 40 inches. Flakes of mica are few or common. The soils range from extremely acid to strongly acid unless limed.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3, has hue of 7.5YR, value of 2 or 3, chroma of 1 or 2, or is neutral in hue and has value of 2 or 3. It ranges from 10 to 20 inches in thickness.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, sandy loam, or loam in the fine-earth fraction.

The C horizon is variable in color. It consists of loamy or sandy colluvium or saprolite that weathered in place from large colluvial rock fragments. It ranges from coarse sand to fine sandy loam in the fine-earth fraction.

The Tanasee soils in map units TeC2 and TeD2 are considered taxadjuncts to the series because they have a surface layer that is slightly thinner than that defined for the series.

Trimont Series

The Trimont series consists of very deep, well drained, moderately permeable soils. These soils are on cool side slopes and at the head of coves on low mountains. They formed in residuum that was affected by soil creep in the upper part and that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite gneiss, hornblende gneiss, and mica gneiss. Slope ranges from 30 to 95 percent. Elevation ranges from 2,500 to 3,500 feet. The soils are fine-loamy, mixed, mesic Humic Hapludults.

Trimont soils are commonly adjacent to Cowee, Evard, Fannin, Hayesville, and Saunook soils. Cowee, Evard, Fannin, and Hayesville soils have an ochric epipedon that is thinner or lighter colored than that of the Trimont soils. They are on the warmer aspects. Hayesville soils are clayey. Fannin soils are micaceous. Saunook soils do not have a C horizon of saprolite. They formed in colluvium in coves and drainageways.

Typical pedon of Trimont gravelly loam, 50 to 95 percent slopes, stony; about 2.2 miles west of Waynesville on Secondary Road 1173 to Water Rock Estates Road, 0.25 mile south on Water Rock Estates Road to the first road on the left, 150 feet west of the intersection in a wooded area (State plane coordinates 654,000 feet N., 795,000 feet E.):

A—0 to 7 inches; dark brown (10YR 3/3) gravelly loam, yellowish brown (10YR 5/4) dry; weak fine granular structure; very friable; common very fine to medium and few coarse pores; many very fine and common fine to coarse roots; about 12 percent gravel, 3 percent cobbles, and 2 percent stones, by volume; few fine flakes of mica; moderately acid; clear smooth boundary.
Bt—7 to 32 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; few very fine to medium pores; common very fine to medium and few coarse roots; very few faint strong brown (7.5YR 4/6) clay films on faces of peds; about 5 percent gravel, 3 percent cobbles, and 3 percent stones, by volume; common fine flakes of mica; strongly acid; gradual wavy boundary.

BC—32 to 38 inches; strong brown (7.5YR 5/8) loam; weak fine subangular blocky structure; very friable; few very fine and fine pores; few very fine to medium roots; about 10 percent gravel, 4 percent cobbles, and 1 percent stones, by volume; common fine flakes of mica; strongly acid; gradual wavy boundary.

C—38 to 60 inches; multicolored saprolite of gravelly sandy loam; massive; very friable; about 15 percent gravel, 3 percent cobbles, and 2 percent stones, by volume; common fine flakes of mica; moderately acid.

The thickness of the solum ranges from 27 to 60 inches. Gravel, cobbles, and stones make up 15 to 35 percent, by volume, of the A horizon and 5 to 35 percent of the lower horizons. Flakes of mica are few or common. The soils range from very strongly acid to moderately acid.

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

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam, loam, or clay loam in the fine-earth fraction.

The BC horizon has colors similar to those of the Bt horizon. It is loam, fine sandy loam, or sandy loam in the fine-earth fraction.

The C horizon is multicolored saprolite that weathered from felsic to mafic high-grade metamorphic or igneous rock. It is loam, sandy loam, or fine sandy loam in the fine-earth fraction.

Tuckasegee Series

The Tuckasegee series consists of very deep, well drained, moderately rapidly permeable soils. These soils are in coves and drainageways and on fans, benches, and toe slopes of low and intermediate mountains (fig. 22). They formed in colluvium derived from materials weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite, granite gneiss, mica gneiss, hornblende gneiss, and schist. Slope ranges from 15 to 50 percent. Elevation ranges from 3,500 to 4,800 feet. The soils are fine-loamy, mixed, mesic Typic Haplumbrepts.

Tuckasegee soils are commonly adjacent to Chestnut, Cullasaja, Edneyville, and Plott soils. Chestnut, Edneyville, and Plott soils may have a C horizon of saprolite. They formed in residuum on ridges and side slopes. Cullasaja soils are loamy-skeletal.

Typical pedon of Tuckasegee gravelly loam in an area of Tuckasegee-Cullasaja complex, 30 to 50 percent slopes, extremely stony; about 2 miles southeast of Sunburst Campground on North Carolina Highway 215, about 300 feet west of the road in a wooded area (State plane coordinates 607,000 feet N., 832,000 feet E.):

A—0 to 11 inches; very dark grayish brown (10YR 3/2) gravelly loam, brown (10YR 4/3) dry; weak medium granular structure; very friable; few fine pores; many very fine to coarse roots; about 10 percent gravel, 5 percent cobbles, and 5 percent stones, by volume; few fine flakes of mica; moderately acid; clear smooth boundary.

AB—11 to 14 inches; dark yellowish brown (10YR 3/4) gravelly loam; moderate medium granular structure; friable; few fine pores; common very fine to medium and few coarse roots; about 10 percent gravel, 5 percent cobbles, and 5 percent stones, by volume; few fine flakes of mica; strongly acid; clear wavy boundary.

Bw—14 to 39 inches; dark yellowish brown (10YR 4/6) gravelly sandy loam; weak fine subangular blocky structure; friable; common fine pores; common medium and few very fine to coarse roots; about 10 percent gravel, 5 percent cobbles, and 8 percent stones, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

BC—39 to 60 inches; yellowish brown (10YR 5/6) gravelly sandy loam; massive; friable; common fine pores; few medium roots; about 10 percent gravel, 5 percent cobbles, and 15 percent stones, by volume; few fine flakes of mica; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. Gravel, cobbles, and stones commonly make up 15 to 35 percent, by volume, of the profile but range from 5 to 50 percent. The 10- to 40-inch control section has an average of less than 35 percent rock fragments, by volume. Flakes of mica are few or common. The soils range from very strongly acid to moderately acid unless limed.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3.

The AB horizon has hue of 7.5YR or 10YR and value and chroma of 3 or 4. It is fine sandy loam, sandy loam, or loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is fine sandy loam, sandy loam, loam, or sandy clay loam in the fine-earth fraction.

The BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is fine sandy loam, sandy loam, or loam in the fine-earth fraction.

The C horizon, if it occurs, is colluvium that is similar in color to the BC horizon or is multicolored. It is fine sandy loam, sandy loam, loam, or loamy sand in the fine-earth fraction.

Udorthents

Udorthents consist of soils in areas where the natural soil layers have been destroyed by earthmoving activities. Because operations, such as scraping, backfilling, trenching, and excavating, have completely altered soil characteristics, the original series cannot be identified. The excavated areas are mainly borrow pits from which soil material has been removed and used as foundation material for roads or buildings. The fill areas are sites where loamy material at least 20 inches thick covers the natural soil, including sites for landfills, building sites, industrial sites, and sites for playgrounds. These areas occur in any landscape position and are well drained and moderately well drained.

Because of the variability of Udorthents, a typical pedon is not described. The soils are commonly 2 to 20 feet thick but range to more than 50 feet in thickness. Areas of landfills contain layers of nonsoil material that are covered with 2 to 3 feet of soil material.

Udorthents are variable in color and are in shades of red, yellow, and brown. The texture is variable and includes loam, sandy loam, sandy clay loam, clay loam, or clay. Reaction ranges from extremely acid to moderately alkaline in areas where industrial waste having a high content of lime has been deposited.

Wayah Series

The Wayah series consists of very deep, well drained, moderately rapidly permeable soils. These soils are on ridges and side slopes of high mountains. They formed in residuum that was affected by soil creep in the upper part and that weathered from felsic to mafic high-grade metamorphic or igneous rock, such as granite gneiss and hornblende gneiss. Slope ranges from 2 to 95 percent. Elevation is more than 4,800 feet. The soils are coarse-loamy, mixed, frigid Typic Haplumbrepts.

Wayah soils are commonly adjacent to Balsam, Burton, Craggey, and Tanasee soils. Balsam and Tanasee soils do not have a C horizon of saprolite. They formed in colluvium in coves and drainageways. Burton soils are moderately deep to hard bedrock. Craggey soils are shallow to hard bedrock.

Typical pedon of Wayah sandy loam, 50 to 95 percent slopes, stony; about 4.5 miles east-northeast on the Blue Ridge Parkway from the Richland Balsam Overlook on the parkway, 300 feet northeast in a wooded area (State plane coordinates 595,000 feet N., 821,000 feet E.):

Oe—1 inch to 0; partially decomposed leaves and twigs.

A1—0 to 8 inches; very dark brown (10YR 2/2) sandy loam, brown (10YR 4/3) dry; moderate fine granular structure; friable; many very fine and fine and common medium and coarse pores; many very fine to coarse roots; about 5 percent gravel, 3 percent cobbles, and 1 percent stones, by volume; few fine flakes of mica; very strongly acid; clear smooth boundary.

A2—8 to 13 inches; dark brown (10YR 3/3) sandy loam, dark yellowish brown (10YR 4/4) dry; weak fine granular structure; very friable; many very fine and fine and common medium and coarse pores; many very fine to coarse roots; about 5 percent gravel, 2 percent cobbles, and 1 percent stones, by volume; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bw1—13 to 28 inches; yellowish brown (10YR 5/8) sandy loam; weak fine subangular blocky structure; friable; few very fine to medium pores; common very fine to coarse roots; about 5 percent gravel, 2 percent cobbles, and 1 percent stones, by volume; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bw2—28 to 33 inches; dark yellowish brown (10YR 4/6) gravelly sandy loam; weak fine subangular blocky structure; very friable; few fine and medium pores; few fine to coarse roots; about 12 percent gravel, 5 percent cobbles, and 3 percent stones, by volume; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—33 to 60 inches; yellowish brown (10YR 5/4) saprolite of gravelly sandy loam; massive; very friable; few fine pores; few fine to coarse roots; about 15 percent gravel, 5 percent cobbles, and 5 percent stones, by volume; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 50 inches. The depth to bedrock is more than 60 inches. Gravel, cobbles, and stones make up 5 to 15 percent, by volume, of the A horizon and 5 to 35 percent of the other horizons. Flakes of mica are few or common. The soils range from extremely acid to moderately acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It ranges from 10 to 20 inches in thickness.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is fine sandy loam, loam, or sandy loam in the fine-earth fraction.

The C horizon has colors similar to those of the Bw horizon or is multicolored. It is saprolite that weathered from felsic or intermediate high-grade metamorphic or igneous rock. The texture is loamy sand, sandy loam, fine sandy loam, or loam in the fine-earth fraction.

The Wayah soils in map units WhB2, WhC2, WhD2,

WhE2, and WhF2 are considered taxadjuncts to the series because they have a surface layer that is slightly thinner than that defined for the series.

Whiteoak Series

The Whiteoak series consists of very deep, well drained, moderately permeable soils. These soils are in coves and drainageways and on fans, benches, and toe slopes of intermountain hills and low and intermediate mountains. They formed in colluvium derived from materials weathered from low-grade metasedimentary rock, such as phyllite, slate, and metasandstone. Slope ranges from 8 to 50 percent. Elevation ranges from 1,400 to 4,000 feet. The soils are fine-loamy, mixed, mesic Umbric Dystrochrepts.

Whiteoak soils are commonly adjacent to Brasstown, Cheoah, Junaluska, Soco, Spivey, and Stecoah soils. Brasstown, Cheoah, Junaluska, Soco, and Stecoah soils have a C horizon of saprolite. They formed in residuum on ridges and side slopes. Spivey soils are loamy-skeletal.

Typical pedon of Whiteoak cobbly loam, 8 to 15 percent slopes, stony; about 5.75 miles from the Fines Creek Exit on Interstate Highway 40, on White Oak Road to a metal gate, 250 feet southwest of the gate in a wooded area (State plane coordinates 719,500 feet N., 796,900 feet E.):

Oe—1 inch to 0; partially decomposed deciduous leaves, twigs, needles, and roots.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) cobbly loam, brown (10YR 5/3) dry; weak medium granular structure; very friable; many very fine to medium and common coarse roots; about 20 percent cobbles, 5 percent channers, and 2 percent stones, by volume; very strongly acid; clear smooth boundary.

BA—9 to 12 inches; brown (10YR 4/3) loam; weak fine subangular blocky structure; friable; common very fine and fine and few medium and coarse roots; about 5 percent channers and 1 percent flagstones, by volume; very strongly acid; clear wavy boundary.

Bw1—12 to 23 inches; yellowish brown (10YR 5/4) loam; moderate fine and medium subangular blocky structure; friable; few very fine to medium roots; about 5 percent channers, 1 percent flagstones, and 1 percent stones, by volume; very strongly acid; gradual wavy boundary.

Bw2—23 to 34 inches; yellowish brown (10YR 5/4) channery loam; moderate fine and medium subangular blocky structure; friable; few very fine to medium roots; about 20 percent channers, 5 percent flagstones, and 2 percent stones, by volume; very strongly acid; gradual wavy boundary.

BC—34 to 62 inches; yellowish brown (10YR 5/4) very flaggy loam; weak fine subangular blocky structure; very friable; few very fine and fine roots; about 20 percent channers, 15 percent flagstones, and 5 percent stones, by volume; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock is greater than 60 inches. The content of rock fragments is as much as 35 percent in the A and Bw horizons and can be as much as 60 percent in the BC and C horizons. The quantity of flakes of mica range from none to common. The soils range from very strongly acid to moderately acid unless limed.

The A or Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 4.

The BA horizon or AB horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 4 to 6. The texture is loam, silt loam, or fine sandy loam in the fine-earth fraction.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, silt loam, sandy clay loam, clay loam, or silty clay loam in the fine-earth fraction.

The BC horizon or the CB horizon, if it occurs, has the same range in color as the Bw horizon. The texture is loam, sandy loam, fine sandy loam, or silt loam in the fine-earth fraction.

The C horizon, if it occurs, is variable in color. It consists of colluvial material that has the same textures as the BC horizon.

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Glossary

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

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Access road. A road constructed to facilitate the use and management of the land. Access roads are designed for limited traffic and typically consist of a cut slope, a roadbed, and a fill outslope.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams. Old alluvium refers to the parent materials of soils on stream terraces. Recent alluvium refers to the parent materials of soils on flood plains.

Amphibolite. A metamorphic rock consisting mainly of amphibole and plagioclase with little or no quartz. As the content of quartz increases, the rock grades to hornblende plagioclase gneiss.

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.

Aspect. The direction in which a land surface faces. Generally, cool aspects are north- or east-facing and warm aspects are south- or west-facing.

Atterberg limits. Atterberg limits are measured for soil materials passing the No. 40 sieve. They include the liquid limit (LL), which is the moisture content at which the soil passes from a plastic to a liquid state, and the plastic limit (PL), which is the water content corresponding to an arbitrary limit between the plastic and semisolid states of consistency of a soil.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Ball and burlap harvest. A method of harvesting nursery plants in which burlap is wrapped around a ball of soil that is attached to the root system.

Basal area. The cross-sectional area of a tree bole measured at 4.5 feet above ground level. Generally expressed in square feet of cross-sectional area per acre.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-based dips. Short sections of access road having a reverse grade that intercept storm water. The dips are spaced about 200 feet apart and are designed to divert water away from stream crossings or steep grades.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most systems involve a drum, pole, and wire cables using the same principle as that of a rod and reel for fishing. Generally, felled trees are yarded or reeled in with one end lifted or completely suspended to reduce friction and soil disturbance.

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.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, phyllite, or schist as much as 6 inches along the longest axis. A single piece is called a fragment or channer.

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.

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay by weight within the control section. The content of rock fragments is less than 35 percent, by volume.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvial fan. A fan-shaped area of soils deposited by mass-wasting (direct gravitational action) and local unconcentrated runoff on and at the base of steeper side slopes.

Colluvium. Soil material, 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 constructing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil 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 are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cove. The gently sloping to very steep, concave colluvial area at the head of drainageways in Piedmont and mountainous areas. Coves commonly have higher tree site indices than surrounding slopes.

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.

Crop residue management. Use of that portion of the plant or crop left in the field after harvest for protection or improvement of the soil.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delineation. The process of drawing or plotting features on a map with lines and symbols.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

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

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high, they can have moderate or high slope gradients.

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

Drainageway. A narrow, gently sloping to very steep, concave colluvial area along an intermittent or perennial stream.

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.

Engineering test data. Laboratory test and mechanical analysis of selected soils in the survey area.

Eroded (soil phase). Because of erosion, the soil has lost an average of 25 to 75 percent of the original A horizon or the uppermost 2 to 6 inches if the original A horizon was less than 8 inches thick.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human

or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:

Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most areas, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.

Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. A term describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in metric tons per hectare (values determined by the universal soil loss equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per hectare	none
Less than 2.5 tons per hectare	slight
2.5 to 10 tons per hectare	moderate
10 to 25 tons per hectare	severe
More than 25 tons per hectare	very severe

Evapotranspiration. The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not 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 grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Felsic rock. A general term for light-colored igneous rock and some high-grade metamorphic rocks that have an abundance of quartz, feldspars, feldspathoids, and muscovite mica.

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.

Field border. A strip of perennial vegetation (trees, shrubs, or herbaceous plants) established on the edge of a field to control erosion, provide travel lanes for farm machinery, reduce competition from adjacent woodland, or provide food and cover for wildlife.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface made by excavating soil material from the road cut. It is usually on the downhill side of the road.

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

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, phyllite, slate, or schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flooding. The temporary covering of the surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under usual weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent*

means that flooding occurs under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), or *very long* (more than 1 month).

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

Foot slope. The inclined surface at the base of a hill.

Forest type. A classification of forest land based on the species forming the majority of live-tree stocking.

Fragile (in tables). The soil is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture can damage roads, buildings and other structures, and plant roots.

Gap. A concave, lower area between ridge crests that generally has lesser slope.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Geotextile. A permeable fabric filter cloth that is not degradable if buried. It is used to increase the strength of roadbeds.

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

Gneiss. A coarse-grained metamorphic rock in which bands rich in granular minerals alternate with bands that are predominantly schistose minerals. It is commonly formed by the metamorphism of granite.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Granite. A coarse-grained igneous rock dominated by light-colored minerals, consisting of about 50 percent orthoclase and 25 percent quartz with the balance being plagioclase feldspars and ferromagnesian silicates. Granites and granodiorites comprise 95 percent of all intrusive rocks.

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 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water (geology). 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.

Head slope. A concave, horseshoe-shaped slope on a mountain landscape at the beginning of an intermittent drainageway.

High-grade metamorphic rocks. Highly metamorphosed rocks, such as gneiss and schist.

High mountains. That part of the landscape that is above an elevation of about 4,800 feet. It is dominated by frigid soil temperatures.

High stream terrace. A terrace in an area that no longer floods, commonly 20 feet or more higher in elevation than the adjacent flood plain.

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 at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true

soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Hornblende. A rock-forming ferromagnesian silicate mineral of the amphibole group.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification of molten or partly molten rock, generally crystalline in nature.

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.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermediate mountains. That part of the landscape that ranges from about 3,500 to 4,800 feet in elevation. It is dominated by mesic soil temperatures.

Intermediate rock. Igneous or metamorphic rock that is intermediate in composition between mafic and felsic rock.

Intermountain hills. Low-lying hills that are in valleys between mountain ranges. These areas predominantly have mesic soil temperatures.

Landscape. A section or portion of the land. The land in this survey area is divided into high, intermediate, or low mountains; low rolling hills; stream terraces; and flood plains. A landscape can be further divided into side slopes, back slopes, head slopes, toe slopes, foot slopes, ridgetops, ridge noses, and spur ridges.

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 that are 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Lateral support. The natural foundation of landscapes that tends to hold sloping soils in place and helps to resist landslides.

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

Line-out bed. An area in a plant nursery where seedlings are grown in closely spaced rows to a predetermined size.

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

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

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Low mountains. That part of the landscape that ranges from about 2,500 to 3,500 feet in elevation. It is dominated by mesic soil temperatures.

Low rolling hills. That part of the landscape that ranges from about 1,900 to 2,500 feet in elevation. It is dominated by mesic soils. This landscape has broad ridges and short side slopes.

Low stream terrace. A terrace in an area that floods, commonly 3 to 10 feet higher in elevation than the adjacent flood plain.

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

Mafic rock. A general term for dark igneous rock composed predominantly of magnesium silicates. It can contain small amounts of quartz, feldspar, or muscovite mica.

Mast. The fruit of forest trees and shrubs, such as acorns, beechnuts, and berries, that is used for food by wildlife.

Mean annual increment. The average annual volume of a stand of trees from the year of origin to the age under consideration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

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

Metasedimentary rock. Metamorphosed sedimentary rocks, such as phyllite, metasandstone, and conglomerate. In this survey area, these rocks generally have a low grade of metamorphism.

Micas. A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

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

Narrow-base terrace. A terrace that is no more than 4 to 8 feet wide at the base. A narrow-base terrace and a broad-base terrace are similar, except for the width of the ridge and channel.

Native pasture. Pasture that has seeded naturally in native grasses. It is on slopes too steep to manage with modern machinery.

No-till planting. A method of planting crops in which there is virtually no seedbed preparation. A thin slice of the soil is opened, and the seed is planted at the desired depth.

Nose slope. The downward sloping convex end of a main ridge or spur ridge.

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.

Outsloped roads. Roads that have a slightly tilted roadbed, which diverts waterflow off the downhill side.

Overstory. The portion of the trees in a forest stand forming the upper crown cover.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

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 to move downward through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

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

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid 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.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
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
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Reforestation. The process in which tree seedlings are planted or become naturally established in an area that was once forested.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. See Ridgetop.

Ridge nose. The downward sloping convex terminal point of a main ridge or spur ridge.

Ridgetop. The crest of a hill or mountain.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

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

Road cut. A sloping surface made by mechanical means during road construction. It is generally on the uphill section of a road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

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

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

Runoff class (surface). Refers to the rate at which

water flows away from the soil over the surface without infiltrating. Six runoff classes are recognized:

Ponded.—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level to nearly level soils in depressions. The water depth may fluctuate greatly.

Very slow.—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very open.

Slow.—Surface water flows away so slowly that free water stands on the surface for moderate periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

Medium.—Surface water flows away fast enough for free water to stand on the surface for only short periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level or gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

Rapid.—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly moderately steep or steep and have a moderate or slow rate of absorption.

Very rapid.—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

Saddle. A localized concave dip in a main ridge where intermittent drainage starts to form on the adjacent side slope.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

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

Schist. A metamorphic rock dominated by fibrous or platy minerals. It has schistose cleavage and is a product of regional metamorphism.

Seasonal high water table. The highest level of a saturated zone (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Seep. A small area where water oozing through the soil causes the surface to remain wet but water does not flow on the surface.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

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

Shoulder. The landscape position, parallel to the ridgetop, that is directly below the ridgetop and directly above the side slope.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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 soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site

based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Skid trails. The paths left from skidding logs and the bulldozer or tractor used to pull them.

Skidding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most systems involve pulling the trees with wire cables attached to a bulldozer or rubber-tired tractor. Generally, felled trees are skidded or pulled with one end lifted to reduce friction and soil disturbance.

Slate. A fine grained metamorphic rock with well developed slaty cleavage. Formed by the low-grade regional metamorphism of shale.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, slope classes are as follows:

Nearly level	0 to 3 percent
Gently sloping	2 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 30 percent
Steep	30 to 50 percent
Very steep	50 to 95 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

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.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil compaction. An alteration of soil structure that ultimately can affect the biological and chemical properties of the soil. Compaction decreases the extent of voids and increases bulk density.

Soil creep. The slow mass movement of soil and soil materials downslope, primarily under the influence of gravity, facilitated by water saturation and by alternating periods of freezing and thawing.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. Soil map units generally are designed to reflect significant differences in use and management.

Soil puddling. This condition occurs in certain soils if they are driven on when they are wet. Exertion of mechanical force destroys the soil structure by compression and shearing and results in the rearrangement of the soil particles to a massive or nonstructural state.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Soil strength. The load-supporting capacity of a soil at specific moisture and density conditions.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Specialty crop. Crops, such as Fraser firs grown for Christmas trees, that require intensive management and a specific combination of soils and climate.

Spring. A small area where water moves through the soil and flows on the surface.

Spur ridge. A sharply convex portion of a mountain side slope extending from the main ridge to some point at a lower elevation.

Stand density. The degree to which an area is covered with living trees. It is usually expressed in units of basal area per acre, number of trees per acre, or the percentage of ground covered by the tree canopy as viewed from above.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, thickness of the line can be one fragment or more. It generally overlies material that weathered in place, and it is overlain by recent sediments 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 which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

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.

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 materials typically required for that use. Good results can be expected.
Suited.—The limitations affecting the intended use make special planning, design, or maintenance necessary.
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. Major soil reclamation, special design, or intensive management practices are needed.
Unsuited.—The intended use is very difficult or costly to initiate and maintain, and thus it generally should not be undertaken.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

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."

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.

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.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The textural classes are defined as follows:
Sands (coarse sand, sand, fine sand, and very fine sand).—Soil material in which the content of sand is 85 percent or more and the percentage of silt plus 1½ times the percentage of clay does not exceed 15.
Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus 1½ times the percentage of clay is not less than 15; at the lower limit, the content of sand is 70 to 85 percent and the percentage of silt plus twice the percentage of clay does not exceed 30.
Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more soil material in which the content of clay is less than 7 percent, the content of silt is less than 50 percent, and the content of sand is 43 to 52 percent.
Loam.—Soil material that contains 7 to 27 percent

clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam.—Soil material that contains 50 percent or more silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 percent or more silt and less than 12 percent clay.

Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand.

Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay.—Soil material that contains 35 percent or more clay and 45 percent or more sand.

Silty clay.—Soil material that contains 40 percent or more clay and 40 percent or more silt.

Clay.—Soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). An 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.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Universal soil loss equation. An equation used to design systems for controlling water erosion: A=RKLSPC wherein A is the average annual soil loss in tons per acre per year, R is the rainfall factor, K is the soil erodibility factor, L is the length of slope, S is the steepness of slope, P is the conservation practice factor, and C is the cropping and management factor.

Water table (apparent). A thick zone of free water in the soil. The apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table (perched). A saturated zone of water in the soil standing above an unsaturated zone.

Water table (seasonal high). The highest level of a saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

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 process of uprooting trees by the wind.

Windswept. A phase of a soil map unit where hardwood trees have been stunted, twisted, and gnarled due to exposure to high winter winds and frequent ice storms.

Yarding paths. The paths left from cable-yarded logs as they are pulled uphill or downhill to a nearby central area.

Yield (forest land). The volume of wood fiber from harvested trees taken from a certain unit of area. Yield is usually measured in board feet or cubic feet per acre.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-90 at Canton, North Carolina)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	46.7	23.2	34.2	68	-6	6	3.02	1.94	3.99	6	2.7
February	49.9	25.8	37.1	72	3	12	3.53	1.74	5.09	6	3.3
March	59.1	33.3	45.4	80	11	55	4.38	2.68	5.91	7	.7
April	67.7	40.3	53.2	85	22	154	3.35	1.89	4.64	6	.5
May	74.2	47.7	60.5	86	29	330	3.97	2.41	5.36	8	.0
June	80.3	55.1	67.3	90	38	519	3.29	1.96	4.48	7	.0
July	82.6	59.1	70.6	91	47	638	4.27	2.81	5.59	8	.0
August	82.0	58.4	69.8	91	46	615	4.00	2.36	5.47	7	.0
September	76.3	52.8	64.1	88	34	424	3.19	1.38	4.73	5	.0
October	67.6	40.8	53.6	81	21	157	2.72	1.34	3.91	5	.0
November	58.6	33.0	45.2	76	11	43	2.98	1.86	3.98	5	.1
December	50.3	26.8	37.7	69	2	15	3.06	1.54	4.39	6	1.2
Yearly:											
Average	66.3	41.4	53.9	---	---	---	---	---	---	---	---
Extreme	---	---	---	93	-7	---	---	---	---	---	---
Total	---	---	---	---	---	2,968	41.75	36.06	47.24	76	8.5

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

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-90 at Canton, North Carolina)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 16	May 1	May 16
2 years in 10 later than--	Apr. 11	Apr. 27	May 11
5 years in 10 later than--	Apr. 1	Apr. 19	May 2
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 16	Oct. 4	Sept. 29
2 years in 10 earlier than--	Oct. 21	Oct. 9	Oct. 2
5 years in 10 earlier than--	Oct. 31	Oct. 19	Oct. 9

TABLE 3.--GROWING SEASON

(Recorded in the period 1961-90 at Canton, North Carolina)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	197	163	141
8 years in 10	202	169	147
5 years in 10	212	182	159
2 years in 10	222	194	171
1 year in 10	227	201	177

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

Map symbol	Soil name	Acres	Percent
BkB2	Braddock clay loam, 2 to 8 percent slopes, eroded	490	0.2
BkC2	Braddock clay loam, 8 to 15 percent slopes, eroded	841	0.3
BoD2	Braddock clay loam, 15 to 30 percent slopes, eroded, stony	1,488	0.5
BrC	Braddock-Urban land complex, 2 to 15 percent slopes	271	0.1
BsC	Brasstown-Junaluska complex, 8 to 15 percent slopes	237	0.1
BsD	Brasstown-Junaluska complex, 15 to 30 percent slopes	3,553	1.2
BsE	Brasstown-Junaluska complex, 30 to 50 percent slopes	8,662	2.9
BuD	Burton-Craggey-Rock outcrop complex, windswept, 8 to 30 percent slopes, stony	605	0.2
ChE	Cheoah channery loam, 30 to 50 percent slopes	712	0.2
ChF	Cheoah channery loam, 50 to 95 percent slopes	5,281	1.8
CtD	Cullasaja very cobbly loam, 15 to 30 percent slopes, extremely bouldery	302	0.1
CtE	Cullasaja very cobbly loam, 30 to 50 percent slopes, extremely bouldery	563	0.2
CxA	Cullowhee-Nikwasi complex, 0 to 2 percent slopes, frequently flooded	2,328	0.8
DeA	Dellwood cobbly sandy loam, 0 to 3 percent slopes, occasionally flooded	2,629	0.9
DhA	Dellwood-Urban land complex, 0 to 3 percent slopes, occasionally flooded	864	0.3
DsB	Dillsboro loam, 2 to 8 percent slopes	1,968	0.7
DsC	Dillsboro loam, 8 to 15 percent slopes	1,647	0.6
DuC	Dillsboro-Urban land complex, 2 to 15 percent slopes	910	0.3
EdC	Edneyville-Chestnut complex, 8 to 15 percent slopes, stony	189	0.1
EdD	Edneyville-Chestnut complex, 15 to 30 percent slopes, stony	3,628	1.2
EdE	Edneyville-Chestnut complex, 30 to 50 percent slopes, stony	22,134	7.5
EdF	Edneyville-Chestnut complex, 50 to 95 percent slopes, stony	37,152	12.6
EvD	Evard-Cowee complex, 15 to 30 percent slopes	8,825	3.0
EvE	Evard-Cowee complex, 30 to 50 percent slopes	18,803	6.4
EwF	Evard-Cowee complex, 50 to 95 percent slopes, stony	3,172	1.1
ExD	Evard-Cowee-Urban land complex, 15 to 30 percent slopes	935	0.3
FnE2	Fannin loam, 30 to 50 percent slopes, eroded	4,926	1.7
HaB2	Hayesville clay loam, 2 to 8 percent slopes, eroded	377	0.1
HaC2	Hayesville clay loam, 8 to 15 percent slopes, eroded	3,552	1.2
HaD2	Hayesville clay loam, 15 to 30 percent slopes, eroded	6,238	2.1
HeC	Hayesville-Urban land complex, 2 to 15 percent slopes	702	0.2
HeD	Hayesville-Urban land complex, 15 to 30 percent slopes	279	0.1
HmA	Hemphill loam, 0 to 3 percent slopes, rarely flooded	293	0.1
HwB	Humaquepts, loamy, 2 to 8 percent slopes, stony	99	*
OcE	Oconaluftee channery loam, 30 to 50 percent slopes	1,222	0.4
OcF	Oconaluftee channery loam, 50 to 95 percent slopes	1,625	0.6
OwD	Oconaluftee channery loam, windswept, 15 to 30 percent slopes	516	0.2
OwE	Oconaluftee channery loam, windswept, 30 to 50 percent slopes	229	0.1
Pg	Pits	97	*
PwC	Plott fine sandy loam, 8 to 15 percent slopes, stony	203	0.1
PwD	Plott fine sandy loam, 15 to 30 percent slopes, stony	1,515	0.5
PwE	Plott fine sandy loam, 30 to 50 percent slopes, stony	9,009	3.1
PwF	Plott fine sandy loam, 50 to 95 percent slopes, stony	30,682	10.4
RfF	Rock outcrop-Ashe-Cleveland complex, 30 to 95 percent slopes	2,706	0.9
RgF	Rock outcrop-Cataska complex, 50 to 95 percent slopes	735	0.3
RmF	Rock outcrop-Craggey complex, windswept, 30 to 95 percent slopes	1,086	0.4
RoA	Rosman fine sandy loam, 0 to 2 percent slopes, occasionally flooded	1,538	0.5
ScB	Saunook loam, 2 to 8 percent slopes	3,004	1.0
SdC	Saunook loam, 8 to 15 percent slopes, stony	8,114	2.8
SdD	Saunook loam, 15 to 30 percent slopes, stony	12,845	4.4
SeE	Saunook loam, 30 to 50 percent slopes, very stony	2,739	0.9
SfC	Saunook-Urban land complex, 2 to 15 percent slopes	222	0.1
SmF	Soco-Cataska-Rock outcrop complex, 50 to 95 percent slopes	1,611	0.5
SoE	Soco-Stecoah complex, 30 to 50 percent slopes	3,007	1.0
SoF	Soco-Stecoah complex, 50 to 95 percent slopes	14,640	5.0
SsE	Spivey-Whiteoak complex, 30 to 50 percent slopes, extremely bouldery	516	0.2
SuA	Statler loam, 0 to 3 percent slopes, rarely flooded	488	0.2
TaC	Tanasee-Balsam complex, 8 to 15 percent slopes, stony	205	0.1
TcD	Tanasee-Balsam complex, 15 to 30 percent slopes, very stony	785	0.3
TcE	Tanasee-Balsam complex, 30 to 50 percent slopes, very stony	1,067	0.4

See footnote at end of table.

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

Map symbol	Soil name	Acres	Percent
TeC2	Tanasee-Balsam complex, 8 to 15 percent slopes, eroded, stony	431	0.1
TeD2	Tanasee-Balsam complex, 15 to 30 percent slopes, eroded, stony	642	0.2
TrE	Trimont gravelly loam, 30 to 50 percent slopes, stony	2,438	0.8
TrF	Trimont gravelly loam, 50 to 95 percent slopes, stony	3,588	1.2
TuD	Tuckasegee-Cullasaja complex, 15 to 30 percent slopes, very stony	5,424	1.8
TvE	Tuckasegee-Cullasaja complex, 30 to 50 percent slopes, extremely stony	3,448	1.2
Ud	Udorthents, loamy	2,058	0.7
UfA	Udorthents-Urban land complex, 0 to 3 percent slopes, rarely flooded	126	*
Ur	Urban land	394	0.1
WaD	Wayah sandy loam, 15 to 30 percent slopes, stony	1,040	0.4
WaE	Wayah sandy loam, 30 to 50 percent slopes, stony	4,136	1.4
WaF	Wayah sandy loam, 50 to 95 percent slopes, stony	10,869	3.7
WeC	Wayah sandy loam, windswept, 8 to 15 percent slopes, stony	399	0.1
WeD	Wayah sandy loam, windswept, 15 to 30 percent slopes, stony	1,987	0.7
WeE	Wayah sandy loam, windswept, 30 to 50 percent slopes, stony	1,645	0.6
WhB2	Wayah loam, windswept, 2 to 8 percent slopes, eroded, stony	136	*
WhC2	Wayah loam, windswept, 8 to 15 percent slopes, eroded, stony	353	0.1
WhD2	Wayah loam, windswept, 15 to 30 percent slopes, eroded, stony	1,111	0.4
WhE2	Wayah loam, windswept, 30 to 50 percent slopes, eroded, stony	3,145	1.1
WhF2	Wayah loam, windswept, 50 to 95 percent slopes, eroded, stony	871	0.3
WoC	Whiteoak cobbly loam, 8 to 15 percent slopes, stony	1,361	0.5
WoD	Whiteoak cobbly loam, 15 to 30 percent slopes, stony	2,645	0.9
	Water	635	0.2
	Total	293,943	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
BkB2	Braddock clay loam, 2 to 8 percent slopes, eroded
DsB	Dillsboro loam, 2 to 8 percent slopes
HaB2	Hayesville clay loam, 2 to 8 percent slopes, eroded
RoA	Rosman fine sandy loam, 0 to 2 percent slopes, occasionally flooded
ScB	Saunook loam, 2 to 8 percent slopes
SuA	Statler loam, 0 to 3 percent slopes, rarely flooded

TABLE 6.--SUITABILITY OF SOILS FOR ORNAMENTAL CROP PRODUCTION

(Absence of a rating indicates that the soil is not suited to the crop or that the crop generally is not grown on the soil. See the section "Ornamental Crops" for an explanation of the soil ratings)

Soil name and map symbol	Fraser fir	Norway spruce	Colorado blue spruce	Eastern white pine (cut)	Eastern white pine (ball and burlap harvested)	Eastern hemlock	Rhododenron and azalea	Line-out beds
BkB2, BkC2, BoD2---------- Braddock	Low	Medium	Medium	High	Medium	Medium	Medium	---
BrC*. Braddock-Urban land								
BsC, BsD: Brasstown------	Low	High	High	High	High	High	High	---
Junaluska------	Low	High	High	High	High	High	High	---
BsE: Brasstown------	Low	---	---	Medium	---	---	---	---
Junaluska------	Low	---	---	Medium	---	---	---	---
BuD*. Burton-Craggey-Rock outcrop								
ChE---------- Cheoah	High	Low	Low	High	Low	Low	Low	Medium
ChF. Cheoah								
CtD, CtE-------- Cullasaja	Low	Low	Low	Low	---	Medium	Low	---
CxA. Cullowhee-Nikwasi								
DeA---------- Dellwood	---	---	---	Medium	---	---	---	Medium
DhA*. Dellwood-Urban land								
DsB, DsC-------- Dillsboro	Low	Medium	Medium	High	Medium	Medium	Medium	---
DuC*. Dillsboro-Urban land								
EdC, EdD: Edneyville-----	Medium	Low	Low	High	Low	Low	Low	Medium
Chestnut-------	Medium	Low	Low	High	Low	Low	Low	Medium

See footnote at end of table.

TABLE 6.--SUITABILITY OF SOILS FOR ORNAMENTAL CROP PRODUCTION--Continued

Soil name and map symbol	Fraser fir	Norway spruce	Colorado blue spruce	Eastern white pine (cut)	Eastern white pine (ball and burlap harvested)	Eastern hemlock	Rhododenron and azalea	Line-out beds
EdE, EdF: Edneyville	Low	---	---	---	---	---	---	---
Chestnut	Low	---	---	---	---	---	---	---
EvD, EvE: Evard	Low	High	High	High	Low	High	High	---
Cowee	Low	High	High	High	Low	High	High	---
EwF: Evard	Low	Medium	Medium	Medium	Low	Medium	Medium	---
Cowee	Low	Medium	Medium	Medium	Low	Medium	Medium	---
ExD*. Evard-Cowee-Urban land								
FnE2 Fannin	Low	High	High	High	Low	High	High	---
HaB2, HaC2, HaD2 Hayesville	Low	Medium	Medium	High	Medium	Medium	Medium	---
HeC*, HeD* Hayesville-Urban land								
HmA*. Hemphill								
HwB*. Humaquepts								
OcE Oconaluftee	High	---	---	---	---	---	---	---
OcF, OwD, OwE. Oconaluftee								
Pg*. Pits								
PwC, PwD Plott	High	---	---	High	---	---	---	Medium
PwE Plott	Medium	---	---	Low	---	---	---	---
PwF. Plott								
RfF. Rock outcrop-Ashe-Cleveland								

See footnote at end of table.

TABLE 6.--SUITABILITY OF SOILS FOR ORNAMENTAL CROP PRODUCTION--Continued

Soil name and map symbol	Fraser fir	Norway spruce	Colorado blue spruce	Eastern white pine (cut)	Eastern white pine (ball and burlap harvested)	Eastern hemlock	Rhododenron and azalea	Line-out beds
RgF. Rock outcrop- Cataska								
RmF. Rock outcrop- Craggey								
RoA---------- Rosman	---	---	---	High	---	---	---	High
ScB, SdC, SdD, SeE---------- Saunook	Medium	High	High	High	High	High	High	---
SfC*. Saunook-Urban land								
SmF*. Soco-Cataska-Rock outcrop								
SoE, SoF: Soco---------- Stecoah--------	Low Low	--- ---	--- ---	--- ---	Medium Medium	--- ---	Low Low	--- ---
SsE: Spivey--------- Whiteoak-------	Medium Medium	Medium Medium	--- ---	Medium Medium	Low Low	Medium Medium	Low Low	--- ---
SuA---------- Statler	---	High	High	High	High	High	High	Medium
TaC: Tanasee-------- Balsam---------	High High	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---
TcD: Tanasee-------- Balsam---------	Medium Medium	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---	--- ---
TcE, TeC2, TeD2. Tanasee-Balsam								
TrE, TrF-------- Trimont	Medium	Low	Low	Medium	Low	Low	Low	---
TuD: Tuckasegee----- Cullasaja------	Low Low	--- ---	--- ---	Low Low	--- ---	Low Low	--- ---	--- ---

See footnote at end of table.

TABLE 6.--SUITABILITY OF SOILS FOR ORNAMENTAL CROP PRODUCTION--Continued

Soil name and map symbol	Fraser fir	Norway spruce	Colorado blue spruce	Eastern white pine (cut)	Eastern white pine (ball and burlap harvested)	Eastern hemlock	Rhododenron and azalea	Line-out beds
TvE. Tuckasegee-Cullasaja								
Ud*. Udorthents								
UfA*. Udorthents-Urban land								
Ur*. Urban land								
WaD---------- Wayah	High	---	---	---	---	---	---	---
WaE---------- Wayah	Medium	---	---	---	---	---	---	---
WaF, WeC, WeD, WeE, WhB2, WhC2, WhD2, WhE2, WhF2. Wayah								
WoC, WoD-------- Whiteoak	Medium	High	High	High	Medium	High	High	Medium

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Apples	Corn silage	Grass hay	Pasture	Straw-berries	Tobacco	Tomatoes
		Bu	Tons	Tons	AUM*	Gallons	Lbs	Tons
BkB2---------- Braddock	IIIe	800	18	4.0	7.6	2,200	2,600	25
BkC2---------- Braddock	IVe	800	16	3.5	7.0	2,200	2,400	---
BoD2---------- Braddock	VIe	800	---	3.0	6.0	1,500	---	---
BrC**:								
Braddock-------	IVe	---	---	---	---	---	---	---
Urban land-----	VIIIs	---	---	---	---	---	---	---
BsC:								
Brasstown------	IVe	800	---	3.0	7.0	2,000	1,900	---
Junaluska------	IVe	700	---	2.5	6.5	1,800	1,800	---
BsD:								
Brasstown------	VIe	800	---	2.0	6.3	---	---	---
Junaluska------	VIe	700	---	2.0	6.0	---	---	---
BsE:								
Brasstown------	VIIe	800	---	---	5.0	---	---	---
Junaluska------	VIIe	700	---	---	5.0	---	---	---
BuD**:								
Burton---------	VIe	---	---	---	---	---	---	---
Craggey--------	VIIs	---	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
ChE---------- Cheoah	VIIe	800	---	---	4.0	---	---	---
ChF---------- Cheoah	VIIe	600	---	---	---	---	---	---
CtD, CtE-------- Cullasaja	VIIs	---	---	---	---	---	---	---
CxA:								
Cullowhee------	IIIw	---	22	4.0	7.0	---	---	---
Nikwasi--------	VIw	---	22	3.0	6.0	---	---	---
DeA---------- Dellwood	IVs	---	18	4.0	7.6	2,000	2,000	---

See footnotes at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Apples	Corn silage	Grass hay	Pasture	Straw-berries	Tobacco	Tomatoes
		Bu	Tons	Tons	AUM*	Gallons	Lbs	Tons
DhA**:								
Dellwood	IVs	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
DsB Dillsboro	IIe	800	24	5.0	8.5	2,500	2,800	35
DsC Dillsboro	IIIe	---	22	4.5	8.0	2,400	2,600	30
DuC**:								
Dillsboro	IIIe	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
EdC:								
Edneyville	IVe	1,000	---	4.0	7.0	1,800	---	---
Chestnut	IVe	900	---	4.0	6.5	1,600	---	---
EdD:								
Edneyville	VIe	800	---	3.5	6.5	---	---	---
Chestnut	VIe	700	---	3.5	6.0	---	---	---
EdE, EdF:								
Edneyville	VIIe	600	---	---	6.0	---	---	---
Chestnut	VIIe	600	---	---	6.0	---	---	---
EvD:								
Evard	VIe	800	---	---	6.5	---	---	---
Cowee	VIe	700	---	---	6.0	---	---	---
EvE:								
Evard	VIIe	600	---	---	6.0	---	---	---
Cowee	VIIe	600	---	---	6.0	---	---	---
EwF:								
Evard	VIIe	---	---	---	5.0	---	---	---
Cowee	VIIe	---	---	---	5.0	---	---	---
ExD**:								
Evard	VIe	---	---	---	---	---	---	---
Cowee	VIe	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
FnE2 Fannin	VIIe	800	---	---	6.0	---	---	---
HaB2 Hayesville	IIIe	800	20	4.0	7.5	2,000	2,200	20

See footnotes at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Apples	Corn silage	Grass hay	Pasture	Straw-berries	Tobacco	Tomatoes
		Bu	Tons	Tons	AUM*	Gallons	Lbs	Tons
HaC2---------- Hayesville	IVe	800	18	3.5	7.0	1,800	2,000	---
HaD2---------- Hayesville	VIe	800	---	3.5	6.5	---	---	---
HeC**:								
Hayesville-----	IVe	---	---	---	---	---	---	---
Urban land-----	VIIIs	---	---	---	---	---	---	---
HeD**:								
Hayesville-----	VIe	---	---	---	---	---	---	---
Urban land-----	VIIIs	---	---	---	---	---	---	---
HmA---------- Hemphill	IVw	---	18	3.5	6.0	---	---	---
HwB**---------- Humaquepts	IVw	---	---	---	---	---	---	---
OcE---------- Oconaluftee	VIIe	---	---	---	4.0	---	---	---
OcF---------- Oconaluftee	VIIe	---	---	---	---	---	---	---
OwD---------- Oconaluftee	VIe	---	---	---	---	---	---	---
OwE---------- Oconaluftee	VIIe	---	---	---	---	---	---	---
Pg**---------- Pits	VIIIs	---	---	---	---	---	---	---
PwC---------- Plott	IVe	1,000	---	4.0	7.0	---	---	---
PwD---------- Plott	VIe	1,000	---	3.5	6.0	---	---	---
PwE---------- Plott	VIIe	800	---	---	5.0	---	---	---
PwF---------- Plott	VIIe	---	---	---	---	---	---	---
RfF:								
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
Ashe----------	VIIe	---	---	---	---	---	---	---
Cleveland------	VIIe	---	---	---	---	---	---	---
RgF:								
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
Cataska--------	VIIs	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Apples	Corn silage	Grass hay	Pasture	Straw-berries	Tobacco	Tomatoes
		Bu	Tons	Tons	AUM*	Gallons	Lbs	Tons
RmF:								
Rock outcrop	VIIIs	---	---	---	---	---	---	---
Craggey	VIIs	---	---	---	---	---	---	---
RoA Rosman	IIw	---	26	5.0	8.0	2,200	3,000	35
ScB Saunook	IIe	1,000	25	5.0	8.0	2,500	3,000	35
SdC Saunook	IVe	1,000	15	5.0	8.0	2,200	2,400	25
SdD Saunook	VIe	1,000	---	3.0	5.0	---	---	---
SeE Saunook	VIIe	800	---	4.0	---	---	---	---
SfC**: Saunook	IIIe	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
SmF**:								
Soco	VIIe	---	---	---	4.0	---	---	---
Cataska	VIIs	---	---	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---	---	---
SoE, SoF:								
Soco	VIIe	600	---	---	4.0	---	---	---
Stecoah	VIIe	600	---	---	5.0	---	---	---
SsE:								
Spivey	VIIs	---	---	---	5.0	---	---	---
Whiteoak	VIIs	600	---	---	6.0	---	---	---
SuA Statler	I	---	28	4.0	7.0	2,500	3,200	35
TaC:								
Tanasee	IVe	---	---	---	---	---	---	---
Balsam	VIIs	---	---	---	---	---	---	---
TcD:								
Tanasee	VIe	---	---	---	---	---	---	---
Balsam	VIIs	---	---	---	---	---	---	---
TcE:								
Tanasee	VIIe	---	---	---	---	---	---	---
Balsam	VIIs	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Apples	Corn silage	Grass hay	Pasture	Straw-berries	Tobacco	Tomatoes
		Bu	Tons	Tons	AUM*	Gallons	Lbs	Tons
TeC2:								
Tanasee	IVe	---	---	---	---	---	---	---
Balsam	VIIs	---	---	---	---	---	---	---
TeL2:								
Tanasee	VIe	---	---	---	---	---	---	---
Balsam	VIIs	---	---	---	---	---	---	---
TrE, TrF Trimont	VIIe	600	---	---	2.5	---	---	---
TuD:								
Tuckasegee	VIe	---	---	---	---	---	---	---
Cullasaja	VIIs	---	---	---	---	---	---	---
TvE:								
Tuckasegee	VIIe	---	---	---	---	---	---	---
Cullasaja	VIIs	---	---	---	---	---	---	---
Ud** Udorthents	VIIs	---	---	---	---	---	---	---
UfA**:								
Udorthents	VIIs	---	---	---	---	---	---	---
Urban land	VIIIs	---	---	---	---	---	---	---
Ur** Urban land	VIIIs	---	---	---	---	---	---	---
WaD Wayah	VIe	---	---	---	5.0	---	---	---
WaE Wayah	VIIe	---	---	---	4.0	---	---	---
WaF Wayah	VIIe	---	---	---	---	---	---	---
WeC Wayah	IVe	---	---	---	6.0	---	---	---
WeD Wayah	VIe	---	---	---	5.0	---	---	---
WeE Wayah	VIIe	---	---	---	4.0	---	---	---
WhB2 Wayah	IIIe	---	---	---	6.0	---	---	---
WhC2 Wayah	IVe	---	---	---	6.0	---	---	---
WhD2 Wayah	VIe	---	---	---	5.0	---	---	---

See footnotes at end of table.

TABLE 7.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Apples	Corn silage	Grass hay	Pasture	Straw-berries	Tobacco	Tomatoes
		Bu	Tons	Tons	AUM*	Gallons	Lbs	Tons
WhE2---------- Wayah	VIIe	---	---	---	4.0	---	---	---
WhF2---------- Wayah	VIIe	---	---	---	---	---	---	---
WoC---------- Whiteoak	IVs	1,000	15	3.5	5.0	2,000	2,400	25
WoD---------- Whiteoak	VIs	1,000	---	3.0	4.5	---	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
BkB2, BkC2----- Braddock	4C	Slight	Moderate	Moderate	Slight	Northern red oak----	80	62	Yellow-poplar, eastern white pine, shortleaf pine.
						Yellow-poplar-------	90	90	
						Eastern white pine--	95	176	
						Black oak-----------	---	---	
						White oak-----------	---	---	
						Virginia pine-------	---	---	
						Scarlet oak---------	---	---	
						Pitch pine----------	---	---	
						Hickory-------------	---	---	
BoD2------------ Braddock	4R	Moderate	Moderate	Moderate	Slight	Northern red oak----	70	52	Eastern white pine, shortleaf pine.
						Yellow-poplar-------	80	71	
						Eastern white pine--	85	155	
						Black oak-----------	---	---	
						White oak-----------	---	---	
						Virginia pine-------	---	---	
						Scarlet oak---------	---	---	
						Pitch pine----------	---	---	
						Hickory-------------	---	---	
BsC[6]:									
Brasstown------	4A	Slight	Slight	Slight	Slight	Scarlet oak---------	80	62	Eastern white pine.
						White oak-----------	80	62	
						Eastern white pine--	91	168	
						Shortleaf pine------	71	112	
						Virginia pine-------	74	114	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
						Black oak-----------	---	---	
						Chestnut oak--------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	
Junaluska------	3D	Slight	Slight	Slight	Moderate	Scarlet oak---------	65	48	Eastern white pine, shortleaf pine.
						Chestnut oak--------	65	48	
						White oak-----------	61	44	
						Shortleaf pine------	68	106	
						Virginia pine-------	74	114	
						Eastern white pine--	86	157	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
						Black oak-----------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	
BsD[6]:									
Brasstown------	4R	Moderate	Moderate	Slight	Slight	Scarlet oak---------	80	62	Eastern white pine.
						White oak-----------	80	62	
						Eastern white pine--	91	168	
						Shortleaf pine------	71	112	
						Virginia pine-------	74	114	
						Pitch pine----------	---	---	
						Northern red oak----	---	---	
						Black oak-----------	---	---	
						Chestnut oak--------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
BsD[6]:									
Junaluska	3R	Moderate	Moderate	Moderate	Moderate	Scarlet oak	65	48	Eastern white pine, shortleaf pine.
						Chestnut oak	65	48	
						White oak	61	44	
						Shortleaf pine	68	106	
						Virginia pine	74	114	
						Eastern white pine	86	157	
						Pitch pine	---	---	
						Northern red oak	---	---	
						Black oak	---	---	
						Hickory	---	---	
						Black locust	---	---	
BsE[6]:									
Brasstown	4R	Severe	Severe	Slight	Slight	Scarlet oak	80	62	Eastern white pine.
						White oak	80	62	
						Eastern white pine	91	168	
						Shortleaf pine	71	112	
						Virginia pine	74	114	
						Pitch pine	---	---	
						Northern red oak	---	---	
						Black oak	---	---	
						Chestnut oak	---	---	
						Hickory	---	---	
						Black locust	---	---	
Junaluska	3R	Severe	Severe	Moderate	Moderate	Scarlet oak	65	48	Eastern white pine, shortleaf pine.
						Chestnut oak	65	48	
						White oak	61	44	
						Shortleaf pine	68	106	
						Virginia pine	74	114	
						Eastern white pine	86	157	
						Pitch pine	---	---	
						Northern red oak	---	---	
						Black oak	---	---	
						Hickory	---	---	
						Black locust	---	---	
BuD[6]:									
Burton	3R	Severe	Severe	Severe	Moderate	Northern red oak	40	26	
						Fraser fir	---	---	
						Red spruce	---	---	
						Yellow birch	---	---	
						Sweet birch	---	---	
Craggey	3D	Severe	Severe	Severe	Severe	Northern red oak	40	26	
						Red spruce	---	---	
						Fraser fir	---	---	
						Yellow birch	---	---	
						Sweet birch	---	---	
Rock outcrop.									

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
ChE, ChF-------- Cheoah	4R	Severe	Severe	Slight	Slight	Northern red oak---- Yellow-poplar------- American beech------ Black cherry-------- Eastern hemlock----- Black oak----------- Yellow birch-------- Sugar maple--------- Red maple----------- Yellow buckeye------ Sweet birch--------- Scarlet oak--------- White oak----------- Hickory-------------	83 103 80 74 --- --- --- --- --- --- --- --- --- ---	65 112 --- --- --- --- --- --- --- --- --- --- --- ---	Fraser fir, northern red oak, yellow-poplar.
CtD------------- Cullasaja	8X	Moderate	Severe	Severe	Slight	Yellow-poplar------- Black cherry-------- Yellow birch-------- Northern red oak---- Eastern white pine-- American beech------ Sugar maple--------- Eastern hemlock----- Sweet birch--------- Yellow buckeye------	109 --- --- --- --- --- --- --- --- ---	122 --- --- --- --- --- --- --- --- ---	Fraser fir.
CtE------------- Cullasaja	8R	Severe	Severe	Severe	Slight	Yellow-poplar------- Black cherry-------- Yellow birch-------- Northern red oak---- Eastern white pine-- American beech------ Sugar maple--------- Eastern hemlock----- Sweet birch--------- Yellow buckeye------	109 --- --- --- --- --- --- --- --- ---	122 --- --- --- --- --- --- --- --- ---	Fraser fir.
CxA[6]: Cullowhee------	8W	Slight	Moderate	Slight	Slight	Yellow-poplar------- Shortleaf pine------ Eastern white pine-- American sycamore--- Red maple----------- Yellow birch-------- Eastern hemlock-----	103 82 100 --- --- --- ---	112 132 186 --- --- --- ---	Eastern white pine.
Nikwasi---------	6W	Slight	Severe	Severe	Slight	Yellow-poplar------- Eastern white pine-- American sycamore--- Red maple----------- Yellow birch-------- Eastern hemlock----- Sweet birch--------- Alder---------------	88 86 --- --- --- --- --- ---	86 157 --- --- --- --- --- ---	Eastern white pine.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns: Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index[3]	Volume[4]	Trees to plant[5]
DeA---------- Dellwood	8F	Slight	Slight	Moderate	Slight	Yellow-poplar-------	100	107	Yellow-poplar, eastern white pine.
						Eastern white pine--	91	168	
						Red maple----------	---	---	
						River birch---------	---	---	
						American sycamore---	---	---	
						Eastern hemlock-----	---	---	
						Sweet birch---------	---	---	
						Black cherry--------	---	---	
DsB, DsC-------- Dillsboro	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	95	98	Yellow-poplar, eastern white pine, shortleaf pine, Fraser fir, black walnut.
						Eastern white pine--	---	---	
						Shortleaf pine------	---	---	
						Virginia pine-------	---	---	
						White oak-----------	---	---	
						Scarlet oak---------	---	---	
						Northern red oak----	---	---	
EdC[6]: Edneyville-----	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	62	Eastern white pine, yellow-poplar, shortleaf pine, Fraser fir.
						Shortleaf pine------	64	97	
						Virginia pine-------	66	102	
						Eastern white pine--	90	166	
						Yellow-poplar-------	98	104	
						Chestnut oak--------	---	---	
						Scarlet oak---------	73	55	
						Black oak-----------	---	---	
						White oak-----------	---	---	
						Pitch pine----------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	
Chestnut-------	4D	Slight	Slight	Slight	Moderate	Northern red oak----	76	58	Eastern white pine, yellow-poplar, Fraser fir, shortleaf pine.
						Eastern white pine--	78	139	
						Yellow-poplar-------	97	102	
						Scarlet oak---------	68	50	
						White oak-----------	70	52	
						Black oak-----------	71	53	
						Chestnut oak--------	69	51	
						Shortleaf pine------	---	---	
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	
EdD[6]: Edneyville-----	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	80	62	Eastern white pine, yellow-poplar, shortleaf pine, Fraser fir.
						Shortleaf pine------	64	97	
						Virginia pine-------	66	102	
						Eastern white pine--	90	166	
						Yellow-poplar-------	98	104	
						Chestnut oak--------	---	---	
						Scarlet oak---------	---	---	
						Black oak-----------	---	---	
						White oak-----------	---	---	
						Pitch pine----------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
EdD[6]:									
Chestnut-------	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	76	58	Eastern white pine, yellow-poplar, Fraser fir, shortleaf pine.
						Eastern white pine--	78	139	
						Yellow-poplar-------	97	102	
						Scarlet oak---------	68	50	
						White oak-----------	70	52	
						Black oak-----------	71	53	
						Chestnut oak--------	69	51	
						Shortleaf pine------	---	---	
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	
EdE[6], EdF[6]:									
Edneyville-----	4R	Severe	Severe	Slight	Slight	Northern red oak----	80	62	Eastern white pine, yellow-poplar, shortleaf pine, Fraser fir.
						Shortleaf pine------	64	97	
						Virginia pine-------	66	102	
						Eastern white pine--	90	166	
						Yellow-poplar-------	98	104	
						Chestnut oak--------	---	---	
						Scarlet oak---------	---	---	
						Black oak-----------	---	---	
						White oak-----------	---	---	
						Pitch pine----------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	
Chestnut-------	4R	Severe	Severe	Slight	Moderate	Northern red oak----	76	58	Eastern white pine, yellow-poplar, Fraser fir, shortleaf pine.
						Eastern white pine--	78	139	
						Yellow-poplar-------	97	102	
						Scarlet oak---------	68	50	
						White oak-----------	70	52	
						Black oak-----------	71	53	
						Chestnut oak--------	69	51	
						Shortleaf pine------	---	---	
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						Hickory-------------	---	---	
						Black locust--------	---	---	
EvD[6]:									
Evard----------	4R	Moderate	Moderate	Slight	Slight	Chestnut oak--------	77	59	Shortleaf pine, eastern white pine, yellow-poplar.
						Shortleaf pine------	73	116	
						Pitch pine----------	77	118	
						Virginia pine-------	69	107	
						Eastern white pine--	93	172	
						Yellow-poplar-------	95	98	
						White oak-----------	---	---	
						Northern red oak----	---	---	
						Hickory-------------	---	---	
						Scarlet oak---------	---	---	
						Black oak-----------	---	---	
						Black locust--------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
EvD[6]:									
Cowee	3R	Moderate	Moderate	Slight	Moderate	Chestnut oak	55	38	Eastern white pine, shortleaf pine.
						Virginia pine	63	96	
						Scarlet oak	54	38	
						Shortleaf pine	78	126	
						Eastern white pine	78	139	
						Yellow-poplar	80	71	
						Pitch pine	52	73	
						Northern red oak	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Black locust	---	---	
EvE[6], EwF[6]:									
Evard	4R	Severe	Severe	Slight	Slight	Chestnut oak	77	59	Shortleaf pine, eastern white pine, yellow-poplar.
						Shortleaf pine	73	116	
						Pitch pine	77	118	
						Virginia pine	69	107	
						Eastern white pine	93	172	
						Yellow-poplar	95	98	
						White oak	---	---	
						Northern red oak	---	---	
						Hickory	---	---	
						Scarlet oak	---	---	
						Black oak	---	---	
						Black locust	---	---	
Cowee	3R	Severe	Severe	Slight	Moderate	Chestnut oak	55	38	Eastern white pine, shortleaf pine.
						Virginia pine	63	96	
						Scarlet oak	54	38	
						Shortleaf pine	78	126	
						Eastern white pine	78	139	
						Yellow-poplar	80	71	
						Pitch pine	52	73	
						Northern red oak	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Black locust	---	---	
FnE2	7R	Severe	Severe	Slight	Slight	Yellow-poplar	96	100	Eastern white pine, shortleaf pine, yellow-poplar, Fraser fir.
Fannin						Northern red oak	---	---	
						Eastern white pine	94	174	
						Pitch pine	---	---	
						Shortleaf pine	---	---	
						Virginia pine	---	---	
						Scarlet oak	---	---	
						Chestnut oak	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Black locust	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
HaB2, HaC2---- Hayesville	6C	Slight	Moderate	Moderate	Slight	Yellow-poplar	85	81	Eastern white pine.
						Eastern white pine	77	137	
						Northern red oak	---	---	
						Pitch pine	---	---	
						Shortleaf pine	68	106	
						Virginia pine	70	109	
HaD2---- Hayesville	6R	Moderate	Moderate	Moderate	Slight	Yellow-poplar	85	81	Eastern white pine.
						Eastern white pine	77	137	
						Northern red oak	---	---	
						Pitch pine	---	---	
						Shortleaf pine	68	106	
						Virginia pine	70	109	
HmA---- Hemphill	6W	Slight	Severe	Severe	Slight	Yellow-poplar	88	86	Eastern white pine.
						Red maple	---	---	
						Yellow birch	---	---	
						Eastern hemlock	---	---	
						Eastern white pine	84	153	
						Alder	---	---	
OcE, OcF---- Oconaluftee	10R	Severe	Severe	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir, northern red oak.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Black oak	---	---	
						American beech	---	---	
						Yellow birch	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						Eastern hemlock	---	---	
						Yellow buckeye	---	---	
						Sweet birch	---	---	
OwD---- Oconaluftee	2R	Moderate	Moderate	Severe	Slight	Northern red oak	40	26	
						Red spruce	---	---	
						Fraser fir	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						Yellow birch	---	---	
						Sweet birch	---	---	
OwE---- Oconaluftee	2R	Severe	Severe	Severe	Slight	Northern red oak	40	26	
						Red spruce	---	---	
						Fraser fir	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						Yellow birch	---	---	
						Sweet birch	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
PwC---------- Plott	5A	Slight	Slight	Slight	Slight	Northern red oak----	85	67	Fraser fir, northern red oak, yellow-poplar, black cherry.
						Yellow-poplar-------	113	128	
						Black cherry--------	87	---	
						American beech------	---	---	
						Sugar maple---------	---	---	
						Eastern hemlock-----	---	---	
						Black oak-----------	---	---	
						Yellow birch--------	---	---	
						Black locust--------	---	---	
						Sweet birch---------	---	---	
						Scarlet oak---------	---	---	
						White oak-----------	---	---	
						Hickory-------------	---	---	
PwD---------- Plott	5R	Moderate	Moderate	Slight	Slight	Northern red oak----	85	67	Fraser fir, northern red oak, yellow-poplar, black cherry.
						Yellow-poplar-------	113	128	
						Black cherry--------	87	---	
						American beech------	---	---	
						Sugar maple---------	---	---	
						Eastern hemlock-----	---	---	
						Black oak-----------	---	---	
						Yellow birch--------	---	---	
						Black locust--------	---	---	
						Sweet birch---------	---	---	
						Scarlet oak---------	---	---	
						White oak-----------	---	---	
						Hickory-------------	---	---	
PwE, PwF-------- Plott	5R	Severe	Severe	Slight	Slight	Northern red oak----	85	67	Fraser fir, northern red oak, yellow-poplar, black cherry.
						Yellow-poplar-------	113	128	
						Black cherry--------	87	---	
						American beech------	---	---	
						Sugar maple---------	---	---	
						Eastern hemlock-----	---	---	
						Black oak-----------	---	---	
						Yellow birch--------	---	---	
						Black locust--------	---	---	
						Sweet birch---------	---	---	
						Scarlet oak---------	---	---	
						White oak-----------	---	---	
						Hickory-------------	---	---	
RfF[6]: Rock outcrop.									
Ashe----------	3R	Severe	Severe	Moderate	Moderate	Chestnut oak--------	57	40	Eastern white pine, Fraser fir.
						Eastern white pine--	80	144	
						Northern red oak----	78	60	
						Shortleaf pine------	57	82	
						Pitch pine----------	---	---	
						Virginia pine-------	62	95	
						Scarlet oak---------	56	39	
Cleveland------	2R	Severe	Severe	Moderate	Severe	Chestnut oak--------	45	30	Eastern white pine, shortleaf pine.
						Northern red oak----	60	43	
						Eastern white pine--	70	121	
						Hickory-------------	---	---	
						Virginia pine-------	57	84	
						Pitch pine----------	---	---	
						Scarlet oak---------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
RgF[6]:									
Rock outcrop.									
Cataska	2R	Moderate	Severe	Severe	Severe	Chestnut oak	40	26	Virginia pine.
						Scarlet oak	40	26	
						Pitch pine	40	---	
RmF[6]:									
Rock outcrop.									
Craggey	2R	Severe	Severe	Severe	Severe	Northern red oak	40	26	
						Red spruce	---	---	
						Fraser fir	---	---	
						Yellow birch	---	---	
						Sweet birch	---	---	
RoA	8A	Slight	Slight	Slight	Slight	Yellow-poplar	105	115	Yellow-poplar,
Rosman						Eastern white pine	100	186	eastern white
						Northern red oak	---	---	pine, black
						American sycamore	---	---	walnut.
						Black walnut	---	---	
						Red maple	---	---	
						River birch	---	---	
ScB, SdC	8A	Slight	Slight	Slight	Slight	Yellow-poplar	107	119	Yellow-poplar,
Saunook						Eastern white pine	104	194	eastern white
						Northern red oak	---	---	pine, northern
						White oak	---	---	red oak,
						Scarlet oak	---	---	Fraser fir,
						Eastern hemlock	---	---	black walnut.
						Red maple	---	---	
						Black cherry	---	---	
						American beech	---	---	
						Sweet birch	---	---	
						Yellow buckeye	---	---	
SdD	8R	Moderate	Moderate	Slight	Slight	Yellow-poplar	107	119	Yellow-poplar,
Saunook						Eastern white pine	104	194	eastern white
						Northern red oak	---	---	pine, northern
						White oak	---	---	red oak,
						Scarlet oak	---	---	Fraser fir,
						Eastern hemlock	---	---	black walnut.
						Red maple	---	---	
						Black cherry	---	---	
						American beech	---	---	
						Sweet birch	---	---	
						Yellow buckeye	---	---	
SeE	8R	Severe	Severe	Slight	Slight	Yellow-poplar	107	119	Yellow-poplar,
Saunook						Eastern white pine	104	194	eastern white
						Northern red oak	---	---	pine, northern
						White oak	---	---	red oak,
						Scarlet oak	---	---	Fraser fir,
						Eastern hemlock	---	---	black walnut.
						Red maple	---	---	
						Black cherry	---	---	
						American beech	---	---	
						Sweet birch	---	---	
						Yellow buckeye	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
SmF[6]:									
Soco	4R	Severe	Severe	Slight	Moderate	Chestnut oak	68	50	Eastern white pine, Fraser fir.
						Eastern white pine	85	155	
						Shortleaf pine	61	90	
						Pitch pine	---	---	
						Virginia pine	---	---	
						Scarlet oak	76	58	
						Northern red oak	---	---	
						White oak	---	---	
						Black oak	---	---	
						Yellow-poplar	---	---	
						Hickory	---	---	
						Black locust	---	---	
Cataska	2R	Moderate	Severe	Severe	Severe	Chestnut oak	40	26	Virginia pine.
						Scarlet oak	40	26	
						Pitch pine	40	---	
Rock outcrop.									
SoE[6], SoF[6]:									
Soco	11R	Severe	Severe	Slight	Moderate	Eastern white pine	85	155	Eastern white pine, Fraser fir, shortleaf pine.
						Shortleaf pine	61	90	
						Pitch pine	---	---	
						Virginia pine	---	---	
						Chestnut oak	68	50	
						Scarlet oak	76	58	
						Northern red oak	---	---	
						White oak	---	---	
						Black oak	---	---	
						Yellow-poplar	---	---	
						Hickory	---	---	
						Black locust	---	---	
Stecoah	12R	Severe	Severe	Slight	Slight	Eastern white pine	91	168	Eastern white pine, Fraser fir, shortleaf pine.
						Shortleaf pine	69	108	
						Scarlet oak	---	---	
						White oak	82	64	
						Yellow-poplar	---	---	
						Chestnut oak	---	---	
						Virginia pine	---	---	
						Hickory	---	---	
						Black oak	---	---	
						Northern red oak	---	---	
						Pitch pine	---	---	
						Black locust	---	---	
SsE[6]:									
Spivey	8R	Severe	Severe	Moderate	Slight	Yellow-poplar	100	107	Yellow-poplar, eastern white pine, Fraser fir.
						Northern red oak	80	62	
						Eastern white pine	90	166	
						Eastern hemlock	---	---	
						Sugar maple	---	---	
						White oak	---	---	
						Yellow birch	---	---	
						Black cherry	---	---	
						American beech	---	---	
						Sweet birch	---	---	
						Yellow buckeye	---	---	
						Black oak	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
SsE[6]:									
Whiteoak	7R	Severe	Severe	Slight	Slight	Yellow-poplar	98	104	Yellow-poplar, eastern white pine, northern red oak, Fraser fir.
						Eastern white pine	110	203	
						Northern red oak	---	---	
						White oak	---	---	
						Scarlet oak	---	---	
						American beech	---	---	
						Red maple	---	---	
						Eastern hemlock	---	---	
						Black cherry	---	---	
						Sweet birch	---	---	
						Yellow buckeye	---	---	
						Black oak	---	---	
SuA, Statler	8A	Slight	Slight	Slight	Slight	Yellow-poplar	100	107	Yellow-poplar, black walnut, eastern white pine.
						White oak	80	62	
						Eastern white pine	90	166	
						Red maple	---	---	
						Northern red oak	---	---	
						Hickory	---	---	
TaC[6]:									
Tanasee	10A	Slight	Slight	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Black cherry	---	---	
						Black oak	---	---	
						American beech	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Eastern hemlock	---	---	
						Yellow buckeye	---	---	
						White ash	---	---	
						Sweet birch	---	---	
Balsam	10A	Slight	Slight	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Sweet birch	---	---	
						Eastern hemlock	---	---	
TcD[6]:									
Tanasee	10R	Moderate	Moderate	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Black cherry	---	---	
						Black oak	---	---	
						American beech	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Eastern hemlock	---	---	
						Yellow buckeye	---	---	
						White ash	---	---	
						Sweet birch	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
TcD[6]:									
Balsam	10R	Moderate	Moderate	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Sweet birch	---	---	
						Eastern hemlock	---	---	
TcE[6]:									
Tanasee	10R	Severe	Severe	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Black cherry	---	---	
						Black oak	---	---	
						American beech	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Eastern hemlock	---	---	
						Yellow buckeye	---	---	
						White ash	---	---	
						Sweet birch	---	---	
Balsam	10R	Severe	Severe	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Sweet birch	---	---	
						Eastern hemlock	---	---	
TeC2[6]:									
Tanasee	10A	Slight	Slight	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Black cherry	---	---	
						Black oak	---	---	
						American beech	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Eastern hemlock	---	---	
						Yellow buckeye	---	---	
						White ash	---	---	
						Sweet birch	---	---	
Balsam	10A	Slight	Slight	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Sweet birch	---	---	
						Eastern hemlock	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
TeD2[6]:									
Tanasee	10R	Moderate	Moderate	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Black cherry	---	---	
						Black oak	---	---	
						American beech	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Eastern hemlock	---	---	
						Yellow buckeye	---	---	
						White ash	---	---	
						Sweet birch	---	---	
Balsam	10R	Moderate	Moderate	Slight	Slight	Red spruce	64	150	Red spruce, Fraser fir.
						Fraser fir	---	---	
						Northern red oak	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Sweet birch	---	---	
						Eastern hemlock	---	---	
TrE, TrF Trimont	8R	Severe	Severe	Slight	Slight	Yellow-poplar	102	110	Yellow-poplar, northern red oak, black oak, white oak.
						Northern red oak	94	76	
						Black oak	---	---	
						White oak	---	---	
						American beech	---	---	
						Black cherry	---	---	
						Sweet birch	---	---	
TuD[6]:									
Tuckasegee	8R	Moderate	Moderate	Slight	Slight	Yellow-poplar	109	122	Yellow-poplar, eastern white pine, northern red oak, black cherry, Fraser fir.
						Eastern white pine	98	182	
						Northern red oak	---	---	
						Black cherry	---	---	
						Eastern hemlock	---	---	
						White oak	---	---	
						Yellow birch	---	---	
						American beech	---	---	
						Black locust	---	---	
						Yellow buckeye	---	---	
						Sugar maple	---	---	
						Sweet birch	---	---	
Cullasaja	8R	Moderate	Moderate	Slight	Slight	Yellow-poplar	109	122	Fraser fir, yellow-poplar, eastern white pine, northern red oak, black cherry.
						Black cherry	---	---	
						Northern red oak	---	---	
						Yellow birch	---	---	
						Eastern white pine	---	---	
						Sweet birch	---	---	
						Sugar maple	---	---	
						American beech	---	---	
						Yellow buckeye	---	---	
						Eastern hemlock	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
TvE[6]:									
Tuckasegee	8R	Severe	Severe	Slight	Slight	Yellow-poplar	109	122	Yellow-poplar, eastern white pine, northern red oak, black cherry, Fraser fir.
						Eastern white pine	98	182	
						Northern red oak	---	---	
						Black cherry	---	---	
						Eastern hemlock	---	---	
						White oak	---	---	
						Yellow birch	---	---	
						American beech	---	---	
						White ash	---	---	
						Black locust	---	---	
						Yellow buckeye	---	---	
						Sugar maple	---	---	
						Red maple	---	---	
						Sweet birch	---	---	
Cullasaja	8R	Severe	Severe	Slight	Slight	Yellow-poplar	109	122	Fraser fir, yellow-poplar, eastern white pine, northern red oak, black cherry.
						Black cherry	---	---	
						Northern red oak	---	---	
						Yellow birch	---	---	
						Eastern white pine	---	---	
						Sweet birch	---	---	
						American beech	---	---	
						Yellow buckeye	---	---	
						Sugar maple	---	---	
						Eastern hemlock	---	---	
WaD Wayah	4R	Moderate	Moderate	Slight	Slight	Northern red oak	72	54	Northern red oak, red spruce, Fraser fir.
						Black cherry	72	---	
						Red spruce	57	129	
						Fraser fir	60	---	
						American beech	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Black oak	---	---	
						Yellow buckeye	---	---	
						Eastern hemlock	---	---	
						Sweet birch	---	---	
WaE, WaF Wayah	4R	Severe	Severe	Slight	Slight	Northern red oak	72	54	Northern red oak, red spruce, Fraser fir.
						Black cherry	72	---	
						Red spruce	57	129	
						Fraser fir	60	---	
						American beech	---	---	
						Yellow birch	---	---	
						Sugar maple	---	---	
						Black oak	---	---	
						Yellow buckeye	---	---	
						Eastern hemlock	---	---	
						Sweet birch	---	---	
WeC Wayah	2A	Slight	Slight	Severe	Slight	Northern red oak	43	28	
						Red spruce	---	---	
						Fraser fir	---	---	
						Sugar maple	---	---	
						Yellow birch	---	---	
						Black cherry	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
WeD---------- Wayah	2R	Moderate	Moderate	Severe	Slight	Northern red oak----	43	28	
						Red spruce----------	---	---	
						Fraser fir----------	---	---	
						Sugar maple---------	---	---	
						Yellow birch--------	---	---	
						Black cherry--------	---	---	
WeE---------- Wayah	2R	Severe	Severe	Severe	Slight	Northern red oak----	43	28	
						Red spruce----------	---	---	
						Fraser fir----------	---	---	
						Sugar maple---------	---	---	
						Yellow birch--------	---	---	
						Black cherry--------	---	---	
WhB2, WhC2------ Wayah	2A	Slight	Slight	Severe	Slight	Northern red oak----	40	26	
						Red spruce----------	---	---	
						Fraser fir----------	---	---	
						Sugar maple---------	---	---	
						Yellow birch--------	---	---	
						Black cherry--------	---	---	
WhD2---------- Wayah	2R	Moderate	Moderate	Severe	Slight	Northern red oak----	40	26	
						Red spruce----------	---	---	
						Fraser fir----------	---	---	
						Sugar maple---------	---	---	
						Yellow birch--------	---	---	
						Black cherry--------	---	---	
WhE2, WhF2------ Wayah	2R	Severe	Severe	Severe	Slight	Northern red oak----	40	26	
						Red spruce----------	---	---	
						Fraser fir----------	---	---	
						Sugar maple---------	---	---	
						Yellow birch--------	---	---	
						Black cherry--------	---	---	
WoC---------- Whiteoak	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	98	104	Yellow-poplar, eastern white pine, northern red oak, Fraser fir.
						Eastern white pine--	110	203	
						Northern red oak----	---	---	
						White oak-----------	---	---	
						Scarlet oak---------	---	---	
						American beech------	---	---	
						Red maple-----------	---	---	
						Eastern hemlock-----	---	---	
						Black cherry--------	---	---	
						Sweet birch---------	---	---	
						Yellow buckeye------	---	---	
						Black oak-----------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol[1]	Management concerns				Potential productivity			Trees to plant[5]
		Erosion hazard[2]	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index[3]	Volume[4]	
WoD---------- Whiteoak	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar	98	104	Yellow-poplar, eastern white pine, northern red oak, Fraser fir.
						Eastern white pine	110	203	
						Northern red oak	---	---	
						White oak	---	---	
						Scarlet oak	---	---	
						American beech	---	---	
						Red maple	---	---	
						Eastern hemlock	---	---	
						Black cherry	---	---	
						Sweet birch	---	---	
						Yellow buckeye	---	---	
						Black oak	---	---	

[1] The number in the ordination symbol denotes potential productivity, in cubic meters per hectare per year, for a group or range of site indices for the indicator species (first tree listed under "Common trees"). One cubic meter per hectare per year equals 14.3 cubic feet per acre per year.

[2] Some soils are subject to mass movement (landslides). Roads should not be constructed in areas of these soils.

[3] Site indices were assigned using available plot data and comparison curves. If sufficient plot data was available, the site index was assigned based on data from soils with similar properties. The site index may vary considerably among sites with the same soil (especially in the mountains) because of the influences of climate, relief, landform position, aspect, drainage, and elevation.

[4] Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands. Cubic feet can be converted to board feet by multiplying by about 5.

[5] If hardwoods are desired on a forest site, the natural reproduction (seeds and sprouts) of acceptable species should be used. Special site preparation techniques may be needed. Planting hardwoods on a specific site should be based on the recommendations of a forester. Fraser fir is planted for Christmas trees only.

[6] See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BkB2 Braddock	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
BkC2 Braddock	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
BoD2 Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
BrC*: Braddock	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land.					
BsC*: Brasstown	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
Junaluska	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Slight	Moderate: small stones, slope, depth to rock.
BsD*: Brasstown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
BsE*: Brasstown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Junaluska	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
BuD*: Burton	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Craggey	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: small stones, depth to rock, slope.	Severe: fragile.	Severe: slope, depth to rock.
Rock outcrop.					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ChE, ChF Cheoah	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
CtD Cullasaja	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: small stones, large stones, slope.
CtE Cullasaja	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
CxA*: Cullowhee	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
Nikwasi	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
DeA Dellwood	Severe: flooding.	Moderate: wetness, large stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: droughty.
DhA*: Dellwood	Severe: flooding.	Moderate: wetness, large stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: droughty.
Urban land.					
DsB Dillsboro	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
DsC Dillsboro	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
DuC*: Dillsboro	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
Urban land.					
EdC*: Edneyville	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
Chestnut	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
EdD*:					
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
EdE*, EdF*:					
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
EvD*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
EvE*, EwF*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
ExD*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Urban land.					
FnE2 Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HaB2 Hayesville	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
HaC2 Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
HaD2 Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HeC*:					
Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land.					
HeD*:					
Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Urban land.					
HmA	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Hemphill					
HwB*.					
Humaquepts					
OcE, OcF	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Oconaluftee					
OwD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Oconaluftee					
OwE	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Oconaluftee					
Pg*.					
Pits					
PwC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Plott					
PwD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Plott					
PwE, PwF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Plott					
RfF*:					
Rock outcrop.					
Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
RgF*:					
Rock outcrop.					
Cataska	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, small stones.	Severe: slope.	Severe: slope, depth to rock.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RmF*: Rock outcrop.					
Craggey	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: small stones, depth to rock, slope.	Severe: slope, fragile.	Severe: slope, depth to rock.
RoA Rosman	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
ScB Saunook	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
SdC Saunook	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
SdD Saunook	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
SeE Saunook	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SfC*: Saunook	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land.					
SmF*: Soco	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Cataska	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, small stones.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.					
SoE*, SoF*: Soco	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Stecoah	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
SsE*: Spivey	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
Whiteoak	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SuA Statler	Severe: flooding.	Slight	Moderate: small stones.	Slight	Slight.
TaC*: Tanasee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Balsam	Moderate: slope.	Moderate: slope.	Severe: slope, small stones, large stones.	Moderate: large stones.	Severe: large stones.
TcD*: Tanasee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Balsam	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Moderate: large stones, slope.	Severe: large stones, slope.
TcE*: Tanasee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Balsam	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: large stones, slope.
TeC2*: Tanasee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Balsam	Moderate: slope.	Moderate: slope.	Severe: slope, small stones, large stones.	Moderate: large stones.	Severe: large stones.
TeD2*: Tanasee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Balsam	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Moderate: large stones, slope.	Severe: large stones, slope.
TrE, TrF Trimont	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
TuD*: Tuckasegee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Cullasaja	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TvE*:					
Tuckasegee	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Cullasaja	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope.
Ud*.					
Udorthents					
UfA*.					
Udorthents-Urban land					
Ur*.					
Urban land					
WaD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Wayah					
WaE, WaF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wayah					
WeC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Wayah					
WeD	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Wayah					
WeE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wayah					
WhB2	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Wayah					
WhC2	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Wayah					
WhD2	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Wayah					
WhE2, WhF2	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wayah					
WoC	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
Whiteoak					
WoD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Whiteoak					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
BkB2---------- Braddock	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BkC2---------- Braddock	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BoD2---------- Braddock	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BrC*:										
Braddock----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
BsC*:										
Brasstown---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Junaluska---------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
BsD*:										
Brasstown---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Junaluska---------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BsE*:										
Brasstown---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Junaluska---------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
BuD*:										
Burton----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Craggey----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
ChE, ChF---------- Cheoah	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
CtD, CtE---------- Cullasaja	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
CxA*:										
Cullowhee	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Nikwasi	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
DeA	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Dellwood										
DhA*:										
Dellwood	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
DsB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Dillsboro										
DsC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Dillsboro										
DuC*:										
Dillsboro	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
EdC*:										
Edneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Chestnut	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EdD*:										
Edneyville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Chestnut	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EdE*, EdF*:										
Edneyville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Chestnut	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
EvD*:										
Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cowee	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
EvE*, EwF*:										
Evard	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Cowee	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
ExD*:										
Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cowee	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
FnE2	Very	Poor	Good	Good	Good	Very	Very	Poor	Good	Very
Fannin	poor.					poor.	poor.			poor.
HaB2	Good	Good	Good	Good	Good	Very	Very	Good	Good	Very
Hayesville						poor.	poor.			poor.
HaC2	Fair	Good	Good	Good	Good	Very	Very	Good	Good	Very
Hayesville						poor.	poor.			poor.
HaD2	Poor	Fair	Good	Good	Good	Very	Very	Fair	Good	Very
Hayesville						poor.	poor.			poor.
HeC*:										
Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
HeD*:										
Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
HmA	Very	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Hemphill	poor.									
HwB*.										
Humaquepts										
OcE, OcF	Very	Poor	Good	Good	Good	Very	Very	Poor	Good	Very
Oconaluftee	poor.					poor.	poor.			poor.
OwD	Poor	Fair	Good	Very	Poor	Very	Very	Fair	Poor	Very
Oconaluftee				poor.		poor.	poor.			poor.
OwE	Very	Poor	Good	Very	Poor	Very	Very	Poor	Poor	Very
Oconaluftee	poor.			poor.		poor.	poor.			poor.
Pg*.										
Pits										

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
PwC---------- Plott	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PwD---------- Plott	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PwE, PwF---------- Plott	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
RfF*: Rock outcrop.										
Ashe----------	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Cleveland----------	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
RgF*: Rock outcrop.										
Cataska----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
RmF*: Rock outcrop.										
Craggey----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
RoA---------- Rosman	Good	Good	Good	Good	Good	Fair	Very poor.	Good	Good	Very poor.
ScB---------- Saunook	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SdC---------- Saunook	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SdD---------- Saunook	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
SeE---------- Saunook	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
SfC*: Saunook----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
SmF*: Soco----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
SmF*:										
Cataska	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Rock outcrop.										
SoE*, SoF*:										
Soco	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Stecoah	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
SsE*:										
Spivey	Very poor.	Very poor.	Fair	Good	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
Whiteoak	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
SuA	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Statler										
TaC*:										
Tanasee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Balsam	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TcD*:										
Tanasee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Balsam	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TcE*:										
Tanasee	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Balsam	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
TeC2*:										
Tanasee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Balsam	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TeD2*:										
Tanasee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Balsam	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
TrE, TrF---------- Trimont	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
TuD*:										
Tuckasegee--------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cullasaja---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TvE*:										
Tuckasegee--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Cullasaja---------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Ud*. Udorthents										
UfA*. Udorthents-Urban land										
Ur*. Urban land										
WaD---------- Wayah	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WaE, WaF---------- Wayah	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
WeC---------- Wayah	Fair	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
WeD---------- Wayah	Poor	Fair	Good	Very poor.	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
WeE---------- Wayah	Very poor.	Poor	Good	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
WhB2, WhC2--------- Wayah	Fair	Good	Good	Very poor.	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
WhD2---------- Wayah	Poor	Fair	Good	Very poor.	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
WhE2, WhF2--------- Wayah	Very poor.	Poor	Good	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
WoC---------- Whiteoak	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WoD---------- Whiteoak	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BkB2 Braddock	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
BkC2 Braddock	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
BoD2 Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
BrC*: Braddock	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Urban land.						
BsC*: Brasstown	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: small stones, slope.
Junaluska	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: small stones, slope, depth to rock.
BsD*, BsE*: Brasstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Junaluska	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BuD*: Burton	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Craggey	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
ChE, ChF Cheoah	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CtD, CtE---------- Cullasaja	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, large stones, slope.
CxA*: Cullowhee---------	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Nikwasi----------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
DeA--------------- Dellwood	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: droughty.
DhA*: Dellwood--------- Urban land.	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: droughty.
DsB--------------- Dillsboro	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones.
DsC--------------- Dillsboro	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
DuC*: Dillsboro--------- Urban land.	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
EdC*: Edneyville------- Chestnut--------- EdD*, EdE*, EdF*: Edneyville------- Chestnut---------	Moderate: slope. Moderate: depth to rock, slope. Severe: slope. Severe: slope.	Moderate: slope. Moderate: slope. Severe: slope. Severe: slope.	Moderate: slope. Moderate: depth to rock, slope. Severe: slope. Severe: slope.	Severe: slope. Severe: slope. Severe: slope. Severe: slope.	Moderate: slope, frost action. Moderate: slope, frost action. Severe: slope. Severe: slope.	Moderate: small stones, droughty, slope. Moderate: small stones, droughty, slope. Severe: slope. Severe: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
EvD*, EvE*, EwF*:						
Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ExD*:						
Evard	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.						
FnE2	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Fannin	slope.	slope.	slope.	slope.	low strength, slope.	slope.
HaB2	Moderate:	Slight	Slight	Moderate:	Moderate:	Slight.
Hayesville	too clayey.			slope.	low strength, frost action.	
HaC2	Moderate:	Moderate:	Moderate:	Severe:	Moderate:	Moderate:
Hayesville	too clayey, slope.	slope.	slope.	slope.	low strength, slope, frost action.	slope.
HaD2	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Hayesville	slope.	slope.	slope.	slope.	slope.	slope.
HeC*:						
Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Urban land.						
HeD*:						
Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.						
HmA	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Hemphill	wetness.	flooding, wetness, shrink-swell.	flooding, wetness, shrink-swell.	flooding, wetness, shrink-swell.	shrink-swell, low strength, wetness.	wetness.
HwB*.						
Humaquepts						
OcE, OcF, OwD, OwE	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Oconaluftee	slope.	slope.	slope.	slope.	slope.	slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pg*. Pits						
PwC---------- Plott	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
PwD, PwE, PwF----- Plott	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RfF*: Rock outcrop.						
Ashe----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cleveland--------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
RgF*: Rock outcrop.						
Cataska----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
RmF*: Rock outcrop.						
Craggey----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
RoA---------- Rosman	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
ScB---------- Saunook	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength, frost action.	Slight.
SdC---------- Saunook	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
SdD, SeE---------- Saunook	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SfC*: Saunook----------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
Urban land.						

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SmF*:						
Soco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cataska	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.						
SoE*, SoF*:						
Soco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Stecoah	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SsE*:						
Spivey	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
Whiteoak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SuA	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
Statler						
TaC*:						
Tanasee	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Balsam	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones.
TcD*, TcE*:						
Tanasee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Balsam	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
TeC2*:						
Tanasee	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Balsam	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones.
TeD2*:						
Tanasee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TeD2*:						
Balsam	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
TrE, TrF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Trimont						
TuD*, TvE*:						
Tuckasegee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cullasaja	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Ud*.						
Udorthents						
UfA*.						
Udorthents-Urban land						
Ur*.						
Urban land						
WaD, WaE, WaF	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wayah						
WeC	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Wayah						
WeD, WeE	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wayah						
WhB2	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Wayah						
WhC2	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Wayah						
WhD2, WhE2, WhF2	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wayah						
WoC	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
Whiteoak						
WoD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Whiteoak						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BkB2 Braddock	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack.
BkC2 Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
BoD2 Braddock	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
BrC*: Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Urban land.					
BsC*: Brasstown	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, small stones, slope.
Junaluska	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
BsD*, BsE*: Brasstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Junaluska	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
BuD*: Burton	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Craggey	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ChE, ChF Cheoah	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
CtD, CtE Cullasaja	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, large stones, slope.
CxA*: Cullowhee	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
Nikwasi	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
DeA Dellwood	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
DhA*: Dellwood	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
Urban land.					
DsB Dillsboro	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
DsC Dillsboro	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
DuC*: Dillsboro	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Urban land.					
EdC*: Edneyville	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
Chestnut	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EdD*, EdE*, EdF*:					
Edneyville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Chestnut	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
EvD*, EvE*, EwF*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cowee	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
ExD*:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cowee	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Urban land.					
FnE2	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Fannin					
HaB2	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, hard to pack.
Hayesville					
HaC2	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
Hayesville					
HaD2	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Hayesville					
HeC*:					
Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
Urban land.					
HeD*:					
Hayesville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Urban land.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HmA Hemphill	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
HwB*. Humaquepts					
OcE, OcF, OwD, OwE Oconaluftee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Pg*. Pits					
PwC Plott	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope, thin layer.
PwD, PwE, PwF Plott	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
RfF*: Rock outcrop.					
Ashe	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Cleveland	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
RgF*: Rock outcrop.					
Cataska	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
RmF*: Rock outcrop.					
Craggey	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
RoA Rosman	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
ScB Saunook	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SdC---------- Saunook	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
SdD, SeE---------- Saunook	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
SfC*: Saunook----------	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
Urban land.					
SmF*: Soco----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Cataska----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
Rock outcrop.					
SoE*, SoF*: Soco----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Stecoah----------	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
SsE*: Spivey----------	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
Whiteoak----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
SuA---------- Statler	Moderate: flooding, percs slowly.	Severe: seepage.	Severe: seepage.	Moderate: flooding.	Good.
TaC*: Tanasee----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, large stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TaC*:					
Balsam	Severe: large stones.	Severe: seepage, slope, large stones.	Severe: seepage, large stones.	Severe: seepage.	Poor: large stones.
TcD*, TcE*:					
Tanasee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, large stones, slope.
Balsam	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
TeC2*:					
Tanasee	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: seepage, large stones.
Balsam	Severe: large stones.	Severe: seepage, slope, large stones.	Severe: seepage, large stones.	Severe: seepage.	Poor: large stones.
TeD2*:					
Tanasee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, large stones, slope.
Balsam	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
TrE, TrF	Severe:	Severe:	Severe:	Severe:	Poor:
Trimont	slope.	slope.	slope.	slope.	slope.
TuD*, TvE*:					
Tuckasegee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
Cullasaja	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: seepage, large stones, slope.
Ud*.					
Udorthents					
UfA*.					
Udorthents-Urban land					
Ur*.					
Urban land					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WaD, WaE, WaF Wayah	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
WeC Wayah	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
WeD, WeE Wayah	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
WhB2 Wayah	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
WhC2 Wayah	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
WhD2, WhE2, WhF2 Wayah	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
WoC Whiteoak	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.
WoD Whiteoak	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BkB2, BkC2 Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, small stones.
BoD2 Braddock	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, small stones.
BrC*: Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, small stones.
Urban land.				
BsC*: Brasstown	Fair: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Junaluska	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BsD*: Brasstown	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Junaluska	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BsE*: Brasstown	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Junaluska	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BuD*: Burton	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BuD*:				
Craggey	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Rock outcrop.				
ChE, ChF	Poor:	Improbable:	Improbable:	Poor:
Cheoah	slope.	excess fines.	excess fines.	small stones, slope.
CtD	Poor:	Improbable:	Improbable:	Poor:
Cullasaja	large stones.	large stones.	large stones.	large stones, area reclaim, slope.
CtE	Poor:	Improbable:	Improbable:	Poor:
Cullasaja	large stones, slope.	large stones.	large stones.	large stones, area reclaim, slope.
CxA*:				
Cullowhee	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
Nikwasi	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
DeA	Fair:	Probable	Probable	Poor:
Dellwood	large stones, wetness.			too sandy, small stones, area reclaim.
DhA*:				
Dellwood	Fair: large stones, wetness.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
Urban land.				
DsB, DsC	Good	Improbable:	Improbable:	Poor:
Dillsboro		excess fines.	excess fines.	too clayey, area reclaim.
DuC*:				
Dillsboro	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim.
Urban land.				
EdC*:				
Edneyville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EdC*:				
Chestnut	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones.
EdD*:				
Edneyville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Chestnut	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
EdE*, EdF*:				
Edneyville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Chestnut	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, slope.
EvD*:				
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cowee	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
EvE*, EwF*:				
Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cowee	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
ExD*:				
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cowee	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Urban land.				
FnE2	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Fannin				
HaB2, HaC2	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Hayesville				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HaD2 Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
HeC*: Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
HeD*: Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Urban land.				
HmA Hemphill	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
HwB*. Humaquepts				
OcE, OcF Oconaluftee	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
OwD Oconaluftee	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
OwE Oconaluftee	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Pg*. Pits				
PwC Plott	Good	Probable	Probable	Fair: small stones, area reclaim, slope.
PwD Plott	Fair: slope.	Probable	Probable	Poor: slope.
PwE, PwF Plott	Poor: slope.	Probable	Probable	Poor: slope.
RfF*: Rock outcrop.				
Ashe	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
RfF*:				
Cleveland	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
RgF*:				
Rock outcrop.				
Cataska	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
RmF*:				
Rock outcrop.				
Craggey	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
RoA	Fair: wetness.	Probable	Probable	Fair: small stones, area reclaim.
Rosman				
ScB, SdC	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Saunook				
SdD	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Saunook				
SeE	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Saunook				
SfC*:				
Saunook	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Urban land.				
SmF*:				
Soco	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cataska	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SoE*, SoF*:				
Soco	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Stecoah	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
SsE*:				
Spivey	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
Whiteoak	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
SuA Statler	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
TaC*:				
Tanasee	Good	Probable	Probable	Poor: area reclaim, small stones.
Balsam	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
TcD*:				
Tanasee	Fair: slope.	Probable	Probable	Poor: area reclaim, small stones, slope.
Balsam	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
TcE*:				
Tanasee	Poor: slope.	Probable	Probable	Poor: area reclaim, small stones, slope.
Balsam	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
TeC2*:				
Tanasee	Good	Probable	Probable	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TeC2*:				
Balsam	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
TeD2*:				
Tanasee	Fair: slope.	Probable	Probable	Poor: area reclaim, small stones, slope.
Balsam	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
TrE, TrF Trimont	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
TuD*:				
Tuckasegee	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Cullasaja	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
TvE*:				
Tuckasegee	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Cullasaja	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
Ud*. Udorthents				
UfA*. Udorthents-Urban land				
Ur*. Urban land				
WaD Wayah	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WaE, WaF Wayah	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WeC---- Wayah	Good----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WeD---- Wayah	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WeE---- Wayah	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WhB2, WhC2---- Wayah	Good----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WhD2---- Wayah	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WhE2, WhF2---- Wayah	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WoC---- Whiteoak	Good----	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WoD---- Whiteoak	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
BkB2---------- Braddock	Severe: seepage.	Moderate: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
BkC2, BoD2-------- Braddock	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
BrC*: Braddock---------	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
Urban land.						
BsC*, BsD*, BsE*: Brasstown--------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
Junaluska--------	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
BuD*: Burton----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Craggey----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.						
ChE, ChF---------- Cheoah	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
CtD, CtE---------- Cullasaja	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
CxA*: Cullowhee--------	Severe: seepage.	Severe: seepage, wetness.	Flooding, large stones, cutbanks cave.	Wetness, droughty, flooding.	Wetness, too sandy.	Droughty.
Nikwasi----------	Severe: seepage.	Severe: seepage, wetness.	Flooding, large stones, cutbanks cave.	Wetness, droughty, flooding.	Large stones, wetness, too sandy.	Large stones, wetness, droughty.
DeA---------- Dellwood	Severe: seepage.	Severe: seepage, large stones.	Flooding, large stones.	Large stones, wetness, droughty.	Large stones, wetness, too sandy.	Large stones, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
DhA*:						
Dellwood	Severe: seepage.	Severe: seepage, large stones.	Flooding, large stones.	Large stones, wetness, droughty.	Large stones, wetness, too sandy.	Large stones, droughty.
Urban land.						
DsB---------- Dillsboro	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, soil blowing.	Soil blowing---	Favorable.
DsC---------- Dillsboro	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
DuC*:						
Dillsboro	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
Urban land.						
EdC*, EdD*, EdE*, EdF*:						
Edneyville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope----------	Slope, droughty.
Chestnut	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
EvD*, EvE*, EwF*:						
Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope----------	Slope, too sandy.	Slope.
Cowee	Severe: slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
ExD*:						
Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope----------	Slope, too sandy.	Slope.
Cowee	Severe: slope.	Severe: thin layer, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Urban land.						
FnE2---------- Fannin	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
HaB2---------- Hayesville	Severe: seepage.	Severe: hard to pack.	Deep to water	Slope----------	Favorable------	Favorable.
HaC2, HaD2-------- Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
HeC*, HeD*: Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
Urban land.						
HmA--Hemphill	Slight	Severe: hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
HwB*. Humaquepts						
OcE, OcF, OwD, OwE--Oconaluftee	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Pg*. Pits						
PwC, PwD, PwE, PwF--Plott	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
RfF*: Rock outcrop.						
Ashe	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Cleveland	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
RgF*: Rock outcrop.						
Cataska	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Slope, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
RmF*: Rock outcrop.						
Craggey	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
RoA--Rosman	Severe: seepage.	Severe: piping.	Flooding	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Favorable.
ScB--Saunook	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
SdC, SdD, SeE----- Saunook	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
SfC*:						
Saunook----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
Urban land.						
SmF*:						
Soco----------	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Cataska----------	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Slope, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
SoE*, SoF*:						
Soco----------	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Stecoah----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
SsE*:						
Spivey----------	Severe: seepage, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
Whiteoak----------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
SuA---------- Statler	Severe: seepage.	Severe: piping.	Deep to water	Favorable------	Favorable------	Favorable.
TaC*, TcD*, TcE*, TeC2*, TeD2*:						
Tanasee----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, soil blowing.	Slope, large stones, too sandy.	Large stones, slope.
Balsam----------	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
TrE, TrF---------- Trimont	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
TuD*, TvE*:						
Tuckasegee-------	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
TuD*, TvE*: Cullasaja	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, too sandy.	Large stones, slope, droughty.
Ud*. Udorthents						
UfA*. Udorthents-Urban land						
Ur*. Urban land						
WaD, WaE, WaF, WeC, WeD, WeE---- Wayah	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
WhB2---------- Wayah	Severe: seepage.	Severe: piping.	Deep to water	Slope----------	Favorable------	Favorable.
WhC2, WhD2, WhE2, WhF2---------- Wayah	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
WoC, WoD---------- Whiteoak	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
BkB2, BkC2, BoD2-Braddock	0-6	Clay loam	CL	A-6, A-7	0-5	80-100	75-100	65-95	50-85	35-50	15-26
	6-40	Clay loam, clay, gravelly clay.	CH, CL, SC, GC	A-7	0-15	80-100	65-100	55-95	40-90	42-66	15-35
	40-60	Loam, very cobbly sandy clay loam, clay loam.	SC, CL, GM, GC	A-2, A-4, A-6, A-7	0-50	75-95	30-90	25-85	20-70	25-50	8-28
BrC*:											
Braddock	0-6	Clay loam	CL	A-6, A-7	0-5	80-100	75-100	65-95	50-85	35-50	15-26
	6-40	Clay loam, clay, gravelly clay, sandy clay.	CH, CL, SC, GC	A-7, A-2	0-15	80-100	65-100	55-95	40-90	42-66	15-35
	40-60	Loam, very cobbly sandy clay loam, clay loam.	SC, CL, GM, GC	A-2, A-4, A-6, A-7	0-50	75-95	30-90	25-85	20-70	25-50	8-28
Urban land.											
BsC*, BsD*, BsE*:											
Brasstown	0-7	Channery loam	SM, GM, ML, MH	A-4, A-5, A-7-5	2-15	70-95	70-90	40-80	35-55	30-57	NP-14
	7-31	Channery loam, channery sandy clay loam, loam.	CL, ML, SC, SM	A-6, A-7-6	2-15	75-100	70-100	55-97	40-73	35-50	11-20
	31-45	Channery fine sandy loam, channery loam, loam, silt loam.	SM, GM, ML	A-4	2-15	70-100	70-100	40-96	35-55	25-35	NP-10
	45-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Junaluska	0-2	Channery loam	SM, ML, MH, GM	A-4, A-5, A-2-4, A-7	5-15	70-96	55-91	40-80	30-55	29-56	NP-14
	2-25	Loam, channery clay loam, sandy clay loam, silty clay loam.	CL, ML, SC, SM	A-6, A-7	5-15	75-100	60-100	55-95	40-73	29-50	10-20
	25-28	Channery loam, channery fine sandy loam, fine sandy loam, silt loam.	SM, ML, GM	A-4	5-15	70-100	55-100	40-91	35-55	25-40	3-10
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
BuD*:											
Burton	0-14	Gravelly loam	SM, GM	A-2, A-4, A-1-b, A-5	5-15	65-90	60-75	30-65	20-49	30-50	NP-7
	14-26	Sandy loam, gravelly sandy loam, loam.	SM, SC-SM	A-2, A-4	5-15	73-100	70-95	57-95	25-49	25-35	NP-7
	26-32	Very cobbly fine sandy loam, gravelly sandy loam, cobbly sandy loam.	SM, GM, SP-SM, GM-GC	A-2, A-1-b	10-35	45-75	40-65	35-55	10-30	25-35	NP-7
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Craggey	0-15	Gravelly sandy loam.	SM, GM, SC-SM	A-2, A-1-b	5-15	55-95	50-90	30-60	15-35	<50	NP-7
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
ChE, ChF	0-15	Channery loam	SM, GM, ML, MH	A-4, A-7-5, A-5	5-15	70-95	55-90	40-80	36-65	30-64	NP-11
Cheoah	15-35	Loam, fine sandy loam, silt loam.	SM, SC, ML, CL	A-4	0-5	85-100	80-100	65-90	36-76	25-40	NP-10
	35-51	Channery loam, channery fine sandy loam, channery silt loam, very channery fine sandy loam.	SM, SC, ML, CL	A-4	5-15	70-95	55-90	40-84	36-65	25-36	NP-10
	51-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
CtD, CtE	0-20	Very cobbly loam	SM, SP-SM, GM, GP-GM	A-1, A-2-5	40-70	45-70	35-50	15-35	10-20	41-70	NP-7
Cullasaja	20-60	Very cobbly sandy loam, very cobbly fine sandy loam, very cobbly loam.	SM, GM	A-1-b, A-2-4	30-60	55-85	50-75	35-60	15-30	<40	NP-7
CxA*:											
Cullowhee	0-10	Sandy loam	SM, ML	A-2-4, A-4	0-5	90-100	80-100	50-97	25-55	<35	NP-4
	10-31	Loamy sand, loamy fine sand, sandy loam.	SM, SP-SM	A-2-4, A-1-b	0-5	90-100	85-95	40-89	10-35	<25	NP-4
	31-60	Extremely gravelly sand, very gravelly sand, very cobbly sand, very gravelly loamy sand.	GP-GM, GM, SM, SP-SM	A-1	10-50	13-75	10-55	6-40	1-15	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
CxA*:											
Nikwasi	0-28	Loam	SM, ML	A-2-4, A-4	0-5	90-100	80-99	50-93	17-55	<37	NP-4
	28-60	Extremely gravelly coarse sand, very gravelly sand, very cobbly loamy sand, very gravelly loamy sand.	GP-GM, GM, SM, SP-SM	A-1	10-50	25-75	10-55	7-40	1-15	---	NP
DeA---	0-8	Cobbly sandy loam	SM	A-2-4, A-4, A-1-b	15-30	70-83	70-81	30-75	20-50	<37	NP-4
Dellwood	8-14	Extremely gravelly sand, very gravelly sand, very gravelly loamy sand.	GM, GP-GM, GP, SP	A-1	10-25	13-75	10-55	4-40	1-15	<20	NP
	14-60	Extremely gravelly sand, very cobbly sand, extremely gravelly coarse sand.	GM, GP-GM, GP, SP	A-1	30-50	13-75	10-40	4-40	1-15	<20	NP
DhA*:											
Dellwood	0-8	Cobbly sandy loam	SM	A-2-4, A-4, A-1-b	15-30	70-83	70-81	30-75	20-50	<37	NP-4
	8-14	Extremely gravelly sand, very gravelly sand, very gravelly loamy sand.	GM, GP-GM, GP, SP	A-1	10-25	13-75	10-55	4-40	1-15	<20	NP
	14-60	Extremely gravelly sand, very cobbly sand, extremely gravelly coarse sand.	GM, GP-GM, GP, SP	A-1	30-50	13-75	10-40	4-40	1-15	<20	NP
Urban land.											
DsB, DsC---	0-9	Loam	SM, SC, CL, ML	A-4, A-6, A-7-6	0-10	90-100	85-100	80-96	40-75	<42	NP-15
Dillsboro	9-44	Clay loam, clay	CL, CH, ML, MH	A-7-5	0-5	95-100	90-100	80-99	65-90	40-60	11-35
	44-60	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7-5	0-5	90-100	85-100	75-90	35-75	25-45	7-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
DuC*:											
Dillsboro	0-9	Loam	SM, SC, CL, ML	A-4, A-6, A-7-6	0-10	90-100	85-100	80-96	40-75	<42	NP-15
	9-44	Clay loam, clay	CL, CH, ML, MH	A-7	0-5	95-100	90-100	80-99	65-90	40-60	11-35
	44-60	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7-5	0-5	90-100	85-100	75-90	35-75	25-45	7-20
Urban land.											
EdC*, EdD*, EdE*, EdF*:											
Edneyville	0-3	Gravelly loam	SM, SC-SM, ML, MH	A-2, A-4, A-5	0-10	75-95	65-80	60-75	30-52	25-61	NP-7
	3-34	Fine sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2, A-4, A-5	0-5	85-100	80-100	65-95	30-68	25-45	NP-10
	34-60	Sandy loam, gravelly sandy loam, fine sandy loam, gravelly loamy sand.	SM, SC-SM	A-2, A-4, A-5	0-10	75-100	65-100	60-88	28-49	25-45	NP-10
Chestnut	0-4	Gravelly loam	SM, SC-SM	A-4, A-2, A-5	5-15	75-95	65-90	60-85	30-49	<50	NP-7
	4-30	Gravelly loam, gravelly fine sandy loam, sandy loam.	SM, SC-SM	A-4, A-2, A-5	0-25	75-98	65-97	60-85	34-49	<45	NP-10
	30-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
EvD*, EvE*, EwF*:											
Evard	0-2	Gravelly loam	SM	A-2	0-15	65-85	60-80	55-75	15-35	<30	NP-4
	2-27	Sandy clay loam, clay loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	27-40	Sandy loam, loam, sandy clay loam.	SC-SM, ML, CL, SC-SM	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	40-60	Sandy loam, loam, gravelly sandy loam.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
Cowee	0-6	Gravelly loam	SM, SC-SM, ML	A-2-4, A-4, A-5, A-2	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	6-28	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7, A-2	0-15	47-99	45-90	32-85	17-60	26-56	5-22
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
ExD*:											
Evard	0-2	Gravelly loam	SM	A-2	0-15	65-85	60-80	55-75	15-35	<30	NP-4
	2-27	Sandy clay loam, clay loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	27-40	Sandy loam, loam, sandy clay loam.	SC-SM, ML, CL, SC-SM	A-2, A-4	0-5	80-100	75-100	60-95	20-55	<25	NP-9
	40-60	Sandy loam, loam, gravelly sandy loam.	SM	A-2, A-4	0-15	75-100	70-100	60-90	15-50	---	NP
Cowee	0-6	Gravelly loam	SM, SC-SM, ML	A-2-4, A-4, A-5, A-2	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	6-28	Gravelly loam, sandy clay loam, gravelly sandy loam, clay loam.	SC, CL, ML, SM	A-4, A-6, A-7, A-2	0-15	47-99	45-90	32-85	17-60	26-56	5-22
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Urban land.											
FnE2	0-3	Loam	ML, SM, MH	A-4, A-2, A-5, A-7-5	0-5	92-100	86-100	60-95	34-85	30-51	NP-18
Fannin	3-31	Clay loam, sandy clay loam, loam.	ML, MH, SM	A-4, A-7, A-6	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	31-60	Loam, sandy loam, fine sandy loam.	SM, ML	A-2, A-4, A-5	0-15	75-100	70-98	60-90	15-70	30-50	NP-10
HaB2, HaC2, HaD2-	0-4	Clay loam	CL, SC, ML	A-4, A-6, A-7	0-5	90-100	85-100	80-95	45-65	30-50	7-18
Hayesville	4-24	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	24-32	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	32-60	Fine sandy loam, loam, sandy clay loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	25-40	NP-12
HeC*, HeD*:											
Hayesville	0-4	Clay loam	CL, SC, ML	A-4, A-6, A-7	0-5	90-100	85-100	80-95	45-65	30-50	7-18
	4-24	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	24-32	Sandy clay loam, clay loam, loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	32-60	Fine sandy loam, loam, sandy clay loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	65-90	40-55	25-40	NP-12
Urban land.											
HmA	0-12	Loam	SM, ML	A-4	0	95-100	93-100	65-100	40-90	25-50	4-16
Hemphill	12-47	Clay, silty clay, clay loam.	CL, CH, MH, ML	A-6, A-7	0	95-100	95-100	85-100	65-95	30-60	11-29
	47-62	Fine sandy loam, loam, clay loam.	SM, SC-SM, CL-ML, ML	A-4, A-5, A-6, A-7	0	95-100	90-100	65-100	40-90	25-50	NP-16

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HwB*. Humaquepts											
OcE, OcF, OwD, OwE---------- Oconaluftee	0-8	Channery loam----	SM, ML, GM	A-4, A-5	5-15	70-95	55-90	40-80	36-65	30-75	NP-7
	8-19	Channery loam, channery silt loam, channery fine sandy loam.	SM, ML, GM	A-4, A-5	5-15	70-95	55-90	40-80	36-65	30-45	NP-7
	19-35	Channery loam, fine sandy loam, channery fine sandy loam.	SM, SC, ML, CL	A-4, A-5	5-15	70-100	55-100	40-94	36-77	25-45	NP-10
	35-60	Channery loam, fine sandy loam, channery fine sandy loam.	SM, SC, ML, CL	A-4, A-5	5-15	70-100	55-100	40-91	36-69	25-45	NP-10
Pg*. Pits											
PwC, PwD, PwE, PwF---------- Plott	0-14	Fine sandy loam	SM, ML, MH	A-2, A-4, A-5	0-5	90-100	80-99	50-85	25-70	30-67	NP-7
	14-38	Loam, fine sandy loam, sandy loam.	SM, SC-SM, ML, CL-ML	A-2, A-4, A-5	0-5	90-100	80-95	50-85	20-70	25-44	NP-10
	38-60	Gravelly fine sandy loam, cobbly sandy loam, loamy sand, sandy loam.	SM, SC-SM, SP-SM, GM	A-2-4, A-1-b	5-15	58-92	56-89	20-72	10-30	25-36	NP-7
RfF*: Rock outcrop.											
Ashe----------	0-2	Gravelly sandy loam.	SM, SC-SM	A-2, A-4	5-10	80-90	75-90	60-90	30-49	25-35	NP-7
	2-18	Loam, sandy loam, fine sandy loam.	SM, SC-SM	A-4	5-20	85-100	80-95	60-95	35-49	25-35	NP-7
	18-28	Gravelly sandy loam, cobbly sandy loam, sandy loam.	SM	A-2, A-4	5-20	75-95	65-95	55-95	30-49	<25	NP
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cleveland-------	0-12	Gravelly sandy loam.	SM, GM	A-2, A-4, A-1	2-10	65-90	50-80	45-75	20-40	<25	NP-3
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RgF*: Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
RgF*:											
Cataska	0-3	Channery silt loam.	CL-ML, ML, GM, GM-GC	A-4	3-15	55-80	50-75	45-70	40-60	<30	NP-6
	3-16	Very channery silt loam, very channery loam.	GM-GC, GM, GP-GM	A-2, A-1	10-25	15-50	10-45	10-40	10-35	<30	NP-7
	16-29	Weathered bedrock	---	---	---	---	---	---	---	---	---
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RmF*:											
Rock outcrop.											
Craggey	0-15	Gravelly sandy loam.	SM, GM, SC-SM	A-2, A-1-b	5-15	55-95	50-90	30-60	15-35	<50	NP-7
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RoA	0-11	Fine sandy loam	ML, SM, SC-SM	A-2-4, A-4, A-2-5	0	95-100	90-100	75-100	30-60	<41	NP-7
Rosman	11-38	Loam, fine sandy loam, sandy loam.	ML, SM, SC-SM	A-2-4, A-4	0	95-100	90-100	75-100	30-85	<39	NP-8
	38-60	Gravelly sand, very gravelly sand, gravelly sandy loam, fine sandy loam.	GM, SM, SP-SM, SC-SM	A-2-4, A-4, A-1, A-3	0-35	50-100	50-100	25-100	5-85	<35	NP-7
ScB, SdC, SdD, SeE	0-9	Loam	SM, ML, MH	A-2, A-4, A-5, A-7-5	0-5	90-100	85-100	60-90	25-65	30-59	NP-14
Saunook	9-28	Loam, clay loam, sandy clay loam.	SC, CL, ML, MH	A-4, A-6, A-7-5, A-7-6	0-5	90-100	85-100	75-95	35-75	25-55	7-20
	28-34	Cobbly sandy clay loam, gravelly loam, cobbly loam.	SC, CL, ML, GM	A-4, A-6, A-2-4, A-2-6	5-25	55-99	55-97	45-83	30-55	25-45	7-17
	34-65	Very cobbly sandy loam, cobbly fine sandy loam, cobbly sandy loam.	SM, GM	A-4, A-1-b, A-2-4	15-35	55-80	55-80	30-75	20-50	25-40	NP-10

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
SfC*:											
Saunook	0-9	Loam	SM, ML, MH	A-2, A-4, A-5, A-7-5	0-5	90-100	85-100	60-90	25-65	30-59	NP-14
	9-28	Loam, clay loam, sandy clay loam.	SC, CL, ML, MH	A-4, A-6, A-7-5, A-7-6	0-5	90-100	85-100	75-95	35-75	25-55	7-20
	28-34	Cobbly sandy clay loam, gravelly loam, cobbly loam.	SC, CL, ML, GM	A-4, A-6, A-2-4, A-2-6	5-25	55-99	55-97	45-83	30-55	25-45	7-17
	34-65	Very cobbly sandy loam, cobbly fine sandy loam, cobbly sandy loam.	SM, GM	A-4, A-1-b, A-2-4	15-35	55-80	55-80	30-75	20-50	25-40	NP-10
Urban land.											
SmF*:											
Soco	0-2	Channery loam	SM, ML, GM, MH	A-4, A-5	5-15	70-96	55-92	40-83	36-65	20-55	NP-7
	2-26	Channery loam, channery fine sandy loam, flaggy sandy loam, flaggy loam.	SM, SC, ML, CL	A-4, A-6	5-15	70-95	55-91	40-91	35-65	25-40	NP-11
	26-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cataska	0-3	Channery loam	CL-ML, ML, GM, GM-GC	A-4	3-15	55-80	50-75	45-70	40-60	<30	NP-6
	3-16	Very channery silt loam, very channery loam.	GM-GC, GM, GP-GM	A-2, A-1	10-25	15-50	10-45	10-40	10-35	<30	NP-7
	16-29	Weathered bedrock	---	---	---	---	---	---	---	---	---
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
SoE*, SoF*:											
Soco	0-2	Channery loam	SM, ML, GM, MH	A-4, A-5	5-15	70-96	55-92	40-83	36-65	20-55	NP-7
	2-26	Channery loam, channery fine sandy loam, flaggy sandy loam, flaggy loam.	SM, SC, ML, CL	A-4, A-6	5-15	70-95	55-91	40-91	35-65	25-40	NP-11
	26-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
SoE*, SoF*:											
Stecoah	0-2	Channery loam	SM, ML, GM, MH	A-4, A-5	5-15	70-96	55-92	40-83	36-65	30-55	NP-7
	2-32	Channery loam, channery fine sandy loam, loam.	SM, SC, ML, CL	A-4, A-6	0-15	70-100	55-100	40-94	36-77	25-40	NP-12
	32-44	Channery loam, channery fine sandy loam, loam, fine sandy loam.	SM, SC, ML, CL, CL-ML	A-4	5-15	70-100	55-100	40-91	35-69	24-40	NP-10
	44-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
SsE*:											
Spivey	0-13	Cobbly loam	SM, GM, ML	A-4, A-5	15-30	70-95	65-85	40-80	36-65	15-45	NP-10
	13-60	Cobbly loam, very cobbly loam, very flaggy loam.	SM, GM	A-1, A-2, A-4	20-60	55-85	40-75	30-60	20-50	25-40	NP-10
Whiteoak	0-9	Cobbly loam	SM	A-1-b, A-2-4, A-4	10-25	70-95	65-85	30-75	20-50	25-35	NP-10
	9-23	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0-10	87-100	81-100	66-90	45-75	25-40	7-14
	23-34	Channery loam, channery clay loam, channery sandy clay loam.	CL, ML, SC, SM	A-4, A-6	5-15	75-95	70-90	54-80	40-70	25-40	7-14
	34-62	Very flaggy loam, flaggy loam, very channery loam.	SM, ML, GM, SC-SM	A-1-b, A-2-4, A-4	15-35	49-80	43-75	32-70	20-55	25-35	NP-6
SuA	0-9	Loam	ML, CL-ML, CL	A-4, A-6	0	95-100	75-100	70-100	53-75	25-37	3-14
Statler	9-23	Clay loam, silt loam, loam.	CL, CL-ML	A-4, A-6	0	95-100	75-100	70-100	60-80	25-52	5-27
	23-40	Loam, clay loam, sandy clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0-5	95-100	75-100	65-98	50-75	25-52	5-27
	40-60	Loam, fine sandy loam, clay loam.	CL-ML, CL, SC-SM, SC	A-4	0-10	90-100	65-100	55-95	40-75	25-40	4-27
TaC*, TcD*, TcE*:											
Tanasee	0-7	Sandy loam	SM, ML, MH	A-2-4, A-4, A-5	0-5	90-100	80-95	50-85	25-60	30-60	NP-7
	7-13	Gravelly sandy loam, sandy loam, loam.	SM, ML	A-2-4, A-4, A-1, A-5	0-15	70-100	60-95	30-85	20-60	30-50	NP-7
	13-31	Gravelly sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2-4, A-4, A-1, A-5	0-15	70-100	60-95	30-85	20-60	25-50	NP-7
	31-60	Gravelly loamy sand, cobbly loamy coarse sand, very cobbly sandy loam.	SM, SP-SM, SC-SM	A-2-4, A-1-b	0-50	70-85	60-75	20-50	10-30	20-40	NP-7

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
TaC*, TcD*, TcE*:											
Balsam	0-17	Cobbly fine sandy loam.	SM	A-1-b, A-2-5, A-5	15-37	75-91	70-85	30-75	20-49	41-70	NP-7
	17-35	Very cobbly sandy loam, very cobbly fine sandy loam, very cobbly loam.	GM, SM	A-1-b, A-2-4	30-60	51-85	45-75	34-60	15-35	<40	NP-7
	35-60	Very cobbly sandy loam, very cobbly coarse sandy loam, very cobbly loam.	GP-GM, GM, SP-SM, SM	A-1, A-3, A-2-4	30-60	33-85	23-75	14-60	5-25	<40	NP-7
TeC2*, TeD2*:											
Tanasee	0-5	Sandy loam	SM, ML, MH	A-2-4, A-4, A-5	0-5	90-100	80-95	50-85	25-60	30-60	NP-7
	5-18	Gravelly sandy loam, sandy loam, loam.	SM, ML	A-2-4, A-4, A-1, A-5	0-15	70-100	60-95	30-85	20-60	30-50	NP-7
	18-32	Gravelly sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2-4, A-4, A-1, A-5	0-15	70-100	60-95	30-85	20-60	25-50	NP-7
	32-60	Gravelly loamy sand, cobbly loamy coarse sand, very cobbly sandy loam.	SM, SP-SM, SC-SM	A-2-4, A-1-b	0-50	70-85	60-75	20-50	10-30	20-40	NP-7
Balsam	0-6	Cobbly fine sandy loam.	SM	A-1-b, A-2-5, A-5	15-37	75-91	70-85	30-75	20-49	41-70	NP-7
	6-26	Very cobbly sandy loam, very cobbly fine sandy loam, very cobbly loam.	GM, SM	A-1-b, A-2-4	30-60	51-85	45-75	34-60	15-35	<40	NP-7
	26-60	Very cobbly sandy loam, very cobbly coarse sandy loam, very cobbly loam.	GP-GM, GM, SP-SM, SM	A-1, A-3, A-2-4	30-60	33-85	23-75	14-60	5-25	<40	NP-7
TrE, TrF	0-7	Gravelly loam	SM, ML	A-2-4, A-4, A-1, A-5	5-15	70-85	60-75	30-65	20-55	30-51	NP-10
Trimont											
	7-38	Clay loam, sandy clay loam, loam.	SC, CL, ML, SM	A-4, A-6, A-7	0-5	90-100	85-100	75-90	35-65	25-51	6-18
	38-60	Gravelly sandy loam, loam, sandy loam.	SM, ML, CL, SC	A-2-4, A-4, A-1, A-5	0-15	70-100	60-100	30-85	20-65	25-50	NP-16

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
TuD*, TvE*:											
Tuckasegee	0-14	Gravelly loam	SM	A-2, A-4, A-5, A-1-b	5-15	70-85	60-75	30-65	20-50	19-50	NP-10
	14-39	Gravelly fine sandy loam, loam, sandy loam, gravelly sandy loam.	SM, ML, GM	A-4	2-15	70-100	65-100	55-95	36-65	<40	NP-10
	39-60	Gravelly sandy loam, very cobbly sandy loam, gravelly loam, cobbly sandy loam.	SM, GM, GP-GM, SP-SM	A-2-4, A-1-b, A-1-a	15-60	45-85	35-75	25-55	12-35	<40	NP-7
Cullasaja	0-20	Very cobbly loam	SM	A-5, A-2-5, A-5	15-35	70-95	65-85	55-70	25-40	41-70	NP-7
	20-60	Very cobbly sandy loam, very cobbly fine sandy loam, very cobbly loam.	SM, GM	A-1-b, A-2-4	30-60	55-85	50-75	35-60	15-30	25-40	NP-7
Ud*.											
Udorthents											
UfA*.											
Udorthents-Urban land											
Ur*.											
Urban land											
WaD, WaE, WaF, WeC, WeD, WeE--- Wayah	0-13	Sandy loam	SM, ML	A-2, A-4, A-5	0-5	90-100	80-98	50-88	25-65	30-50	NP-10
	13-28	Gravelly loam, sandy loam, gravelly sandy loam, sandy loam.	SM, SC-SM, GM, ML	A-2-4, A-4, A-1-b	3-15	53-99	50-97	30-87	20-55	25-35	NP-10
	28-60	Gravelly fine sandy loam, gravelly sandy loam, gravelly loamy sand, loamy sand.	SM, SP-SM, GM, GP-GM	A-2-4, A-1-b	3-15	53-87	50-80	20-50	10-30	20-35	NP-4

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
WhB2, WhC2, WhD2, WhE2, WhF2----- Wayah	0-6	Loam----------	SM, ML	A-2, A-4, A-5	0-5	90-100	80-98	50-88	25-65	30-50	NP-10
	6-44	Gravelly loam, sandy loam, gravelly sandy loam, loam.	SM, SC-SM, GM, ML	A-2-4, A-4, A-1-b	3-15	53-99	50-97	30-87	20-55	25-35	NP-10
	44-60	Gravelly fine sandy loam, gravelly sandy loam, gravelly loamy sand, loamy sand.	SM, SP-SM, GM, GP-GM	A-2-4, A-1-b	3-15	53-87	50-80	20-50	10-30	20-35	NP-4
WoC, WoD--------- Whiteoak	0-9	Cobbly loam------	SM	A-1-b, A-2-4, A-4	10-25	70-95	65-85	30-75	20-50	25-35	NP-10
	9-23	Loam, clay loam, sandy clay loam.	CL, ML, SC, SM	A-4, A-6	0-10	87-100	81-100	66-90	45-75	25-40	7-14
	23-34	Channery loam, channery clay loam, channery sandy clay loam.	CL, ML, SC, SM	A-4, A-6	5-15	75-95	70-90	54-80	40-70	25-40	7-14
	34-62	Very flaggy loam, flaggy loam, very channery loam.	SM, ML, GM, SC-SM	A-1-b, A-2-4, A-4	15-35	49-80	43-75	32-70	20-55	25-35	NP-6

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

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

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
BkB2, BkC2, BoD2-	0-6	27-40	1.20-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.32	3	8	.5-1
Braddock	6-40	35-55	1.20-1.50	0.6-2.0	0.12-0.17	3.6-5.5	Moderate	0.24			
	40-60	20-45	1.20-1.50	0.6-6.0	0.06-0.12	3.6-5.5	Low	0.24			
BrC*:											
Braddock	0-6	27-40	1.20-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.32	3	8	.5-1
	6-40	35-55	1.20-1.50	0.6-2.0	0.12-0.17	3.6-5.5	Moderate	0.24			
	40-60	20-40	1.20-1.50	0.6-6.0	0.06-0.12	3.6-5.5	Low	0.24			
Urban land.											
BsC*, BsD*, BsE*:											
Brasstown	0-7	5-18	1.00-1.40	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15	3	5	1-5
	7-31	18-35	1.35-1.60	0.6-2.0	0.12-0.18	3.6-6.0	Low	0.15			
	31-45	8-20	1.40-1.65	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.15			
	45-60	---	---	---	---	---	---	---			
Junaluska	0-2	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15	2	5	1-5
	2-25	18-35	1.30-1.65	0.6-2.0	0.12-0.18	3.6-6.0	Low	0.15			
	25-28	15-20	1.35-1.65	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15			
	28-60	---	---	---	---	---	---	---			
BuD*:											
Burton	0-14	5-18	1.10-1.30	2.0-6.0	0.13-0.18	3.6-6.0	Low	0.15	2	5	8-20
	14-26	5-18	1.35-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15			
	26-32	5-18	1.45-1.65	2.0-6.0	0.07-0.12	3.6-6.0	Low	0.15			
	32	---	---	---	---	---	---	---			
Craggey	0-15	8-20	1.10-1.30	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15	1	5	8-20
	15	---	---	---	---	---	---	---			
Rock outcrop.											
ChE, ChF	0-15	5-18	1.35-1.60	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.15	3	5	5-10
Cheoah	15-35	5-18	1.35-1.60	2.0-6.0	0.14-0.22	3.6-6.0	Low	0.32			
	35-51	5-18	1.35-1.60	2.0-6.0	0.11-0.17	3.6-6.0	Low	0.20			
	51-60	---	---	---	---	---	---	---			
CtD, CtE	0-20	5-25	0.50-1.20	2.0-6.0	0.07-0.10	4.5-6.0	Low	0.02	5	8	5-18
Cullasaja	20-60	5-20	1.00-1.60	2.0-6.0	0.07-0.10	4.5-6.0	Low	0.05			
CxA*:											
Cullowhee	0-10	5-18	1.30-1.50	2.0-6.0	0.12-0.18	4.5-6.5	Low	0.20	3	3	3-10
	10-31	5-12	1.35-1.55	>6.0	0.05-0.10	4.5-6.5	Low	0.10			
	31-60	1-5	1.40-1.60	>6.0	0.02-0.05	4.5-6.5	Low	0.05			
Nikwasi	0-28	5-18	1.30-1.50	2.0-6.0	0.13-0.20	4.5-6.5	Low	0.20	3	3	5-12
	28-60	1-5	1.40-1.60	>6.0	0.02-0.05	4.5-6.5	Low	0.05			
DeA	0-8	5-15	1.30-1.50	2.0-6.0	0.08-0.12	4.5-7.3	Low	0.10	2	8	3-8
Dellwood	8-14	1-8	1.40-1.60	>6.0	0.02-0.05	4.5-7.3	Low	0.05			
	14-60	1-8	1.40-1.60	>6.0	0.02-0.05	4.5-7.3	Low	0.05			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
DhA*:											
Dellwood	0-8	5-15	1.30-1.50	2.0-6.0	0.08-0.12	4.5-7.3	Low	0.10	2	8	3-8
	8-14	1-8	1.40-1.60	>6.0	0.02-0.05	4.5-7.3	Low	0.05			
	14-60	1-8	1.40-1.60	>6.0	0.02-0.05	4.5-7.3	Low	0.05			
Urban land.											
DsB, DsC	0-9	10-27	1.00-1.70	2.0-6.0	0.11-0.20	4.5-7.3	Low	0.20	5	3	2-8
Dillsboro	9-44	35-60	1.20-1.60	0.6-2.0	0.17-0.19	4.5-7.3	Moderate	0.28			
	44-60	15-35	1.25-1.60	0.6-2.0	0.14-0.18	4.5-6.0	Low	0.24			
DuC*:											
Dillsboro	0-9	10-27	1.00-1.70	2.0-6.0	0.11-0.20	4.5-7.3	Low	0.20	5	3	2-8
	9-44	35-60	1.20-1.60	0.6-2.0	0.17-0.19	4.5-7.3	Moderate	0.28			
	44-60	15-35	1.25-1.60	0.6-2.0	0.14-0.18	4.5-6.0	Low	0.24			
Urban land.											
EdC*, EdD*, EdE*, EdF*:											
Edneyville	0-3	5-18	1.40-1.60	2.0-6.0	0.08-0.13	4.5-6.0	Low	0.17	4	5	1-8
	3-34	7-20	1.40-1.60	2.0-6.0	0.10-0.16	4.5-6.0	Low	0.20			
	34-60	5-20	1.40-1.60	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.20			
Chestnut	0-4	5-20	1.35-1.60	2.0-6.0	0.08-0.12	3.6-6.0	Low	0.17	2	5	1-8
	4-30	5-25	1.35-1.60	2.0-6.0	0.08-0.12	3.6-6.0	Low	0.15			
	30-60	---	---	---	---	---		----			
EvD*, EvE*, EwF*:											
Evard	0-2	5-20	1.20-1.50	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.15	5	8	1-5
	2-27	18-35	1.30-1.50	0.6-2.0	0.15-0.18	4.5-6.0	Low	0.24			
	27-40	12-20	1.20-1.40	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.24			
	40-60	5-20	1.20-1.40	0.6-2.0	0.05-0.17	4.5-6.0	Low	0.24			
Cowee	0-6	8-20	1.25-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.20	2	5	1-5
	6-28	18-35	1.30-1.60	0.6-2.0	0.12-0.18	3.6-6.0	Low	0.24			
	28-60	---	---	---	---	---		----			
ExD*:											
Evard	0-2	5-20	1.20-1.50	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.15	5	8	1-5
	2-27	18-35	1.30-1.50	0.6-2.0	0.15-0.18	4.5-6.0	Low	0.24			
	27-40	12-20	1.20-1.40	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.24			
	40-60	5-20	1.20-1.40	0.6-2.0	0.05-0.17	4.5-6.0	Low	0.24			
Cowee	0-6	8-20	1.25-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.20	2	5	1-5
	6-28	18-35	1.30-1.60	0.6-2.0	0.12-0.18	3.6-6.0	Low	0.24			
	28-60	---	---	---	---	---		----			
Urban land.											
FnE2	0-3	18-25	1.30-1.50	2.0-6.0	0.12-0.18	4.5-6.5	Low	0.32	3	5	1-5
Fannin	3-31	18-35	1.30-1.50	0.6-2.0	0.11-0.17	4.5-6.5	Low	0.24			
	31-60	5-25	1.30-1.50	0.6-2.0	0.08-0.12	4.5-6.5	Low	0.24			
HaB2, HaC2, HaD2-	0-4	20-40	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.5	Low	0.24	5	5	1-3
Hayesville	4-24	30-50	1.20-1.35	0.6-2.0	0.15-0.20	3.6-6.0	Low	0.24			
	24-32	20-40	1.30-1.40	0.6-2.0	0.12-0.20	3.6-6.0	Low	0.20			
	32-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	3.6-6.0	Low	0.17			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
HeC*, HeD*:											
Hayesville	0-4	20-40	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.5	Low	0.24	5	5	1-3
	4-24	30-50	1.20-1.35	0.6-2.0	0.15-0.20	3.6-6.0	Low	0.24			
	24-32	20-40	1.30-1.40	0.6-2.0	0.12-0.20	3.6-6.0	Low	0.20			
	32-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	3.6-6.0	Low	0.17			
Urban land.											
HmA	0-12	8-27	1.20-1.45	0.6-2.0	0.15-0.24	4.5-7.3	Low	0.32	5	5	3-10
Hemphill	12-47	35-60	1.20-1.45	0.06-0.2	0.15-0.20	4.5-7.3	High	0.28			
	47-62	8-35	1.20-1.45	0.2-0.6	0.12-0.20	4.5-7.3	Low	0.24			
HwB*.											
Humaquepts											
OcE, OcF, OwD,											
OwE	0-8	5-18	1.00-1.30	2.0-6.0	0.13-0.18	3.6-5.5	Low	0.15	3	5	8-20
Oconaluftee	8-19	5-18	1.20-1.50	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.15			
	19-35	5-18	1.20-1.50	2.0-6.0	0.11-0.17	3.6-6.0	Low	0.20			
	35-60	5-18	1.35-1.60	2.0-6.0	0.11-0.17	3.6-6.0	Low	0.20			
Pg*.											
Pits											
PwC, PwD, PwE,											
PwF	0-14	4-18	1.00-1.20	2.0-6.0	0.18-0.28	3.6-6.0	Low	0.24	4	5	5-15
Plott	14-38	5-20	1.20-1.40	2.0-6.0	0.14-0.24	4.5-6.0	Low	0.24			
	38-60	2-18	1.20-1.60	2.0-6.0	0.05-0.20	4.5-6.0	Low	0.15			
RfF*:											
Rock outcrop.											
Ashe	0-2	7-20	1.35-1.60	2.0-6.0	0.10-0.13	3.6-6.0	Low	0.17	2	5	1-5
	2-18	7-20	1.35-1.60	2.0-6.0	0.10-0.14	3.6-6.0	Low	0.17			
	18-28	5-15	1.45-1.65	2.0-6.0	0.08-0.12	3.6-6.0	Low	0.17			
	28	---	---	---	---	---	---	---			
Cleveland	0-12	6-20	1.20-1.50	2.0-6.0	0.05-0.10	4.5-6.0	Low	0.17	1	8	5-8
	12	---	---	---	---	---	---	---			
RgF*:											
Rock outcrop.											
Cataska	0-3	12-22	1.30-1.40	2.0-20	0.10-0.14	3.6-5.5	Low	0.20	1	8	1-3
	3-16	12-22	1.30-1.45	0.00-0.06	0.04-0.09	3.6-5.5	Low	0.15			
	16-29	---	---	0.2-0.01	---	---	---	---			
	29	---	---	---	---	---	---	---			
RmF*:											
Rock outcrop.											
Craggey	0-15	8-20	1.10-1.30	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.15	1	5	8-20
	15	---	---	---	---	---	---	---			
RoA	0-11	8-18	1.25-1.40	2.0-6.0	0.12-0.18	5.1-6.5	Low	0.24	5	3	2-8
Rosman	11-38	8-18	1.25-1.50	2.0-6.0	0.10-0.18	5.1-6.5	Low	0.24			
	38-60	1-15	1.35-1.60	6.0-20	0.02-0.10	5.1-6.5	Low	0.10			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
ScB, SdC, SdD, SeE---------- Saunook	0-9	7-20	1.35-1.60	2.0-6.0	0.14-0.20	3.6-6.0	Low----------	0.24	5	5	3-10
	9-28	18-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-5.6	Low----------	0.24			
	28-34	18-35	1.30-1.50	0.6-2.0	0.09-0.15	4.5-6.5	Low----------	0.15			
	34-65	7-20	1.35-1.60	2.0-6.0	0.07-0.12	4.5-6.5	Low----------	0.15			
SfC*: Saunook----------	0-9	7-20	1.35-1.60	2.0-6.0	0.14-0.20	3.6-6.0	Low----------	0.24	5	5	3-10
	9-28	18-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.5	Low----------	0.24			
	28-34	18-35	1.30-1.50	0.6-2.0	0.09-0.15	4.5-6.5	Low----------	0.15			
	34-65	7-20	1.35-1.60	2.0-6.0	0.07-0.12	4.5-6.5	Low----------	0.15			
Urban land.											
SmF*: Soco----------	0-2	5-18	1.35-1.60	2.0-6.0	0.11-0.17	3.6-5.5	Low----------	0.15	2	5	1-8
	2-26	5-18	1.40-1.65	2.0-6.0	0.09-0.15	3.6-5.5	Low----------	0.15			
	26-60	---	---	---	---	---	----------	----			
Cataska----------	0-3	12-22	1.30-1.40	2.0-20	0.10-0.14	3.6-5.5	Low----------	0.20	1	8	1-3
	3-16	12-22	1.30-1.45	0.00-0.06	0.04-0.09	3.6-5.5	Low----------	0.15			
	16-29	---	---	0.2-0.01	---	---	----------	----			
	29	---	---	---	---	---	----------	----			
Rock outcrop.											
SoE*, SoF*: Soco----------	0-2	5-18	1.35-1.60	2.0-6.0	0.11-0.17	3.6-5.5	Low----------	0.15	2	5	1-8
	2-26	5-18	1.40-1.65	2.0-6.0	0.09-0.15	3.6-5.5	Low----------	0.15			
	26-60	---	---	---	---	---	----------	----			
Stecoah----------	0-2	5-18	1.35-1.60	2.0-6.0	0.11-0.17	3.6-5.5	Low----------	0.15	3	5	1-8
	2-32	5-18	1.35-1.60	2.0-6.0	0.10-0.17	3.6-5.5	Low----------	0.32			
	32-44	5-18	1.40-1.65	2.0-6.0	0.10-0.15	3.6-5.5	Low----------	0.15			
	44-60	---	---	---	---	---	----------	----			
SsE*: Spivey----------	0-13	5-20	1.20-1.40	0.6-6.0	0.10-0.16	3.6-6.0	Low----------	0.17	5	8	5-18
	13-60	5-20	1.30-1.50	0.6-6.0	0.07-0.11	3.6-6.0	Low----------	0.05			
Whiteoak----------	0-9	15-24	1.35-1.60	2.0-6.0	0.12-0.18	4.5-6.0	Low----------	0.15	3	8	3-10
	9-23	18-29	1.35-1.60	0.6-2.0	0.14-0.22	4.5-5.5	Low----------	0.24			
	23-34	18-29	1.35-1.60	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.15			
	34-62	7-27	1.40-1.60	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.15			
SuA---------- Statler	0-9	10-20	1.35-1.45	0.6-2.0	0.18-0.22	5.1-7.3	Low----------	0.32	5	5	2-6
	9-23	18-35	1.35-1.50	0.6-2.0	0.17-0.20	5.1-6.5	Low----------	0.24			
	23-40	15-35	1.35-1.50	0.6-2.0	0.17-0.20	5.1-6.0	Low----------	0.24			
	40-60	12-30	1.35-1.50	0.6-6.0	0.14-0.18	5.1-6.0	Low----------	0.24			
TaC*, TcD*, TcE*: Tanasee----------	0-7	5-18	1.10-1.30	2.0-6.0	0.16-0.22	3.6-5.5	Low----------	0.24	5	3	8-20
	7-13	5-18	1.35-1.60	2.0-6.0	0.12-0.18	3.6-5.5	Low----------	0.20			
	13-31	5-18	1.35-1.60	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.15			
	31-60	1-6	1.40-1.65	2.0-6.0	0.05-0.09	4.5-5.5	Low----------	0.10			
Balsam----------	0-17	4-20	0.50-1.00	2.0-6.0	0.20-0.25	3.6-6.0	Low----------	0.10	5	8	8-20
	17-35	4-18	1.00-1.50	2.0-6.0	0.06-0.10	3.6-6.0	Low----------	0.05			
	35-60	2-15	1.20-1.60	2.0-6.0	0.04-0.09	3.6-6.0	Low----------	0.05			

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
TeC2*, TeD2*:											
Tanasee	0-5	5-18	1.10-1.30	2.0-6.0	0.16-0.22	3.6-5.5	Low	0.24	5	3	8-20
	5-18	5-18	1.35-1.60	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.20			
	18-32	5-18	1.35-1.60	2.0-6.0	0.10-0.16	4.5-5.5	Low	0.15			
	32-60	1-6	1.40-1.65	2.0-6.0	0.05-0.09	4.5-5.5	Low	0.10			
Balsam	0-6	4-20	0.50-1.00	2.0-6.0	0.20-0.25	3.6-6.0	Low	0.10	5	8	8-20
	6-26	4-18	1.00-1.50	2.0-6.0	0.06-0.10	3.6-6.0	Low	0.05			
	26-60	2-15	1.20-1.60	2.0-6.0	0.04-0.09	3.6-6.0	Low	0.05			
TrE, TrF	0-7	8-20	1.35-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.15	4	5	3-9
Trimont	7-38	18-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.24			
	38-60	8-20	1.40-1.65	0.6-2.0	0.10-0.15	4.5-6.0	Low	0.15			
TuD*, TvE*:											
Tuckasegee	0-14	12-27	0.85-1.20	2.0-6.0	0.12-0.17	4.5-6.5	Low	0.20	5	5	4-15
	14-39	12-27	1.00-1.40	2.0-6.0	0.11-0.21	4.5-6.0	Low	0.20			
	39-60	10-25	1.20-1.50	2.0-6.0	0.07-0.12	4.5-6.0	Low	0.10			
Cullasaja	0-20	5-25	0.50-1.20	2.0-6.0	0.10-0.16	4.5-6.5	Low	0.10	5	8	5-18
	20-60	5-20	1.00-1.60	2.0-6.0	0.07-0.10	4.5-6.0	Low	0.05			
Ud*.											
Udorthents											
UfA*.											
Udorthents-Urban land											
Ur*.											
Urban land											
WaD, WaE, WaF, WeC, WeD, WeE	0-13	5-18	1.00-1.20	2.0-6.0	0.16-0.22	3.6-5.5	Low	0.24	3	5	8-20
Wayah	13-28	5-18	1.20-1.60	2.0-6.0	0.09-0.13	4.5-6.0	Low	0.15			
	28-60	3-15	1.40-1.65	2.0-6.0	0.05-0.09	4.5-6.0	Low	0.10			
WhB2, WhC2, WhD2, WhE2, WhF2	0-6	5-18	1.00-1.20	2.0-6.0	0.16-0.22	3.6-5.5	Low	0.24	3	5	8-20
Wayah	6-44	5-18	1.20-1.60	2.0-6.0	0.09-0.13	4.5-6.0	Low	0.15			
	44-60	3-15	1.40-1.65	2.0-6.0	0.05-0.09	4.5-6.0	Low	0.10			
WoC, WoD	0-9	15-24	1.35-1.60	2.0-6.0	0.12-0.18	4.5-6.0	Low	0.15	3	8	3-10
Whiteoak	9-23	18-29	1.35-1.60	0.6-2.0	0.14-0.22	4.5-5.5	Low	0.24			
	23-34	18-29	1.35-1.60	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.15			
	34-62	7-27	1.40-1.60	0.6-2.0	0.08-0.12	4.5-5.5	Low	0.15			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

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

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
BkB2, BkC2, BoD2--Braddock	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
BrC*:												
Braddock	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Urban land.												
BsC*, BsD*, BsE*:												
Brasstown	B	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate	High.
Junaluska	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
BuD*:												
Burton	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	High.
Craggey	D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	High	High.
Rock outcrop.												
ChE, ChF--Cheoah	B	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Low	High.
CtD, CtE--Cullasaja	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	High.
CxA*:												
Cullowhee	B/D	Frequent	Very brief	Jan-Dec	1.5-2.0	Apparent	Nov-May	>60	---	Low	High	High.
Nikwasi	B/D	Frequent	Very brief	Jan-Dec	0-1.0	Apparent	Nov-May	>60	---	Moderate	High	High.
DeA--Dellwood	A	Occasional	Very brief	Dec-Apr	2.0-4.0	Apparent	Jan-Apr	>60	---	Low	Low	Moderate.
DhA*:												
Dellwood	A	Occasional	Very brief	Dec-Apr	2.0-4.0	Apparent	Jan-Apr	>60	---	Low	Low	Moderate.
Urban land.												
DsB, DsC--Dillsboro	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
DuC*:												
Dillsboro	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Urban land.												
EdC*, EdD*, EdE*, EdF*:												
Edneyville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
Chestnut	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
EvD*, EvE*, EwF*:												
Evard	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
Cowee	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
ExD*:												
Evard	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
Cowee	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
Urban land.												
FnE2	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Fannin												
HaB2, HaC2, HaD2	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Hayesville												
HeC*, HeD*:												
Hayesville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Urban land.												
HmA	D	Rare	---	---	0-1.0	Apparent	Nov-May	>60	---	High	High	High.
Hemphill												
HwB*.												
Humaquepts												
OcE, OcF, OwD, OwE	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
Oconaluftee												
Pg*.												
Pits												

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
PwC, PwD, PwE, PwF---------- Plott	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
RfF*: Rock outcrop.												
Ashe----------	B	None----------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	High.
Cleveland--------	C	None----------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	High.
RgF*: Rock outcrop.												
Cataska----------	D	None----------	---	---	>6.0	---	---	10-20	Soft	Moderate	Low------	Moderate.
RmF*: Rock outcrop.												
Craggey----------	D	None----------	---	---	>6.0	---	---	10-20	Hard	Moderate	High-----	High.
RoA---------- Rosman	B	Occasional	Very brief	Dec-Apr	2.5-5.0	Apparent	Jan-Apr	>60	---	Moderate	Moderate	Moderate.
ScB, SdC, SdD, SeE---------- Saunook	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
SfC*: Saunook----------	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
Urban land.												
SmF*: Soco----------	B	None----------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
Cataska----------	D	None----------	---	---	>6.0	---	---	10-20	Soft	Moderate	Low------	Moderate.
Rock outcrop.												
SoE*, SoF*: Soco----------	B	None----------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	High.
Stecoah----------	B	None----------	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate	High.
SsE*: Spivey----------	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
Whiteoak----------	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
SuA---------- Statler	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
TaC*, TcD*, TcE*, TeC2*, TeD2*:												
Tanasee----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
Balsam----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	High.
TrE, TrF---------- Trimont	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
TuD*, TvE*:												
Tuckasegee-------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	High.
Cullasaja--------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	High.
Ud*. Udorthents												
UfA*. Udorthents-Urban land												
Ur*. Urban land												
WaD, WaE, WaF, WeC, WeD, WeE, WhB2, WhC2, WhD2, WhE2, WhF2------- Wayah	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
WoC, WoD---------- Whiteoak	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

(NP means nonplastic; LL, liquid limit; and PI, plasticity index. The soils are the typical pedons for the soil series in the survey area. For the location of the pedons, see the section "Soil Series and Their Morphology")

Soil name, sample number, horizon, and depth in inches	Classification		Grain-size distribution											LL	PI	Moisture density	
			Percentage passing sieve--								Percentage smaller than--						
	Unified	AASHTO	3 in.	2 in.	3/4 in.	3/8 in.	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Maximum dry density	Optimum moisture
														Pct		Lb/ft^3	Pct
Cowee gravelly loam: (S86NC-087-001)																	
A------ 0 to 3	ML	A-4(3)	100	100	99	94	87	82	71	51	33	18	11	40	6	97.8	20.7
Bt----- 11 to 24	ML	A-7-6(5)	100	100	99	98	94	86	72	51	37	26	20	41	14	112.2	16.9
Dillsboro loam: (S85NC-087-022)																	
Ap----- 0 to 9	ML	A-7-6(10)	100	100	100	100	100	100	96	70	51	35	17	41	15	97.4	21.2
Bt----- 9 to 44	ML	A-7-5(14)	100	100	100	100	100	100	95	75	60	49	44	47	17	96.9	24.2
BC----- 44 to 60	ML	A-7-5(10)	100	100	100	98	98	97	90	58	42	32	27	44	13	105.7	17.3
Junaluska channery loam: (S85NC-087-006)																	
A------ 0 to 2	SM	A-7-5(6)	100	100	99	98	96	91	69	50	37	17	9	56	14	85.4	28.6
Bt---- 2 to 25	ML	A-7-6(11)	100	100	100	100	100	100	91	73	58	35	26	44	15	98.7	22.6
Plott sandy loam: (S85NC-087-005)																	
A------ 0 to 15	SM	A-5(1)	100	100	100	100	100	98	79	38	26	9	4	67	NP	72.3	39.2
Bw---- 15 to 29	SM	A-2-5(10)	100	100	99	97	97	94	72	29	20	13	8	43	NP	99.9	21.6
BC----- 29 to 57	SM	A-4(2)	100	100	99	96	94	91	75	43	8	5	2	35	NP	100.8	19.5
C------ 57 to 60	SM	A-2-4(0)	100	100	96	93	92	89	72	20	7	4	2	33	NP	103.2	17.4
Rosman fine sandy loam: (S85NC-087-001)																	
Ap----- 0 to 11	ML	A-4(0)	100	100	100	100	100	100	100	57	31	15	8	30	NP	100.0	21.2
Bw1--- 11 to 19	ML	A-4(0)	100	100	100	100	100	100	100	52	27	14	10	27	NP	105.8	18.0
Bw2---- 19 to 38	ML	A-4(0)	100	100	100	100	100	100	100	53	26	16	10	27	NP	106.4	17.2
C------ 38 to 60	SM	A-4(0)	100	100	100	100	100	100	100	45	23	14	10	26	NP	107.5	17.0
Saunook loam: (S85NC-087-003)																	
AP----- 0 to 9	MH	A-7-5(10)	100	100	100	99	99	99	89	63	41	19	11	59	14	81.2	30.3
Bt----- 9 to 28	ML	A-7-6(8)	100	100	100	100	100	100	89	64	47	37	27	42	15	98.6	23.7
Stecoah loam: (S85NC-087-004)																	
Bw---- 2 to 27	CL-ML	A-4(5)	100	100	99	99	99	97	82	58	32	16	11	25	4	114.8	13.2
BC----- 27 to 32	CL-ML	A-4(4)	100	100	100	100	100	100	85	55	24	12	8	26	5	113.8	13.7
C------ 32 to 44	SM	A-4(3)	100	100	100	100	100	100	83	49	18	7	5	24	NP	111.0	13.3

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Ashe	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Balsam	Loamy-skeletal, mixed, frigid Typic Haplumbrepts
Braddock	Clayey, mixed, mesic Typic Hapludults
Brasstown	Fine-loamy, mixed, mesic Typic Hapludults
Burton	Coarse-loamy, mixed, frigid Typic Haplumbrepts
Cataska	Loamy-skeletal, mixed, mesic, shallow Typic Dystrochrepts
Cheoah	Coarse-loamy, mixed, mesic Typic Haplumbrepts
Chestnut	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Cleveland	Loamy, mixed, mesic Lithic Dystrochrepts
Cowee	Fine-loamy, mixed, mesic Typic Hapludults
Craggey	Loamy, mixed, frigid Lithic Haplumbrepts
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
Dillsboro	Clayey, mixed, mesic Humic Hapludults
Edneyville	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
Fannin	Fine-loamy, micaceous, mesic Typic Hapludults
Hayesville	Clayey, kaolinitic, mesic Typic Kanhapludults
Hemphill	Fine, mixed, mesic Typic Umbraqualfs
Humaquepts	Humaquepts
Junaluska	Fine-loamy, mixed, mesic Typic Hapludults
Nikwasi	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Cumulic Humaquepts
Oconaluftee	Coarse-loamy, mixed, frigid Typic Haplumbrepts
Plott	Coarse-loamy, mixed, mesic Typic Haplumbrepts
Rosman	Coarse-loamy, mixed, mesic Fluventic Haplumbrepts
Saunook	Fine-loamy, mixed, mesic Humic Hapludults
Soco	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Spivey	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Statler	Fine-loamy, mixed, mesic Humic Hapludults
Stecoah	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Tanasee	Coarse-loamy, mixed, frigid Typic Haplumbrepts
Trimont	Fine-loamy, mixed, mesic Humic Hapludults
Tuckasegee	Fine-loamy, mixed, mesic Typic Haplumbrepts
Udorthents	Udorthents
Wayah	Coarse-loamy, mixed, frigid Typic Haplumbrepts
Whiteoak	Fine-loamy, mixed, mesic Umbric Dystrochrepts

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