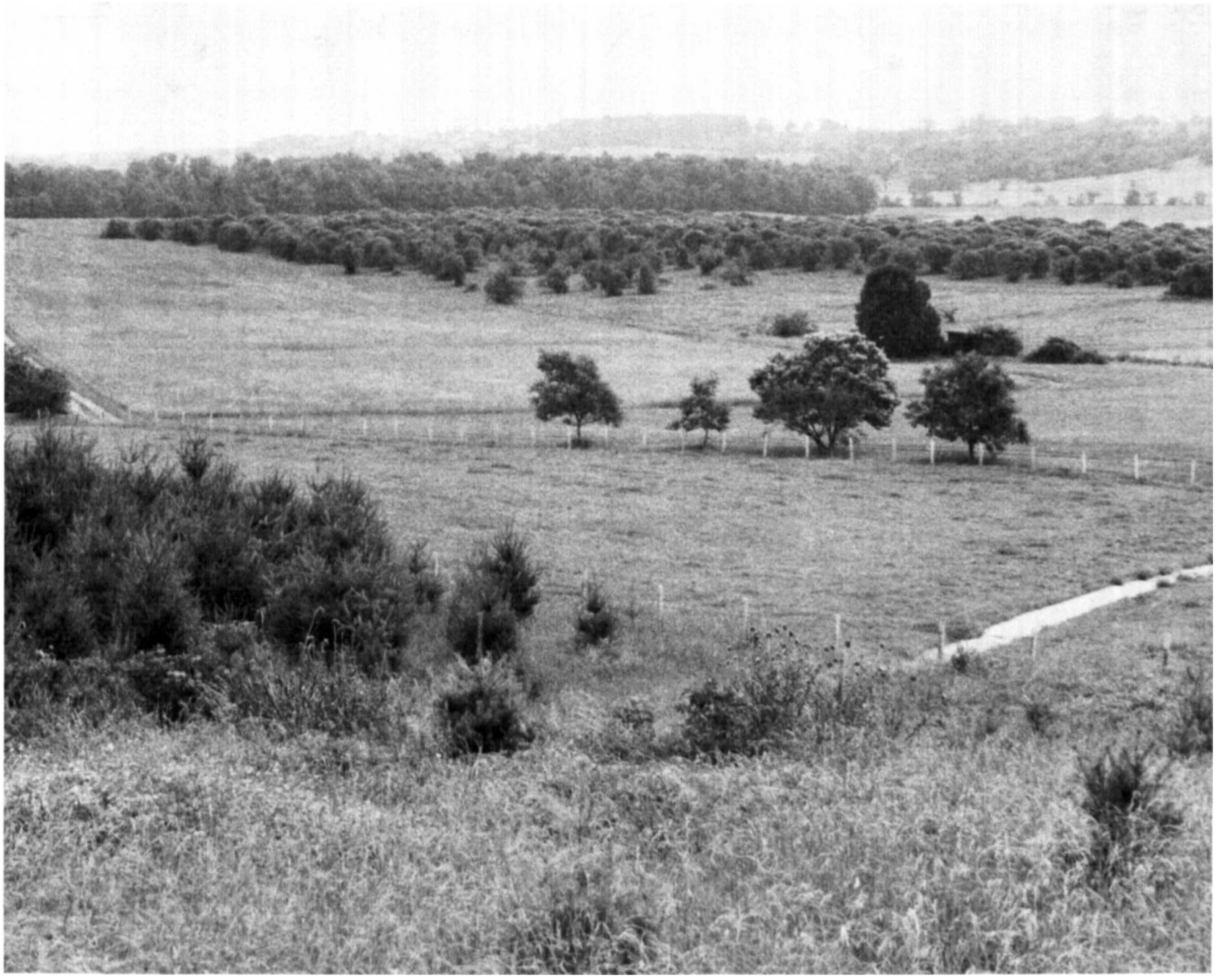
United States Department of Agriculture

Soil Conservation Service

In cooperation with Virginia Polytechnic Institute and State University

Soil Survey of Frederick County Virginia



HOW TO USE

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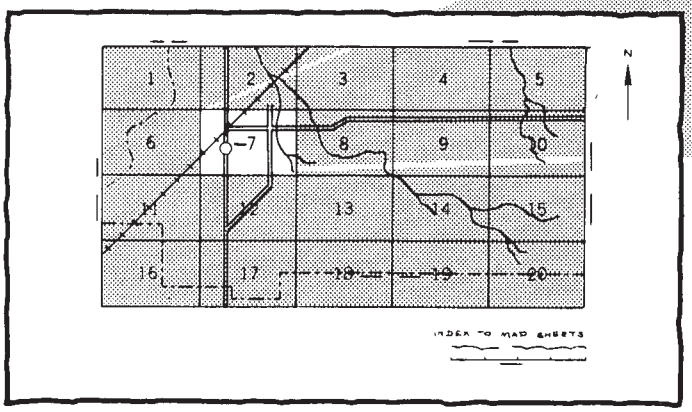

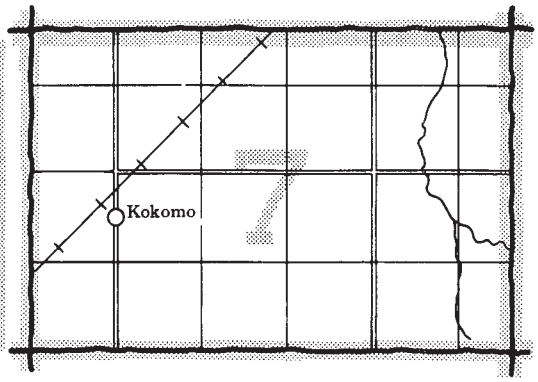

2. Note the number of the map sheet and turn to that sheet.

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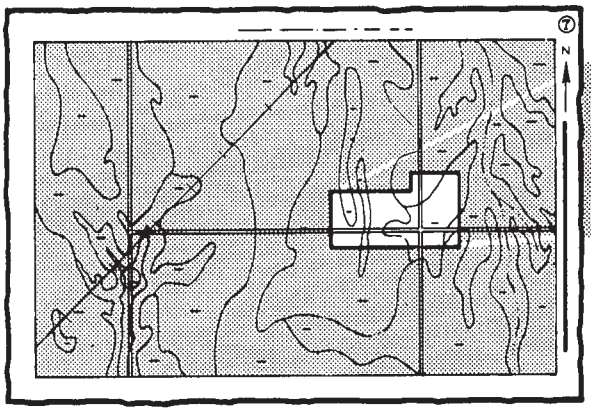

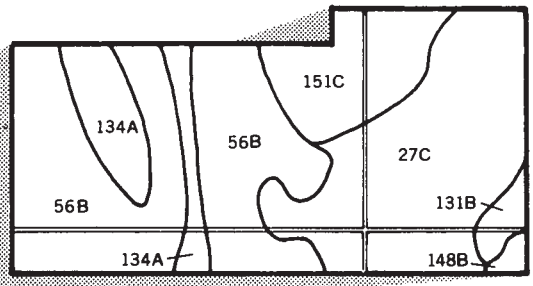

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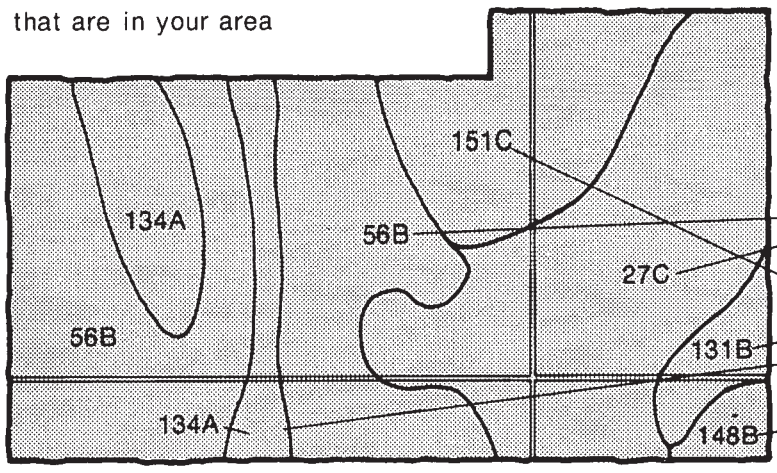

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THIS SOIL SURVEY

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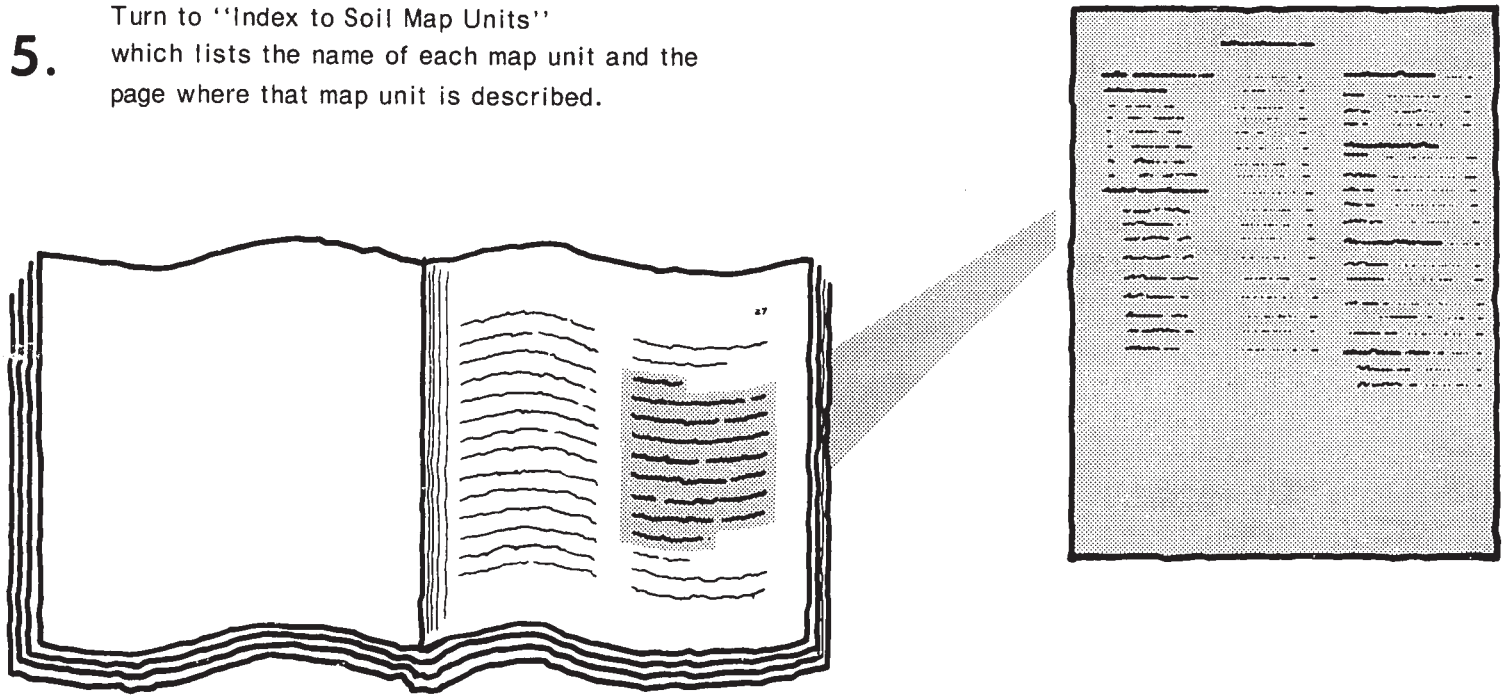
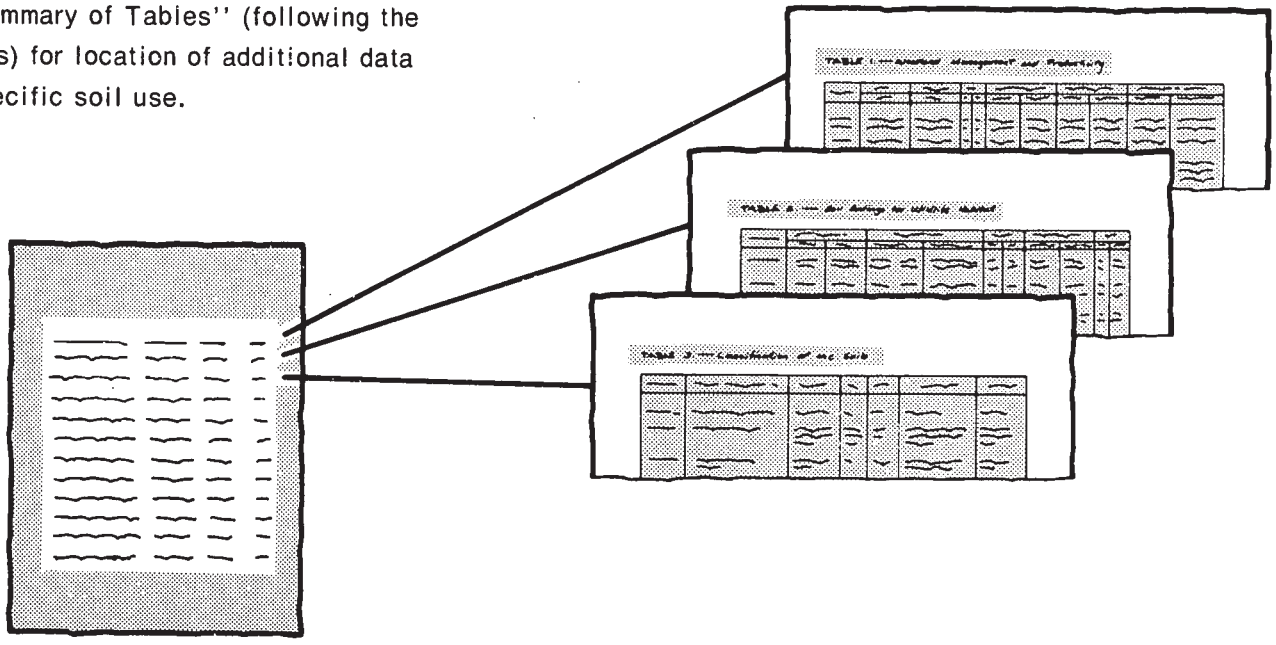


6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



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

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

Major fieldwork for this soil survey was completed in 1981. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made by the Soil Conservation Service in cooperation with the Virginia Polytechnic Institute and State University. The survey is part of the technical assistance furnished to the Lord Fairfax Soil and Water Conservation District. This survey was financed in part by the Virginia Soil and Water Conservation Commission and the Frederick County Board. 1Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

This soil survey supersedes the soil survey of Frederick County, Virginia, published in 1916.

Cover: Pasture (background and middle ground) in an area of Pagebrook silty clay loam, and an apple orchard (background) in an area of Frederick-Poplimento loams, 7 to 15 percent slopes.

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Foreword

This soil survey contains information that can be used in land-planning programs in Frederick County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

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

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

Manly S. Wilder
State Conservationist
Soil Conservation Service

Soil Survey of Frederick County, Virginia

By Robert L. Holmes and David L. Wagner, Soil Conservation Service
Soils surveyed by Robert L. Holmes, David L. Wagner, David L. Racey, Louis W. Heidel, and Edward P. Ealy, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with the
Virginia Polytechnic Institute and State University

FREDERICK COUNTY is the northernmost county in Virginia (fig. 1). It is at the north end of the Shenandoah Valley and is 72 miles west of Washington, D.C., and 135 miles northwest of Richmond, the state capital. The total area of the county is about 436 square miles, or 279,000 acres. Winchester is the county seat.

Frederick County is bounded on the north by Morgan and Berkeley Counties, West Virginia, on the east by Clarke County, Virginia, on the south by Warren and Shenandoah Counties, Virginia; and on the west by Hardy and Hampshire Counties, West Virginia.

Among the points of historic and scenic interest in the county are the survey office of George Washington, the headquarters of General Stonewall Jackson and that of General Philip Sheridan, Abram's Delight, and the Shenandoah College and Conservatory of Music. The Apple Blossom Festival is held annually in May in Winchester.

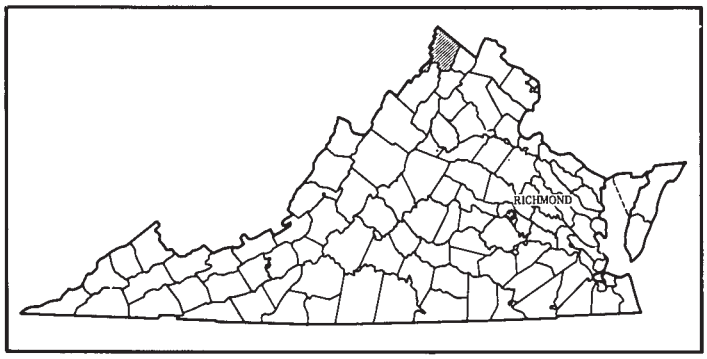

Figure 1.—Location of Frederick County in Virginia.

General Nature of the County

This section briefly describes the county's history and development, climate, and physiography, geology, and drainage. It also discusses transportation, land use, and water supply.

History and Development

In 1732 the first permanent settlement in Frederick County was established by a small band of Pennsylvania Quakers at the site of a camp grounds of Shawnee Indians. The settlement was named Fredericktown after Frederick, the father of George II of England. In 1752 Fredericktown was changed to Winchester in honor of the capital of medieval England. Winchester is the oldest city in Virginia west of the Blue Ridge.

The city of Winchester and Frederick County were of great importance during the French and Indian War. Winchester was a center of defense against Indian raids. From 1756 to 1757, a young colonel named George Washington commanded the Virginia troops headquartered in Winchester. During the Civil War Winchester was of strategic importance to both Confederate and Union forces. The city and the county were the scene of 6 battles, and possession of the city itself changed about 70 times during the 4-year conflict. During the winter of 1861-62 the headquarters of General Stonewall Jackson was in Winchester.

In 1980 the population of Frederick County, excluding Winchester, was about 23,000. The population of Winchester was about 15,000.

Many of the soils in the county are suited to a great variety of crops, and farming is an important enterprise. The climate is favorable both for general farming and for raising livestock. Modern farm machinery can be used on many of the soils in the county. Much of the farmland is used for pasture and hay. Corn, barley, oats, and other crops are fed mainly to livestock on the farm. Apples, peaches, and other specialty crops are also grown. Frederick County is the leading producer of apples in the state.

Agriculture and processing agricultural products are the principal sources of income. In 1980 about 63 percent of the total income from the sale of farm products was derived from the sale of fruit and fruit products. About 30 percent was derived from the sale of livestock and livestock products.

Among the many industries located in the county are frozen-food packing plants; manufacturers of office furniture, phonographic records and tapes, light bulbs, automobile parts, brake linings, plastics, rubber goods, and concrete forms and blocks; and lumber mills.

Woodland makes up about 50 percent of the acreage in the county. Part of the George Washington National Forest is in the county.

Climate

Prepared by the Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Winchester in the period January 1949 to December 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 35 degrees F, and the average daily minimum temperature is 26 degrees. The lowest temperature on record, which occurred at Winchester on January 2, 1968, is -10 degrees. In summer the average temperature is 85 degrees, and the average daily maximum temperature is 73 degrees. The highest recorded temperature, which occurred at Winchester on July 14, 1954, is 103 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 38 inches. Of this, 22 inches, or 58 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 12 inches. The heaviest 1-day rainfall during the period of record was 4.87 inches at Winchester on June 22, 1972. Thunderstorms occur on about 17 days each year, and most occur in summer.

The average seasonal snowfall is 27.8 inches. The greatest snow depth at any one time during the period of record was 27 inches. On the average, 7 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 57 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 55 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 9 miles per hour, in spring.

Physiography, Geology, and Drainage

Generally, the topography of Frederick County is characterized by the rolling Shenandoah Valley, 8 to 10 miles wide, and on its west flank, mountains, ridges, and valleys of the Appalachian system. The average altitude of the broad valley is about 700 feet, and that of the ridgetops and mountaintops is about 1,950 feet.

Frederick County is underlain mainly by sedimentary rocks. In the western part it is underlain by sandstone, shale, and, in small amounts, limestone. The prominent features of the ridge belt within or bordering Frederick County are Little North, Great North, Cacapon, and Sleepy Creek Mountains. Little North Mountain, the most easterly ridge, reaches a maximum altitude of 1,488 feet about 1.5 miles northwest of Opequon. From Green Springs southwestward to Cedar Creek, Little North Mountain is characterized by numerous water gaps, which cut the ridge into short linear ridges and isolated, rounded hills, locally called mountains or knobs.

Great North Mountain, the most prominent landmark in the western and southwestern parts of the county, lies northwest of and roughly parallel to Little North Mountain. As Great North Mountain trends southwestward from a distinct ridge along U.S. Route 50, midway between Gore and Hayfield, it increases in prominence. Its altitude ranges from 800 feet in the northeast to 2,844 feet at Pinnacle Knob, the highest point in the county, along the West Virginia boundary northwest of Mountain Falls.

The extreme northwest corner of the county includes

parts of Cacapon and Bear Garden Mountains. The altitude in Virginia of Cacapon Mountain is 2,564 feet, and the altitude of Bear Garden Mountain is 1,403 feet.

Sleepy Creek Mountain, a prominent ridge in West Virginia, terminates rather abruptly at Shockeys Knob, which is located along the Virginia-West Virginia boundary about 1 mile northeast of Shockeysville. The altitude of Shockeys Knob is 1,865 feet, or approximately 1,000 feet above the broad valley around the southwest base of the mountain.

The remainder of the ridge belt is composed of a series of low, parallel, northeastward-and southwestward-trending ridges and valleys. Most of the ridges rise 100 to 300 feet above the intervening valleys.

The valley belt, which lies east of Little North Mountain, is divided into two distinct regions; one is underlain by limestone and the other by shale.

West of a line passing southwestward through or near Stephenson, Winchester, and Middletown, the bedrock is predominantly limestone and dolomite, and the topography is characterized by low, discontinuous ridges aligned in a northeasterly direction. Apple Pie Ridge, Poplar Ridge, Pumpkin Ridge, Ridings Hill, and a prominent ridge in the western environs of Winchester are conspicuous examples. The relief in this part of the county consists of a series of low, rounded ridges and shallow valleys on a gently sloping surface. The altitude increases from about 600 feet in the vicinity of Rest to about 750 feet near Winchester. It reaches a maximum of about 900 feet along the southeast base of Little North Mountain.

The eastern part of the valley belt is underlain by shale and fine-grained sandstone. It has no conspicuous knobs or ridges. The altitude along Opequon Creek where it enters West Virginia is about 450 feet. In the southwestern part of the belt, the altitude commonly is 700 to 750 feet. The shallow drainage channels that cross the area become somewhat deeper and more numerous eastward, and they have a branching, or dendritic, pattern. Interstream surfaces are flat or smoothly rounded.

Frederick County in the southern part is drained by Cedar Creek. The southernmost part of the limestone region of the valley belt is drained by Fawcett Run, Buffalo Marsh Run, and Meadow Brook, which empty into Cedar Creek.

The eastern section of the county is drained by Opequon Creek and its tributaries, Abrams Creek, Redbud Run, Hiatt Run, and Hot Run. The southernmost part of the shale region of the valley belt is drained to the southeast by Stephens Run.

The north-central part of Frederick County is drained by Back Creek, and the western part is drained by Isaacs Creek. Hogue Creek, which flows northeasterly between Great North Mountain and Little North Mountain, empties into Back Creek about 3 miles northeast of Gainesboro. From the western part of the valley belt, a few tributary streams flow through gaps in Little North Mountain and connect with drainage in the ridge belt. The extreme northwestern part of Frederick County, between Dick Ridge and Bear Garden Mountain, is drained by Sleepy Creek, which flows northeastward into West Virginia.

Transportation

The main highways in Frederick County, Interstate 81 and U.S. Route 11, run northeastward-southwestward. Virginia Route 7, one end of which is in Winchester, and Virginia Route 277, one end of which is in Stephens City, run eastward-westward. Virginia Route 37, a four-lane bypass, intersects with Interstate 81 at the north and south sides of Winchester.

There are 512 miles of road in the county. About 324 miles of road are hard surfaced, about 131 miles are all weather, and about 55 miles are light surfaced. All parts of the county are accessible via these roads. Except during extremely bad weather, access to markets and to the city of Winchester is fairly easy from almost all farms.

Railroad freight service in the eastern part of the county is provided by branch lines of the Baltimore and Ohio Railroad and the Pennsylvania Railroad. In the western part of the county, the sand mined in Gore and used in glassmaking is transported by the Winchester and Western Railroad connecting with the Baltimore and Ohio Railroad at Winchester.

The Winchester Municipal Airport is located 3 miles southwest of city center. The airport is equipped with runway lighting and a rotating beacon, has fuel and repair facilities, and provides air charter service and land transportation.

Motor freight service is available from about 22 interstate carriers authorized to operate in the area. Some of these handle interstate shipments. A passenger busline serving Winchester and the rest of the county operates daily and offers express package service. In addition, a local busline operates in the Winchester area. Taxi service is available throughout the county.

Land Use

Frederick County is predominantly rural, and agriculture is the main enterprise.

Since the early seventies, there has been rapid growth in population, housing, and industry. Large housing subdivisions have been built east of Interstate 81. Some of these have a water and sewer service. Large subdivisions are also located around Stephens City and just east of Winchester along Senseny Road, Virginia Route 7, and U.S. Route 50. Small residential areas are scattered throughout the county along major roads, especially U.S. Route 11 North, old U.S. Route 50 at Round Hill, and U.S. Route 522 South. Residential areas, however, take in a relatively small part of the county. In 1978, 123,220 acres, or 44 percent of the acreage in the county, was farmland. The prime farmland in the county is mainly in the limestone region of the valley belt, east of Little North Mountain and west of Stephenson, Winchester, and Middletown. Prime farmland is also in the valleys of Sleepy Creek, Back Creek, and Hogue Creek.

Commercial development has taken place predominantly at the I-81 interchanges at U.S. Route 50 and Virginia Route 7, and east of Stephens City on Virginia Route 277. The area near U.S. Route 50, which has central water and sewage service, is commercially the most developed area. Spot commercial development is mainly along U.S. Route 11 north and south of Winchester and near U.S. Route 50 at Round Hill.

Industrial development is concentrated north of Winchester along U.S. Route 11 and south of the city, in Kernstown. In addition, there are numerous quarries in the Stephens City-Middletown area and in Clearbrook. Clearbrook is in the limestone belt, which roughly parallels Interstate 81.

Recreation is available at both county and private recreation facilities. The county operates a major regional park in the Clearbrook area and another in Stephens City. Mountain Falls Park, Shawneeland, and the Summit are large, privately owned recreation areas in the western part of the county. Many rural housing subdivisions, featuring large lots, are also being developed there.

Water Supply

Frederick County is located within the unglaciated Appalachian ground water region, which is characterized by mountains and hilly uplands separated by small valleys. The ground water supply in the county varies with differences in the underlying rock formation.

In most parts of the county an adequate supply of water is obtained from springs, wells, and streams. Farm ponds supply water for livestock.

Ground water in the valley generally is abundant, but is erratic in occurrence. Ground water in the limestone areas is difficult to locate, and flowing wells are unreliable. Water from limestone areas in the valley belt is moderately hard. It is relatively low in dissolved solids except calcium and magnesium. Seepage is a hazard for water impoundments in limestone areas.

Small flowages of water generally are more consistent in the shale areas than in the limestone areas. In the shale areas water can be impounded at little cost by damming a stream. The water is hard, and it is high in mineral content, particularly iron, calcium, and sulfur. In many localities the water is acidic, and where mud is in underground channels the water is turbid. Wells in the county range from 30 to 450 feet in depth. Water yields range from 1 to 535 gallon per minute. Depth to hard bedrock ranges from 2 to 110 feet.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material has few or no roots or other living organisms and has been changed very little by other biologic activity.

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

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining

their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

This soil survey supersedes the soil survey of Frederick County published in 1916 (*3*). This survey provides additional information and contains larger maps that show the soils in greater detail.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

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

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

Soil Descriptions

1. Weikert-Berks-Blairton

Gently sloping to moderately steep, shallow and moderately deep, well drained to somewhat poorly drained soils that have a medium textured or fine textured subsoil; formed in material weathered from shale or sandstone

These soils are on broad, smooth or slightly convex uplands and in broad areas dissected by shallow drainageways. The broad areas are gently sloping and strongly sloping. The drainageways generally are strongly sloping and moderately steep, but some are steep and very steep. Areas of this map unit in the eastern part of the county are drained by Opequon Creek and small streams and those in other parts of the county by Back Creek and Cedar Creek. Slope typically ranges from 2 to 25 percent.

This map unit makes up about 33 percent of the survey area. The map unit is about 36 percent Weikert soils, 34 percent Berks soils, 12 percent Blairton soils, and 18 percent minor soils.

Weikert soils are mainly on strongly sloping and moderately steep uplands but are also on gently sloping uplands. They are shallow and well drained. The subsoil is yellowish brown and medium textured.

Berks soils are on gently sloping to moderately steep uplands. They are moderately deep and well drained. The subsoil is yellowish brown and medium textured.

Blairton soils are mainly on broad, gently sloping uplands but are also along some strongly sloping drainageways. They are moderately deep and somewhat poorly drained to moderately well drained. The subsoil is yellowish brown and fine textured, and has gray mottles.

The minor soils are the moderately deep, somewhat poorly drained Clearbrook soils on broad flats, the very deep, well drained Wheeling soils on flood plains, the very deep, moderately well drained Zoar soils in depressions and at the head of drainageways, and the deep, well drained Sequoia soils mainly on the gently sloping uplands.

About 60 percent of the acreage of this map unit is cleared. The cleared areas are mainly gently sloping and sloping and are used mainly for pasture. Some cleared areas are used for hay, and a few cleared areas are used for cultivated crops. The uncleared areas are mainly steep and in mixed hardwoods and pine.

The gently sloping and sloping soils are poorly suited to moderately well suited to cultivated crops and pasture. Natural fertility is low, and the soils are droughty during the growing season. The erosion hazard is moderate, and controlling erosion is a major management concern. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.

The soils in this map unit are fairly suited to trees. Potential productivity for trees is generally low on south slopes and in the steep and very steep areas and moderate in other areas. In some areas slope limits the use of logging equipment, and erosion is a hazard on logging roads and skid trails.

Depth to bedrock and the seasonal high water table are the main limitations to use of these soils as sites for buildings and sanitary facilities. In some areas slope is also a limitation.

2. Oaklet-Carbo-Chilhowie

Gently sloping to moderately steep, very deep and moderately deep, well drained soils that have a fine textured subsoil; formed in material weathered from limestone

These soils are on gently sloping to moderately steep, narrow to broad, valley uplands that are dissected by drainageways and that have depressions. Areas of this map unit are drained by Opequon Creek, Back Creek, Cedar Creek, and many small streams. Slope typically ranges from 2 to 25 percent.

This map unit makes up about 6 percent of the survey area. It is about 49 percent Oaklet soils, 24 percent Carbo soils, 8 percent Chilhowie soils, and 19 percent minor soils.

Oaklet soils are mainly on gently sloping and strongly sloping, slightly convex uplands, but are also in some strongly sloping drainageways. They are very deep. The subsoil is yellowish brown and fine textured.

Carbo soils are mainly on gently sloping, smooth uplands, but are also in some upland depressions and in strongly sloping drainageways. They are moderately deep. The subsoil is strong brown and fine textured.

Chilhowie soils are mainly on gently sloping to moderately steep, smooth and convex uplands, but are also in some strongly sloping drainageways. They are moderately deep. The subsoil is dark yellowish brown and fine textured.

The minor soils are the very deep, well drained Frederick and Swimley soils and the shallow, well drained Opequon soils on smooth, convex uplands, the somewhat poorly drained Massanetta soils and the moderately well drained Pagebrook soils on flood plains, the well drained Timberville soils in upland drainageways, and the moderately well drained Guernsey soils in narrow valleys.

About 80 percent of this map unit is cleared. The cleared areas are used mainly for cultivated crops, hay, and pasture. Generally, the uncleared areas are covered by stones and have rock outcrops. They are in mixed hardwoods.

The soils in this map unit are well suited to poorly suited to cultivated crops. These soils are moderately well suited to well suited to hay and pasture. The erosion hazard is moderate to severe, and controlling erosion is a major management concern. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.

These soils are well suited to trees. Potential productivity for trees is moderately high. The rate of seedling mortality is moderate. The low strength of the clayey subsoil is a moderate limitation to use of heavy logging equipment. Erosion is a moderate hazard on logging roads and skid trails.

The slow permeability and the clayey subsoil are the main limitations to use of these soils as sites for building development and sanitary facilities.

3. Frederick-Poplimento-Oaklet

Gently sloping to steep, very deep, well drained soils that have a fine textured subsoil; formed in material weathered from limestone

These soils are on gently sloping to moderately steep, narrow to broad valley uplands that are dissected by some drainageways. Areas of this map unit are drained by Opequon Creek, Back Creek, Cedar Creek, and small streams. Slope typically ranges from 2 to 45 percent.

This map unit makes up about 20 percent of the survey area. It is about 37 percent Frederick soils, 30 percent Poplimento soils, 10 percent Oaklet soils, and 23 percent minor soils.

Frederick soils are on gently sloping to steep, slightly convex uplands, on side slopes, and in some narrow drainageways. The subsoil is yellowish red and fine textured.

Poplimento soils are on gently sloping to steep, slightly convex and concave uplands and in some drainageways. The subsoil is yellowish red and fine textured.

Oaklet soils are on gently sloping, smooth, slightly convex uplands and in some drainageways. The subsoil is yellowish brown and fine textured.

The minor soils are the deep, well drained Frankstown soils on gently sloping to steep uplands, the very deep, well drained Swimley soils and the shallow Opequon soils on gently sloping and sloping, convex uplands, the moderately deep, well drained Carbo soils on gently sloping and sloping, convex uplands and in upland depressions, the somewhat poorly drained Massanetta soils, and the moderately well drained Pagebrook and Lobdell soils on flood plains, the moderately well drained Hayter soils in sloping to steep mountain areas, and the well drained Timberville soils along drainageways.

About 75 percent of the acreage of this map unit is cleared. The cleared areas are used mainly as orchards and for cultivated crops, hay, and pasture. Generally, the uncleared areas are steep and rocky and in mixed hardwoods.

The soils in this unit are poorly suited to well suited to cultivated crops, hay, and pasture. The erosion hazard is a major management concern. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.

These soils are well suited to trees. Potential productivity for trees is high. The rate of seedling mortality is slight. The low strength of the clayey subsoil is a moderate limitation to use of heavy logging equipment. Erosion is a moderate hazard on logging roads and skid trails.

The moderately slow permeability, the clayey subsoil, and slope are the main limitations to use of these soils as sites for building development and sanitary facilities.

4. Weikert-Gainesboro-Berks

Gently sloping to very steep, shallow and moderately deep, well drained soils that have a moderately fine textured or medium textured subsoil; formed in material

weathered from shale or fine-grained sandstone

These soils are on narrow to broad, slightly convex and convex uplands that are dissected by many drainageways. Areas of this map unit are drained by Back Creek and Cedar Creek. Slope ranges from 2 to 65 percent.

This map unit makes up about 28 percent of the survey area. It is about 17 percent Weikert soils, 13 percent Gainesboro soils, 12 percent Berks soils, and 58 percent minor soils.

Weikert soils are mainly in strongly sloping to very steep areas on ridgetops and side slopes and in drainageways. They are shallow. The subsoil is yellowish brown and medium textured.

Gainesboro soils are in gently sloping and very steep areas on ridgetops and side slopes and in drainageways. They are moderately deep. The subsoil is reddish brown and moderately fine textured.

Berks soils are mainly in gently sloping to moderately steep areas on the broader ridgetops, on side slopes, and in some drainageways. They are moderately deep. The subsoil is yellowish brown and medium textured.

The minor soils are the moderately deep Gilpin soils mainly on ridgetops, the moderately deep Dekalb and Lehew soils on ridgetops and side slopes, and the very deep, well drained Craigsville, Birdsboro, and Wheeling soils on flood plains.

About 30 percent of this map unit is cleared. The cleared areas are gently sloping and sloping, and are used mainly as orchards. Some cleared areas are used for pasture and hay, and a few cleared areas are used for cultivated crops. The uncleared areas are mainly steep and very steep and in mixed hardwood and pine.

Natural fertility of the soils in this map unit is low, and the soils are droughty during the growing season. The erosion hazard is moderate, and controlling erosion is a major management concern. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.

These soils are fairly well suited to trees. Potential productivity for trees is generally low on south slopes and moderate on north slopes of the steeper areas. In some areas slope limits the use of logging equipment and erosion is a hazard on logging roads and skid trails.

Depth to bedrock, coarse fragments in the soils, and slope are the main limitations to use of these soils as sites for building development and sanitary facilities.

5. Hazleton

Strongly sloping to very steep, deep, well drained soils that have a moderately coarse textured subsoil; formed in material weathered from sandstone and quartzite

These soils are on narrow to broad, mostly convex mountain ridgetops and side slopes. Areas of this map unit are drained by Back Creek, Cedar Creek, and small streams. Slope ranges from 7 to 65 percent.

This map unit makes up about 6 percent of the survey area. It is about 72 percent Hazleton soils and 28 percent minor soils.

Hazleton soils are in strongly sloping to very steep, narrow to broad areas on mountain ridgetops and side slopes. The subsoil is yellowish brown and moderately coarse textured.

The minor soils are the moderately deep Dekalb and Schaffenaker soils on ridgetops and side slopes, the well drained Laidig soils and the somewhat poorly drained Buchanan soils on side slopes and foot slopes, the shallow Weikert soils and the moderately deep Berks soils on ridgetops and side slopes, and areas where the surface is covered by rocks and boulders, on ridgetops and on steep and very steep side slopes.

Nearly all the acreage of this map unit is uncleared. Most areas are moderately steep, steep, and very steep and in mixed hardwoods and pine.

The soils in this map unit are very poorly suited to pasture and hay. Stones on the surface and slope limit tillage, haying, and pasture operations. Natural fertility is low, and the soils are droughty during the growing season.

These soils are poorly suited to fairly suited to trees. Potential productivity for trees is generally low on south slopes and moderate on north slopes. In some areas slope limits the use of logging equipment and erosion is a hazard on logging roads and skid trails.

Slope, stones on surface, and the moderately rapid permeability are the main limitations to use of these soils as sites for building development and sanitary facilities.

If these soils are used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

6. Laidig-Weikert

Strongly sloping to very steep, very deep and shallow, well drained soils that have a medium textured subsoil; formed in material weathered from sandstone or shale

These soils are on narrow to broad mountain side slopes and uplands. Areas of this map unit are drained by Back Creek, Cedar Creek, and small streams. Slope ranges from 7 to 65 percent.

This map unit makes up about 7 percent of the survey area. It is about 64 percent Laidig soils, 13 percent Weikert soils, and 23 percent minor soils.

Laidig soils are in strongly sloping to very steep, narrow to broad areas on mountain side slopes. They are very deep. The subsoil is yellowish brown and medium textured.

Weikert soils are in strongly sloping to very steep, narrow to broad areas on ridgetops and side slopes. They are shallow. The subsoil is yellowish brown and medium textured.

The minor soils are the deep Hazleton soils and the moderately deep Berks, Dekalb, Gainesboro, and Lehew

soils on uplands and the moderately well drained Hayter soils and the somewhat poorly drained Buchanan soils on mountain foot slopes.

Nearly all of the acreage of this map unit is uncleared. Most areas are moderately steep, steep, and very steep and in mixed hardwoods and pine.

The soils of this map unit are not suited to poorly suited to cultivated crops and to hay. Natural fertility is low, and the soils are droughty during the growing season. The erosion hazard is moderate, and controlling erosion is a major management concern. Clearing trees, establishing and maintaining a mixture of grasses and legumes, and preventing overgrazing are major pasture management concerns.

These soils are fairly suited to trees. Productivity is moderately low on south slopes and moderate on north slopes. Plant competition is moderate. In some areas slope limits the use of logging equipment and erosion is a hazard on logging roads and skid trails.

Depth to rock, the moderately slow permeability, and slope are the main limitations to use of these soils as a site for building development and sanitary facilities.

Detailed Soil Map Units

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

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Lehew channery fine sandy loam, 7 to 15 percent slopes, is one of several phases in the Lehew series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Gainesboro-Lehew complex, 2 to 7 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, and dumps, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

1B—Berks channery silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on broad valley uplands that are dissected by drainageways. Slopes are smooth, commonly complex, and about 500 to 2,000 feet long. Areas of this soil are long and narrow or irregularly shaped, and range mainly from 3 to 40 acres.

Typically, the surface layer is dark brown channery silt loam about 8 inches thick. The subsoil and the substratum are mostly yellowish brown very channery and extremely channery silt loam about 22 inches thick. Shale bedrock is at a depth of 30 inches.

Included with this Berks soil in mapping are small intermingled areas, generally less than 2 acres each, of Blairton and Weikert soils. Blairton soils are moderately well drained to somewhat poorly drained. They are in slight depressions and along waterways. Weikert soils are shallow. They are near slope breaks. These included soils make up about 10 percent of this map unit. Also included are small areas of soils that have a surface layer of silty clay loam and small areas of rock outcrops. These included soils and areas of rock outcrops make up about 5 percent of the map unit.

Permeability in this Berks soil is moderate, and the available water capacity is very low. Runoff is medium. The erosion hazard is moderate. Tilth is fair, and natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 30 inches, but it is restricted

below a depth of 8 inches by shale fragments. The surface layer and the subsoil are very strongly acid or strongly acid, except where the soil has been limed.

Most areas of this soil are used for cultivated crops and hay and pasture. A few areas are used as woodland and orchards.

This soil is fairly well suited to cultivated crops. It is droughty during dry periods. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, crop residue management, growing cover crops, and including grasses and legumes in the cropping system help to reduce runoff and control erosion and to increase the organic matter content in the surface layer and the available water capacity. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed mainly for pine. Seedling survival is affected by droughtiness during the growing season.

Depth to bedrock is the main limitation to use of this soil for community development.

This soil is in capability subclass IIe.

1C—Berks channery silt loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on broad valley uplands that are dissected by drainageways. Slopes are smooth, commonly complex, and about 500 to 2,500 feet long. Areas of this soil are long and narrow or irregularly shaped and range mainly from 3 to 50 acres.

Typically, the surface layer is dark brown channery silt loam 8 inches thick. The subsoil is yellowish brown very channery silt loam about 14 inches thick. The substratum, to a depth of 30 inches, is strong brown extremely channery silt loam. Shale bedrock is at a depth of 30 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Blairton and Weikert soils. Blairton soils are moderately well drained to somewhat poorly drained. They are in slight depressions and along waterways. Weikert soils are shallow. They are near slope breaks. These included soils make up about 10 percent of this map unit. Also included are small areas of soils that have a surface layer of silty clay loam and small areas of rock outcrops. These included soils and areas of rock outcrops make up about 5 percent of this map unit.

Permeability in this Berks soil is moderate. The available water capacity is very low. Runoff is medium to rapid. The erosion hazard is moderate. Tilth is fair, and natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 30 inches, but it is restricted below a depth of 8 inches by shale fragments. The surface layer and the subsoil are very strongly acid and strongly acid, except where the soil has been limed.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are used as woodland and orchards.

This soil is fairly suited to cultivated crops. It is droughty during dry periods. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, crop residue management, growing cover crops, and including grasses and legumes in the cropping system, and liming and fertilizing help to reduce runoff, to control erosion, and to increase the organic matter content. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes, and preventing overgrazing are major management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed mainly for pine. Seedling survival is affected by droughtiness during the growing season.

Depth to bedrock and slope are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

2—Birdsboro loam. This soil is very deep, nearly level, and well drained. It is on flood plains and low terraces along the larger streams in the county. Areas of the soil commonly are long and winding, and follow the streams. They are about 500 to 5,000 feet long. They range mainly from about 5 to more than 50 acres. Slope ranges from 0 to 3 percent. The soil is subject to flooding.

Typically, the surface layer is dark brown loam about 13 inches thick. The subsoil in the upper part is yellowish red, mottled silt loam to a depth of 21 inches. In the next

part it is yellowish red silty clay loam to a depth of 34 inches. In the lower part it is yellowish red, mottled silty clay loam and yellowish red, mottled silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Craigsville, Pagebrook, and Wheeling soils. Craigsville soils are along stream banks and high water channels. Pagebrook soils are in slightly concave areas. Wheeling soils are scattered throughout this map unit. These included soils make up about 15 percent of the map unit.

Permeability of this Birdsboro soil is moderate, and the available water capacity is high. Runoff is slow. The erosion hazard is slight. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of 60 inches or more. Natural fertility is medium, and organic matter content is moderate. The soil commonly is strongly acid, except where the soil has been limed. The soil is subject to rare flooding. The seasonal high water table is at a depth of 2 to 6 feet from November through March.

Most areas of this soil are used as pasture and woodland. A few areas are used for cultivated crops.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain organic matter content and soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well. The windthrow hazard and the equipment limitation are slight.

Flooding is the main limitation to use of this soil for community development.

This soil is in capability subclass I.

3B—Blairton silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and moderately well drained to somewhat poorly drained. It is along heads of drainageways and in broad upland depressions. Slopes are smooth or slightly concave or convex and about 500 to 3,500 feet long. Areas of this soil commonly are elongated. They range from 3 to more than 200 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil extends to a depth of 30 inches. In the upper part it is yellowish brown, mottled silty clay loam. In the lower part it is light yellowish brown, strong brown, and mottled channery silty clay loam. The substratum, to a depth of 36 inches, is yellowish brown, mottled very channery silt loam. Fractured shale is at a depth of 36 inches.

Included with this soil in mapping are small areas, generally less than 3 acres each, of Berks, Clearbrook, and Weikert soils. Berks soils are well drained. They are on low knolls and ridges. Clearbrook soils are along waterways. Weikert soils are near slope breaks and in eroded areas. These included soils make up about 25 percent of this map unit.

Permeability in this Blairton soil is moderately slow. The available water capacity is low. Runoff is medium. The erosion hazard is moderate. Tilth is fair, but the soil breaks up into clods if tilled when too wet or too dry. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends below a depth of 23 inches, but root growth is restricted by the seasonal high water table. The surface layer and the subsoil commonly are strongly acid or very strongly acid, except where the soil has been limed. The seasonal high water table is at a depth of 1/2 foot to 2 feet from November through March.

Most areas of this soil are used for cultivated crops, hay, and pasture (fig. 2). Many areas are used as woodland.

This soil is moderately well suited to cultivated crops if drainage is installed. The soil is droughty during the growing season. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to control erosion, maintain organic matter content in the surface layer and soil tilth, to reduce crusting, and to increase water infiltration.

This soil is well suited to hay and pasture. The growing season for alfalfa commonly is short because of the seasonal high water table. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment.

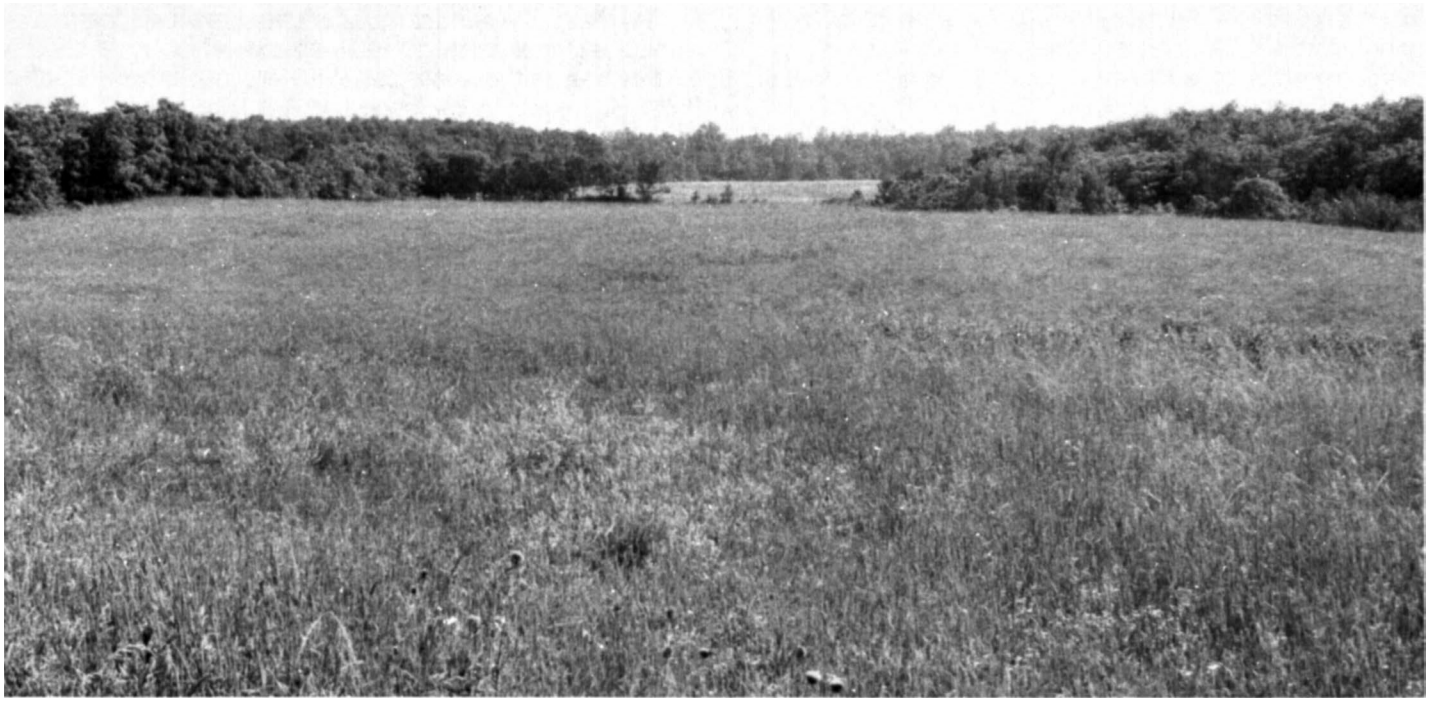

Figure 2.—Fescue in an area of Blairton silt loam, 2 to 7 percent slopes. This soil is well suited to pasture. Compaction of the surface soil is a management concern.

The seasonal high water table, depth to bedrock, and potential frost action are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIw.

3C—Blairton silt loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and somewhat poorly drained to moderately well drained. It is along heads of drainageways and in broad upland depressions. Slopes are smooth or slightly concave or convex and about 300 to 4,000 feet long. Areas of this soil commonly are irregular in shape. They range from 3 to more than 90 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil extends to a depth of 30 inches. In the upper part it is yellowish brown, mottled silty clay loam. In the lower part it is light yellowish brown and strong brown mottled channery silty clay loam. The substratum, to a depth of 36 inches, is yellowish brown, mottled very channery silt loam. Fractured shale is at a depth of 36 inches.

Included with this soil in mapping are small areas, generally less than 3 acres each, of Berks, Clearbrook, and Weikert soils. Berks soils are well drained. They are on low knolls and ridges. Clearbrook soils are along waterways. Weikert soils are near slope breaks and in eroded areas. These included soils make up about 25 percent of this map unit.

Permeability in this Blairton soil is moderately slow, and the available water capacity is low. Runoff is medium to rapid. The erosion hazard is moderate. Tilth is fair, but the soil breaks up into clods if tilled when too wet or too dry. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of 23 inches, but root growth is restricted by the seasonal high water table. The surface layer and the subsoil commonly are strongly acid or very strongly acid, except where the soil has been limed. The seasonal high water table is at a depth of 1/2 foot to 3 feet from November through March.

Most areas of this soil are used for cultivated crops, hay, and pasture. Many areas are used as woodland.

This soil is moderately well suited to cultivated crops. The soil is droughty during the growing season. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content in the surface layer and to improve soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. The growing season for alfalfa commonly is short because of the seasonal high water table. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment.

The seasonal high water table, depth to bedrock, and potential frost action are the main limitations to use of this soil for community development. The seasonal high water table and depth to bedrock are limitations for septic tank absorption fields, sewage lagoons, and trench sanitary landfills and to use of the soil as roadfill. The seasonal high water table is a limitation for dwellings and sanitary landfills. Potential frost action is a limitation for local roads and streets.

This soil is in capability subclass IVe.

4B—Buchanan very stony sandy loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and somewhat poorly drained. It is on the broad, concave, lower foot slopes of mountains. Slopes are smooth to irregular and about 200 to 2,000 feet long. Shallow, intermittent drainageways from the steep mountain slopes above commonly dissect areas of this soil. Sandstone and quartzite stones cover about 3 to 15 percent of the surface. Areas of this soil follow the mountain slope breaks and are irregularly shaped. They range from 10 to more than 100 acres.

Typically, the surface layer is yellowish brown gravelly sandy loam about 5 inches thick. The subsoil extends to a depth of 46 inches. In the upper part it is light yellowish brown sandy loam to a depth of 12 inches. In the middle part it is strong brown, mottled sandy loam and sandy clay loam to a depth of 26 inches. In the lower part it is reddish brown, very gravelly sandy loam called a fragipan. The substratum is light gray, mottled gravelly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small intermingled areas, less than 3 acres each, of Berks and Weikert soils along slope breaks near the upper edge of this map unit. These included soils make up about 10 percent of the map unit. Also included are small areas of wet soils along drainageways and some areas of extremely stony soils. These included soils make up about 10 percent of the map unit. In some map units in the extreme northwestern part of the county, sinkholes range from few to many in abundance.

Permeability in this Buchanan soil is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. The erosion hazard is moderate. Natural fertility is low, and the organic matter content is moderate. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 26 inches. The fragipan severely restricts root growth and the downward movement of water. The surface layer and the subsoil commonly are very strongly acid or strongly acid. Generally, bedrock is deep and does not affect the use of the soil. The seasonal high water table is at a depth of 1/2 foot to 3 feet from November through March.

Most areas of this soil are used as woodland. A few areas are used for cultivated crops and pasture.

This soil is very poorly suited to cultivated crops unless it is cleared of stones. The stones damage tillage equipment and interfere with planting. If the surface is cleared of stones, the soil is moderately well suited. The soil is wet in winter and spring, but tends to be droughty during the growing season.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major concerns in management. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for pine and hardwoods. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment. The windthrow hazard is slight.

The seasonal water table and the permeability in the fragipan are the main limitations to use of this soil for community development.

This soil is in capability subclass VIs.

4C—Buchanan very stony sandy loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and somewhat poorly drained. It is on broad, concave, lower foot slopes of mountains. Slopes are smooth to irregular and about 200 to 2,000 feet long. Shallow, intermittent drainageways from the steep mountain slopes above commonly dissect areas of this soil. Sandstone and quartzite stones cover about 3 to 15 percent of the surface. Areas of this soil follow the mountain slope breaks and are irregular in shape. They range from 10 to more than 100 acres.

Typically, the surface layer is yellowish brown gravelly sandy loam about 5 inches thick. The subsoil extends to a depth of about 46 inches. In the upper part it is light yellowish brown sandy loam to a depth of 12 inches. In the middle part it is strong brown, mottled sandy loam to a depth of 26 inches. In the lower part it is reddish brown, brittle, very gravelly sandy loam called a fragipan. The substratum is light gray, mottled gravelly silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small intermingled areas, less than 3 acres each, of Berks and Weikert soils. Berks and Weikert soils are along slope breaks near the upper edge of this map unit. These included soils make up about 15 percent of the map unit. Also included are small areas of wet soils along drainageways and areas of extremely stony soils. These included soils make up less than 5 percent of the map unit. In some map units in the extreme northwestern part of the county, sinkholes range from few to many in abundance.

Permeability in this Buchanan soil is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. Natural fertility is low, and organic matter content is moderate. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 26 inches. The fragipan severely restricts root growth and the downward movement of water. The surface layer and the subsoil commonly are very strongly acid and strongly acid. The seasonal high water is at a depth of 1/2 foot to 3 feet from November through March.

Most areas of this soil are used as woodland. A few areas are used as pasture.

This soil is very poorly suited to cultivated crops unless it is cleared of stones. The stones damage tillage equipment and interfere with planting. If the surface is cleared of stones, the soil is moderately well suited. The soil is wet in winter and spring, but tends to be droughty during the growing season. Erosion is a moderate hazard if cultivated crops are grown or if vegetation is sparse.

This soil is moderately well suited to hay and pasture. Clearing the soil of stones, establishing and maintaining a mixture of grasses and legumes, and preventing overgrazing and grazing when the soil is wet are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Grazing during periods of seasonal wetness commonly cuts up and compacts the surface soil, reduces yields, and increases erosion. Using stocking rates within carrying capacity, deferred grazing, and using rotation grazing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderate. The soil is managed for pine and hardwoods. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment. The windthrow hazard is slight.

The seasonal high water table and the fragipan are the main limitations to use of this soil as sites for buildings, sanitary landfills, and septic tank absorption fields and to most recreation uses.

This soil is in capability subclass VIs.

5B—Carbo silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on uplands. Slopes are smooth. Areas of this soil are irregularly rectangular or long and winding, and range mainly from 3 to 75 acres.

Typically, the surface layer is dark yellowish brown silt loam about 9 inches thick. The subsoil, about 17 inches thick, is mostly strong brown, firm clay. Bedrock is at a depth of 26 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres each, of Chilhowie and Oaklet soils. Chilhowie soils are near slope breaks and on low ridges. Oaklet soils are scattered throughout this map unit. These included soils make up about 15 percent of the map unit. Also included in some map units are scattered areas of rock outcrops.

Permeability in this Carbo soil is slow, and the available water capacity is low. Runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. Natural fertility is medium, and organic matter content is low. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of about 26 inches. The surface layer and subsoil are strongly acid to neutral.

Most areas of this soil are used for cultivated crops, hay, and pasture and as orchards. A few areas are used as woodland.

This soil is fairly well suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content and to improve soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within grazing capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion.

Potential productivity for trees on this soil is moderately high. The rate of seedling mortality is moderate. The low strength of the clayey subsoil is a

moderate limitation to use of logging equipment. Erosion is a hazard on logging roads and skid trails.

Depth to bedrock, the clayey subsoil, shrinking and swelling, and permeability are the main limitations to use of this soil for community development.

This soil is in capability subclass IIe.

5C—Carbo silt loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on uplands. Slopes are smooth. Areas of the soil are irregularly rectangular or long and winding. They range from 5 to 50 acres.

Typically, the surface layer is yellowish brown or dark yellowish brown silt loam about 9 inches thick. The subsoil, about 17 inches thick, is mostly strong brown, firm clay. Bedrock is at a depth of 26 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres each, of Chilhowie and Oaklet soils. Chilhowie soils are near slope breaks and on low ridges. Oaklet soils are scattered throughout this map unit. These included soils make up about 15 percent of the map unit. Also included in some map units are scattered areas of rock outcrops.

Permeability in this Carbo soil is slow, and the available water capacity is moderate. Runoff is medium. The erosion hazard is severe. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. Natural fertility is medium, and organic matter content is low. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of about 26 inches. The surface layer and subsoil are strongly acid to neutral.

Most areas of this soil are used for cultivated crops, hay, and pasture and as orchards. A few areas are used as woodland.

This soil is fairly well suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content and to improve soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The rate of seedling mortality is moderate. The low strength of the clayey subsoil is a moderate limitation to use of logging equipment. Erosion is a hazard on logging roads and skid trails.

Depth to bedrock, the clayey subsoil, shrinking and swelling, and permeability are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

6C—Carbo-Oaklet silt loams, very rocky, 2 to 15 percent slopes. This map unit consists of moderately deep and deep, gently sloping and strongly sloping, well drained soils on side slopes, hilltops, and ridgetops. A typical area of this map unit is about 50 percent Carbo soil, 45 percent Oaklet soil, and 5 percent other soils. Slopes are smooth, commonly complex, and about 500 to 8,000 feet long. Rock outcrops about 30 to 100 feet apart cover about 5 percent of the surface. Areas of this map unit are irregularly rectangular or long and winding and range mainly from 3 to 150 acres. The Carbo and Oaklet soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Carbo soil is yellowish brown or dark yellowish brown silt loam 9 inches thick. The subsoil, to a depth of about 26 inches, is yellowish brown, firm clay. Limestone bedrock is at a depth of 26 inches.

Typically, the surface layer of the Oaklet soil is dark brown silt loam about 5 inches thick. The subsoil is yellowish brown silt loam to a depth of 11 inches. Below that it is yellowish brown and dark yellowish brown clay to a depth of 60 inches or more.

Included with these soils in mapping are small intermingled areas, generally less than 3 acres, of Chilhowie soils. Also included are small areas of severely eroded soils that have a surface layer of silty clay or clay.

Permeability in the Carbo and Oaklet soils is slow, and the available water capacity is moderate. Runoff is medium. The erosion hazard is severe. The surface layer breaks into clods if these soils are tilled when too wet or too dry, and rock outcrops interfere with tillage. Natural fertility is medium, and organic matter content is low. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of about 26 inches in the Carbo soil and more than 60 inches in the Oaklet soil. The Carbo soil is commonly neutral, and the Oaklet soil is commonly strongly acid to neutral.

Most areas of these soils are used for pasture. Some areas are used as orchards and woodland. A few areas are used for hay and cultivated crops.

These soils are poorly suited to cultivated crops. Crops respond well to lime and fertilizer. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content and to improve soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on these soils is moderately high. Rock outcrops and the low strength of the clayey subsoil are moderate limitations to the use of logging equipment. Erosion is a hazard on logging roads and skid trails. On the Carbo soils, the rate of seedling mortality is moderate.

Rock outcrops, permeability, and shrinking and swelling are the main limitations to use of these soils for community development. On the Carbo soil, depth to bedrock is also a limitation.

These soils are in capability unit IVe.

7C—Carbo-Oaklet-Rock outcrop complex, 2 to 15 percent slopes. This map unit consists of moderately deep and deep, gently sloping and strongly sloping, well drained soils and areas of rock outcrops on undulating and rolling landscapes in the valley. A typical area of this map unit is about 35 percent Carbo soil, 30 percent Oaklet soil, 25 percent areas of Rock outcrop, and 10 percent other soils. Areas of the map unit are irregularly shaped. They are about 300 to 4,500 feet long. They range from 3 to more than 100 acres. The Carbo and Oaklet soils and areas of Rock outcrop are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Carbo soil is yellowish brown or dark yellowish brown silt loam about 9 inches thick. The subsoil, to a depth of about 26 inches, is mostly yellowish brown, firm clay. Limestone bedrock is at a depth of 26 inches.

Typically, the surface layer of the Oaklet soil is dark yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of 60 inches or more, is strong brown and yellowish brown, firm clay.

Included with these soils in mapping are small intermingled areas of Chilhowie soils. Chilhowie soils have a subsoil at a depth of less than 20 inches. Also included are a few areas of soils that have slope of more than 15 percent and a few areas of severely eroded soils that have a surface layer of silty clay or clay.

Permeability in these Carbo and Oaklet soils is slow, and the available water capacity is moderate. Surface runoff is medium to rapid. The erosion hazard is severe. Tillage on these soils is impractical because of rock outcrops. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of about 36 inches in the Carbo soil and about 60 inches in the Oaklet soil. Commonly, the Carbo soil is neutral and the Oaklet soil is strongly acid to mildly alkaline. Natural fertility is medium, and organic matter content is low.

Nearly all areas of these soils are used as woodland and pasture.

These soils are not suited to cultivated crops because rock outcrops interfere with tillage.

These soils are poorly suited to hay and pasture. The soils tend to be droughty during dry periods.

Potential productivity for trees on these soils is moderately high. Rock outcrops and low strength during wet periods limit the use of logging equipment. The rate of seedling mortality is moderate on the Carbo soil and slight on the Oaklet soil. The windthrow hazard on both soils is slight.

Rock outcrops are the main limitation to use of these soils for community development.

These soils are in capability subclass VIs.

8B—Chilhowie silty clay loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on smooth or convex slopes in the valley. Slopes are smooth and commonly complex and about 1,000 to 4,000 feet long. Areas of this soil commonly follow the hilltops and are long and winding. They range mainly from about 3 to 60 acres.

Typically, the surface layer is dark yellowish brown silty clay loam 7 inches thick. The subsoil is brown and dark yellowish brown clay about 10 inches thick. The substratum, to a depth of 27 inches, is yellowish brown very channery silty clay. Limestone bedrock is at a depth of 27 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres each, of Carbo and Oaklet soils. Carbo and Oaklet soils are in the nearly level to concave areas in this map unit. Also included are small areas of severely eroded soils and scattered areas of rock outcrops. These included soils and areas of rock outcrops make up about 20 percent of the map unit.

Permeability in this Chilhowie soil is slow, and the available water capacity is very low. The erosion hazard is moderate. Runoff is medium. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. Natural fertility is high, but organic matter content is low. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of about 27 inches. The surface layer and subsoil commonly are slightly acid to mildly alkaline. Bedrock is at a depth of 27 inches.

Most areas of this soil are used for cultivated crops, hay, and pasture and in urban use. A few areas are used as woodland.

This soil is poorly suited to cultivated crops. It is droughty during the growing season. Crops respond well to lime and fertilizers. Using conservation tillage, growing

cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content and to improve soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major concerns in management. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within grazing capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderate. Seedling survival is affected by droughtiness during the growing season and by the formation of a crust on the surface layer. Windthrow is a moderate hazard because of restricted root depth. The surface layer is soft and slippery when wet, and thus is a moderate limitation to use of heavy logging equipment.

Depth to bedrock and the clayey subsoil are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

8C—Chilhowie silty clay loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on smooth slopes in the valley. Slopes are smooth, commonly complex, and about 600 to 5,000 feet long. Areas of this soil commonly follow the hilltops, and are long and winding. They range mainly from about 3 to 50 acres.

Typically, the surface layer is dark yellowish brown silty clay loam about 7 inches thick. The subsoil is brown and dark yellowish brown clay about 10 inches thick. The substratum, to a depth of 27 inches, is yellowish brown very channery silty clay. Limestone bedrock is at a depth of 27 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres each, of Carbo and Oaklet soils. Carbo and Oaklet soils are in nearly level to concave areas. Also included are small areas of Chilhowie soils on moderately steep slopes, small areas of eroded soils, and scattered areas of rock outcrops. These included soils and areas of rock outcrops make up about 25 percent of this map unit.

Permeability in this Chilhowie soil is slow, and the available water capacity is low. The erosion hazard is moderate. Runoff is rapid. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. Natural fertility is high, but organic matter content is low. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of about 27 inches. The surface layer and the subsoil commonly are slightly acid to mildly alkaline. Bedrock is at a depth of 27 inches.

Most areas of this soil are used for hay and pasture. Some areas are used for cultivated crops, and some areas are in urban use.

This soil is poorly suited to cultivated crops. It is droughty during the growing season. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content and to improve soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major concerns in management. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion.

Potential productivity for trees on this soil is moderate. Seedling survival is affected by droughtiness during the growing season and by the formation of a crust on the surface layer. Windthrow is a moderate hazard because of rooting depth. Slope and the surface layer, which is soft and slippery when wet, are moderate limitations to the safe operation of heavy logging equipment.

Depth to bedrock and the clayey subsoil are the main limitations to use of this soil for community development.

This soil is in capability subclass IVe.

9B—Clearbrook channery silt loam, 2 to 7 percent slopes. This soil is moderately deep, gently sloping, and somewhat poorly drained. It is mainly along heads of drainageways and in broad upland depressions. Slopes are smooth or slightly concave or convex and about 100 to 600 feet long. Areas of this soil commonly are elongated. They range from 3 to more than 80 acres.

Typically, the surface layer is dark brown channery silt loam about 7 inches thick. The subsoil in the upper part is pale brown, mottled very channery silty clay loam to a depth of 14 inches. In the lower part it is light gray and light brownish gray, mottled very channery silty clay loam to a depth of 23 inches. The substratum, to a depth of 27 inches, is gray extremely channery silty clay loam. Soft shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres each, of Berks, Blairton, and Weikert soils. Berks and Weikert soils are near slope breaks along the upper edge of this map unit. Blairton soils are scattered throughout the map unit. The included soils make up about 20 percent of the map unit.

Permeability in this Clearbrook soil is moderately slow. The available water capacity is very low. Runoff is

medium. Tilth is fair. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of 27 inches, but is restricted by shale fragments. The surface layer and the subsoil are very strongly acid or strongly acid, except where the soil has been limed. The seasonal high water table is between the surface and a depth of 1/2 foot from October through April.

Most areas of this soil are used for pasture and hay. A few areas are used for cultivated crops and as woodland.

This soil is moderately well suited to cultivated crops. The soil is droughty during the growing season. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, liming and fertilizing, and crop residue management help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil. A drainage system is needed to lower the seasonal high water table.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing and grazing when the soil is wet are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Grazing during periods of seasonal wetness commonly cuts up and compacts the surface soil, reduces yields, and increases erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled. Seedling survival is affected by droughtiness during long dry periods. The soil is soft when wet, and thus will not support heavy logging equipment.

The seasonal high water table and depth to bedrock are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIw.

9C—Clearbrook channery silt loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and somewhat poorly drained. It is mainly along heads of drainageways and in narrow upland depressions. Slopes are smooth or slightly concave and about 100 to 600 feet long. Areas of this soil commonly are elongated in shape. They range from 3 to more than 80 acres.

Typically, the surface layer is dark brown channery silt loam about 7 inches thick. The subsoil in the upper part is pale brown, mottled very channery silty clay loam to a depth of 14 inches. In the lower part it is light gray and light brownish gray, mottled very channery silty clay loam to a depth of 23 inches. The substratum, to a depth of 27 inches, is gray extremely channery silty clay loam. Soft shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres each, of Berks, Blairton, and Weikert soils. Berks and Weikert soils are near slope breaks along the upper edge of this map unit. The included soils make up about 25 percent of the map unit.

Permeability in this Clearbrook soil is moderately slow or slow. The available water capacity is very low. Runoff is medium to rapid. Soil tilth is fair. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of 27 inches but is restricted by shale fragments. The surface layer and the subsoil are very strongly acid or strongly acid, except where the soil has been limed. The seasonal high water table is between the surface and a depth of 1/2 foot from October through April.

Most areas of this soil are used for pasture and hay. A few areas are used for cultivated crops and as woodland.

This soil is moderately well suited to cultivated crops. The soil is droughty during the growing season. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Grazing during periods of seasonal wetness often cuts up and compacts the surface soil, reduces yields, and increases erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to

maintain a good stand of grasses and legumes to reduce runoff, and to control erosion.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled. Seedling survival is affected by droughtiness during long, dry periods. The soil is soft when wet, and thus will not support heavy logging equipment.

The seasonal high water table and depth to bedrock are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

10—Craigsville cobbly sandy loam. This soil is very deep, nearly level to gently sloping, and well drained. It is on flood plains and first bottoms. Areas of the soil commonly are elongated and follow the course of the adjacent stream. Areas range from 10 to more than 90 acres. Slope ranges from 0 to 5 percent. The soil is subject to flooding.

Typically, the surface layer is dark brown cobbly sandy loam about 5 inches thick. The subsoil is reddish brown very cobbly sandy loam about 32 inches thick. The substratum is reddish brown extremely cobbly sandy loam to a depth of 60 inches or more.

Included with this Craigsville soil in mapping are small areas of Wheeling soils and spots of soils that have a surface layer of sand. Wheeling soils are in the same positions on the landscape as the Craigsville soil, but are finer textured than the Craigsville soil and do not have cobbles throughout. The included soils make up about 15 percent of this map unit.

Permeability in this Craigsville soil is moderately rapid or rapid, and available water capacity is low. The surface layer is friable, but in places cobbles interfere with tillage. The erosion hazard is slight. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of 60 inches or more. Natural fertility and organic matter content are low. The soil commonly is very strongly acid or strongly acid throughout. Reaction in the surface layer varies where the soil has been limed. The soils are subject to frequent flooding of very brief periods from November through May.

Most areas of this soil are used as woodland. A few areas are used for cultivated crops, and a few areas are used as pasture.

This soil is poorly suited to cultivated crops. The cobbles in the soil interfere with tillage. If the surface is cleared of cobbles, the soil is moderately well suited, but yields are limited by the low available water capacity. Some areas of this soil are covered frequently by floodwater from the adjacent stream.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing or grazing when the soil is wet are major pasture management concerns. Overgrazing and grazing when the soil is wet causes surface compaction and damages the stand of grasses and legumes. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed mainly for hardwoods. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment.

Flooding is the main limitation to use of this soil for community development.

This soil is in capability subclass IIIs.

11C—Dekalb channery loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on western mountaintops and ridgetops. Areas of this soil commonly are long and narrow or irregular. They are about 800 to 3,000 feet long, and range from about 5 to more than 50 acres.

Typically, the surface layer is dark brown channery loam about 4 inches thick. The subsurface layer is brown channery loam about 11 inches thick. The subsoil is strong brown very channery loam about 14 inches thick. The substratum, to a depth of 35 inches, is strong brown extremely flaggy loam. Fractured sandstone bedrock is at a depth of 35 inches.

Included with this soil in mapping are small areas of Berks and Hazleton soils. Berks and Hazleton soils are scattered throughout this map unit. The included soils make up about 20 percent of the map unit.

Permeability in this Dekalb soil is rapid, and the available water capacity is low. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable, but sandstone fragments interfere somewhat with tillage. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 35 inches. Natural fertility is low, and organic matter content is moderate. The soil is very strongly acid to moderately acid throughout.

Most areas of this soil are used as woodland. A few areas are used for pasture and hay.

This soil is poorly suited to cultivated crops. The soil tends to be droughty during the growing season.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion.

Potential productivity for trees on this soil is moderate. The soil is managed for hardwoods and pine. The rate of seedling mortality is moderate.

Rock fragments in the soil, depth to bedrock, and permeability are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in some areas the effluent can seep to the surface downslope.

This soil is in capability subclass IIIe.

12E—Dekalb very stony loam, 25 to 65 percent slopes. This soil is moderately deep, steep and very steep, and well drained. It is on the ridgetops and side slopes of foothills of the western mountains. Areas of this soil commonly are irregularly rectangular. They are from about 1,000 to 6,000 feet long, and range from about 50 to more than 300 acres.

Typically, the surface layer is dark brown channery loam about 4 inches thick. The subsurface layer is brown channery loam about 11 inches thick. The subsoil is strong brown very channery loam about 14 inches thick. The substratum, to a depth of 35 inches, is strong brown extremely flaggy loam. Fractured sandstone bedrock is at a depth of 35 inches.

Included with this soil in mapping are small areas of Berks, Hazleton, and Weikert soils. Berks and Hazleton soils are scattered throughout this map unit. Weikert soils are in the steeper areas in the map unit. The included soils make up about 20 percent of the map unit.

Permeability in this Dekalb soil is rapid, and the available water capacity is low. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable, but tillage is impractical because of slope and the stone content. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 35 inches. Natural fertility and organic matter content are low. The soil is very strongly acid to moderately acid.

Most areas of this soil are used as woodland.

This soil is very poorly suited to cultivated crops, pasture, and hay.

Potential productivity for trees on both the north and south aspects on this soil is moderate. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled. Laying out logging roads and skid trails on the contour helps to reduce runoff and to control erosion. On both aspects slope is a severe limitation to the safe operation of heavy logging equipment.

Slope, depth to bedrock, and permeability are the main limitations to use of this soil for community development. If this soil is used as a site for septic tank absorption fields, in some areas the effluent can seep to the surface downslope.

This soil is in capability subclass VIIs.

13B—Frankstown channery silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on uplands in the valley. It is generally on ridges. Areas of this soil commonly are long and winding and irregularly oval. They are about 500 to 2,500 feet long, and range from 3 to about 50 acres.

Typically, the surface layer is dark brown and dark yellowish brown channery silt loam about 8 inches thick. The subsoil extends to a depth of 40 inches. In the upper part it is yellowish brown channery silty clay loam to a depth of 15 inches. In the lower part it is strong brown channery silty clay and very channery silty clay that has pockets of clay. The substratum is strong brown, mottled clay to a depth of 60 inches or more.

Included with this soil in mapping are areas, generally less than 3 acres each, of Carbo, Frederick, and Poplimento soils. Carbo soils are moderately deep. They are on ridges and low knolls. Frederick and Poplimento soils are along slope breaks near the edge of this map unit. These included soils make up about 15 percent of the map unit. Also included are areas of soils that are moderately deep and shallow to rippable siltstone bedrock. These included soils make up about 10 percent of the map unit. Also included in some map units are scattered areas of rock outcrops.

Permeability in this Frankstown soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of 60 inches or more, but is restricted below a depth of 25 inches by siltstone fragments. Natural fertility is medium, and organic matter content is moderate. The surface layer commonly is moderately acid or strongly acid, except where the soil has been limed. The subsoil is strongly acid or moderately acid.

Most areas of this soil are used as orchards and for hay, cultivated crops, and pasture. A few areas are used as woodland.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain the organic matter content

and soil tilth, to reduce crusting, to increase water infiltration, to reduce runoff, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion.

Potential productivity for trees on this soil is moderately high. The equipment limitation and the rate of seedling mortality are slight. This soil is well suited to use as orchards.

Depth to bedrock, potential frost action, and the small stones in the soil are the main limitations to use of this soil for community development.

This soil is in capability subclass IIe.

13C—Frankstown channery silt loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on uplands, mainly on ridges, in the valley. Areas of this soil commonly are long and winding and irregularly oval. They are about 500 to 2,500 feet long. They range from 3 to about 50 acres.

Typically, the surface layer is dark brown and dark yellowish brown channery silt loam about 8 inches thick. The subsoil extends to a depth of about 40 inches. It is yellowish brown channery silty clay loam to a depth of 15 inches. Below that, it is strong brown, channery and very channery silty clay. The substratum is strong brown, mottled clay to a depth of 60 inches or more.

Included with this soil in mapping are areas, generally less than 3 acres each, of Carbo, Frederick, and Poplimento soils. Carbo soils are moderately deep. They are on ridges and knolls. Frederick and Poplimento soils are along slope breaks near the edge of this map unit. These included soils make up about 15 percent of the map unit. Also included are areas of soils that are moderately deep and shallow to rippable siltstone bedrock. These included soils make up about 10 percent of the map unit. Also included in some map units are scattered areas of rock outcrops.

Permeability in this Frankstown soil is moderate, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of 60 inches or more, but is restricted below a depth of 25 inches by siltstone fragments. Natural fertility is medium, and organic matter content is moderate. The surface layer commonly is medium acid or strongly acid, except where the soil has been limed. The subsoil is strongly acid or moderately acid.

Most areas of this soil are used as orchards and for hay, cultivated crops, and pasture. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain the organic matter content and soil tilth, to reduce crusting, to increase water infiltration, to reduce runoff, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes, and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The equipment limitation and the rate of seedling mortality are slight. This soil is well suited to use as orchards.

Depth to bedrock, potential frost action, slope, and small stones in the soil are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

13D—Frankstown channery silt loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained. It is on uplands, mainly ridges, in the valley. Areas of this soil commonly are long and winding and irregularly oval. They are about 500 to 3,500 feet long. They range from 3 to about 75 acres.

Typically, the surface layer is dark brown and dark yellowish brown channery silt loam about 8 inches thick. The subsoil extends to a depth of about 40 inches. It is yellowish brown channery silty clay loam to a depth of about 15 inches. Below that it is strong brown channery and very channery silty clay. The substratum is strong brown, mottled clay to a depth of 60 inches.

Included with this soil in mapping are areas, generally less than 3 acres each, of Frederick and Poplimento soils along slope breaks near the edge of this map unit. These included soils make up about 15 percent of the map unit. Also included are areas of soils that are moderately deep and shallow to rippable siltstone bedrock. These included soils make up about 15 percent of the map unit. Also included in some map units are scattered areas of rock outcrops.

Permeability in this Frankstown soil is moderate, and the available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The

shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of 60 inches or more, but is restricted below a depth of 25 inches by siltstone fragments. Natural fertility is medium, and organic matter content is moderate. The surface layer commonly is moderately acid or strongly acid, except where the soil has been limed. The subsoil is strongly acid or moderately acid.

Most areas of this soil are used as woodland. Some areas are used as orchards and for pasture and hay. A few areas are used for cultivated crops.

The soil is poorly suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain the organic matter content and soil tilth, to reduce crusting, to increase water infiltration, to reduce runoff, and to control erosion.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, using deferred grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high on the north aspect and moderate on the south aspect. Slope is a moderate limitation to use of logging equipment. The rate of seedling mortality is slight on the north aspect and moderate on the south aspect. The soil is well suited to use as orchards.

Depth to bedrock, potential frost action, slope, and small stones in the soil are the main limitations to use of this soil for community development.

This soil is in capability subclass IVe.

13E—Frankstown channery silt loam, 25 to 35 percent slopes. This soil is very deep, steep and very steep, and well drained. It is on uplands, mainly side slopes, in the valley. Areas of this soil commonly are long and winding and irregularly oval. They are about 500 to 4,500 feet long. They range from 3 to about 100 acres.

Typically, the surface layer is dark brown and dark yellowish brown channery silt loam about 8 inches thick. The subsoil extends to a depth of about 40 inches. It is yellowish brown channery and very channery silty clay loam to a depth of 15 inches. Below that, it is strong brown channery and very channery silty clay. The substratum is strong brown clay to a depth of 60 inches or more.

Included with this soil in mapping are areas, generally less than 3 acres each, of Frederick and Poplimento soils along slope breaks near the edge of this map unit. Also included are areas of soils that have slopes of more than 35 percent. These included soils make up about 15 percent of the map unit. Also included are areas of soils that are moderately deep and shallow to rippable siltstone bedrock. These included soils make up about 15 percent of the map unit. Also included in some map units are scattered areas of rock outcrops.

Permeability in this Frankstown soil is moderate, and the available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of 60 inches or more, but is restricted below 25 inches by siltstone fragments. Natural fertility is medium, and organic matter content is moderate. The surface layer commonly is moderately acid or strongly acid, except where the soil has been limed. The subsoil is strongly acid or moderately acid.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops because the slopes are too steep.

This soil is poorly suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high on the north aspect and moderate on the south aspect. In some areas slope is a moderate limitation to use of logging equipment. The rate of seedling mortality is slight on the north aspect and moderate on the south aspect.

Slope is the main limitation to use of this soil for community development.

This soil is in capability subclass VIe.

14B—Frederick-Poplimento loams, 2 to 7 percent slopes. This map unit consists of very deep, gently sloping, well drained soils on narrow to broad, convex valley sides. A typical area of this map unit is about 45 percent Frederick soil, 40 percent Poplimento soil, and 15 percent other soils. Areas of this map unit commonly are irregularly shaped or long and narrow. They are about 300 to 5,000 feet long, and range from 3 to more than 100 acres. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam to a depth of about 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown loam about 5 inches thick. The subsoil extends to a depth of 50 inches. In the upper part it is strong brown clay loam to a depth of about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of 39 inches. In the lower part it is yellowish red and strong brown silty clay loam. The substratum is mostly strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas, generally less than 3 acres each, of Oaklet, Swimley, and Timberville soils. Oaklet and Swimley soils are scattered throughout the map unit. Timberville soils are in depressions and along drainageways. These included soils make up about 15 percent of the map unit. Also included in some map units are areas of severely eroded soils. In some map units rock outcrops cover as much as 1 percent of the surface.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of more than 60 inches. Natural fertility is medium, and organic matter content is low. The soils commonly are moderately acid or strongly acid throughout.

Most areas of these soils are used for cultivated crops, pasture, and hay (fig. 3). Some areas are in urban use, and a few areas are used as woodland.

These soils are well suited to cultivated crops. Crops respond well to lime and fertilizer. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain the organic matter content in the surface layer and soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the main pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing

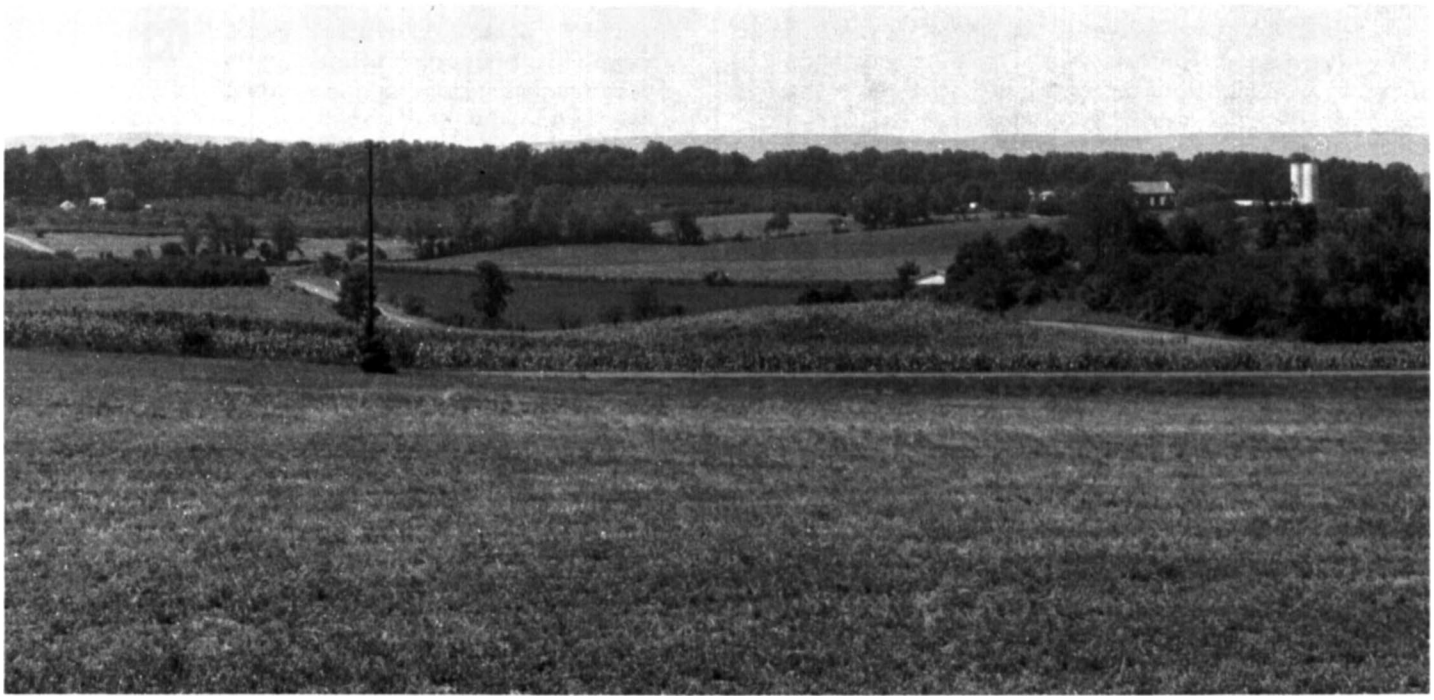

Figure 3.—Alfalfa in an area of Frederick-Poplimento loams, 2 to 7 percent slopes; corn in an area of Timberville silt loam, 2 to 7 percent slopes, in a depression; and an apple orchard in an area of Oaklet silt loam, 7 to 15 percent slopes, in background.

generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on these soils is moderately high. The low strength of the clayey subsoil is a moderate limitation to use of logging equipment. Seedlings survive and grow well if competing vegetation is controlled.

The clayey subsoil, shrinking and swelling, low strength, permeability, and slope are the main limitations to use of these soils for community development.

The included areas of Oaklet soils are more limited for some urban uses than the major soils in this map unit because of slow permeability. The included areas of Swimley soils have limitations similar to those of the major soils in the map unit. The included areas of Timberville soils are more limited for some urban uses than the major soils in this map unit because of flooding by runoff from higher adjacent areas.

The soils in this map unit are in capability subclass IIe.

14C—Frederick-Poplimento loams, 7 to 15 percent slopes. This map unit consists of very deep, strongly sloping, well drained soils on narrow to broad, convex valley sides. A typical area of this map unit is about 45 percent Frederick soil, 40 percent Poplimento soil, and 15 percent other soils. Areas of this map unit commonly are irregularly shaped or long and narrow. They are about 300 to 4,000 feet long, and range from 3 to more than 150 acres. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam to a depth of about 12 inches. Below that, it is red, yellowish red and yellowish brown mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown loam about 5 inches thick. The subsoil extends to a depth of 50 inches. In the upper part it is strong brown clay loam to a depth of about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of about 30 inches. In the lower part it is yellowish red and strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas, generally less than 3 acres each, of Oaklet, Swimley, and Timberville soils. Oaklet and Swimley soils are scattered throughout the map unit. Timberville soils are along drainageways. These included soils make up about 5 percent of the map unit. Also included in some map units are areas of severely eroded soils. In many map units rock outcrops cover as much as 1 percent of the surface.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Surface runoff is rapid. The erosion hazard is severe. The surface layer of these soils is friable and easily tilled. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of more than 60 inches. Natural fertility is medium, and organic matter content is moderate. The soils commonly are moderately acid or strongly acid throughout.

Most areas of these soils are used as pasture, orchards, and woodland (fig. 4). Some areas are in cultivated crops and hay, and a few areas are in urban use.

These soils are moderately well suited to cultivated crops. Erosion is a severe hazard if cultivated crops are grown. Controlling erosion is a major management concern. Crops respond well to lime and fertilizer. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity and liming and fertilizing help to maintain a good stand of grasses and legumes. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on these soils is moderately high. Slope and low strength of the clayey subsoil are moderate limitations to use of logging equipment. Seedlings survive and grow well if competing vegetation is controlled.

The clayey subsoil, the high shrink-swell potential, low strength, permeability, and slope are the main limitations to use of these soils for community development.

The included areas of Oaklet soils are more limited for some urban uses than the major soils in this map unit because of slow permeability. The included areas of Swimley soils have limitations similar to those of the major soils in this map unit. The included areas of Timberville soils are more limited for some urban uses than the major soils in this map unit because of flooding by runoff from higher adjacent areas.

These soils are in capability subclass IIIe.

14D—Frederick-Poplimento loams, 15 to 25 percent slopes. This map unit consists of very deep, moderately steep, well drained soils on narrow to broad, convex valley sides. A typical area of this map unit is about 50 percent Frederick soil, 45 percent Poplimento soil, and 5 percent other soils. Areas of this map unit commonly are irregularly shaped or long and narrow.

Figure 4.—White pine in an area of Frederick-Poplimento loams, 7 to 15 percent slopes, and pasture and a farm pond in an area of Pagebrook silty clay loam.

They are about 300 to 4,000 feet long, and range from 3 to more than 100 acres. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam to a depth of about 12 inches. Below that, it is yellowish red, and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown loam about 5 inches thick. The subsoil extends to a depth of about 50 inches. It is strong brown clay loam to a depth of about 9 inches and yellowish red and strong brown, mottled clay to a depth of about 39 inches. Below that, it is yellowish red and strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas, generally less than 3 acres each, of Oaklet, Swimley, and Timberville soils. Oaklet and Swimley soils are scattered throughout this map unit. Timberville soils are along drainageways. These included soils make up about 5 percent of the map unit. Also included are areas of severely eroded soils. In many map units rock outcrops cover as much as 1 percent of the surface.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The surface layer of these

soils is friable and easily tilled. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of more than 60 inches. Natural fertility is medium, and organic matter content is moderate. The soils commonly are moderately acid or strongly acid throughout.

Most areas of these soils are used as pasture, orchards, and woodland. Some areas are used for cultivated crops and hay, and a few areas are in urban use.

These soils are poorly suited to cultivated crops. Erosion is a severe hazard if cultivated crops are grown. Controlling erosion is a major management concern. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and increase the organic matter content, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are fairly suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of pasture plants, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on these soils is moderately high. Slope and the low strength of the clayey subsoil are severe limitations to use of logging equipment. Seedlings survive and grow well if competing vegetation is controlled.

Slope, the clayey subsoil, and low strength are the main limitations to use of these soils for community development.

The included areas of Oaklet soils are more limited for some urban uses than the major soils of this map unit because of slow permeability. The included areas of Swimley soils have limitations similar to those of the major soils. The included areas of Timberville soils are more limited for some urban uses than the major soils of this map unit because of flooding by runoff from higher, adjacent areas.

The soils in this map unit are in capability subclass IVe.

15C—Frederick-Poplimento very gravelly loams, 7 to 15 percent slopes. This map unit consists of very deep, strongly sloping, well drained soils on ridges, side slopes, and foot slopes. A typical area of this map unit is about 55 percent Frederick soil, 30 percent Poplimento soil, and 15 percent other soils. Areas of this map unit commonly are long and narrow, and in many places follow the ridges and foot slopes. They are about 400 to 5,000 feet long, and range from 3 to about 75 acres. Chert makes up more than 35 percent of the surface layer of the soils in this map unit. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown very gravelly loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red gravelly silty clay loam to a depth of about 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown very gravelly loam about 5 inches thick. The subsoil extends to a depth of about 50 inches. In the upper part it is strong brown cherty clay loam to a depth of about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of 39 inches. In the lower part it is yellowish red and strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of Laidig soils near slope breaks along the lower edge of this map unit. These included soils make up 15 percent of the map unit. Also included are areas of soils that have less chert in the surface layer and, in a few map units, areas of rock outcrops.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. Available water capacity is moderate in both soils. Surface runoff is medium. The erosion hazard is slight. Tillage is impractical because of chert fragments in the surface layer. The shrink-swell potential in the subsoil is high in both soils. The root zone extends to a depth of more than 60 inches in both soils. Natural fertility is medium, and organic matter content is moderate in both soils. The soils commonly are moderately acid or strongly acid throughout.

Nearly all areas of these soils are used as woodland.

These soils are poorly suited to cultivated crops. Tillage is impractical because of the very cherty surface layer.

These soils are moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes is the major pasture management concern. Chert in the surface layer limits carrying capacity and hay production. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on these soils is moderately high. Slope is a moderate limitation to use of logging equipment.

The clayey subsoil, the very cherty surface layer, and slope are the main limitations to use of these soils for community development.

These soils are in capability subclass IVs.

15D—Frederick-Poplimento very gravelly loams, 15 to 25 percent slopes. This map unit consists of very deep, moderately steep, well drained soils on ridges and side slopes. A typical area of the map unit is about 60 percent Frederick soil, 30 percent Poplimento soil, and 10 percent other soils. Areas of these soils commonly are long and narrow, and generally follow the ridges. They are about 400 to 5,000 feet long, and range from 3 to about 50 acres. Chert makes up more than 35 percent of the surface layer of the soils in the map unit. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown very gravelly loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red gravelly silty clay loam to a depth of 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown very gravelly loam about 5 inches thick. The subsoil extends to a depth of 50 inches. In the upper part it is strong brown gravelly clay loam to a depth of about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of about 39 inches. In the lower part it is yellowish red and strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of Hazleton and Laidig soils, which are not as red as the Frederick and Poplimento soils. Hazleton soils are on ridges near the highest elevations in this map unit. Laidig soils are along slope breaks just above the lowest elevations. These included soils make up 10 percent of the map unit. Also included are areas of soils that have less chert in the surface layer and, in a few map units, areas of rock outcrops.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Surface runoff is moderately rapid. The erosion hazard is moderate. Tillage is impractical because of chert fragments in the surface layer. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of more than 60 inches in both soils. Natural fertility is medium, and organic matter content is low. The soils commonly are moderately acid or strongly acid throughout.

Nearly all areas of these soils are used as woodland.

These soils are not suited to cultivated crops because of slope and the very cherty surface layer.

These soils are not suited to hay, and are poorly suited to pasture. Establishing and maintaining a mixture of grasses is the major pasture management concern. The chert on the surface limits carrying capacity. Using stocking rates within carrying capacity, using rotation grazing, deferred grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on these soils is moderately high. Slope is a severe limitation to use of logging equipment. Erosion is a moderate hazard on logging roads and skid trails.

Slope, the clayey subsoil, and the very cherty surface layer are the main limitations to use of these soils for community development.

These soils are in capability subclass VIs.

15E—Frederick-Poplimento very gravelly loams, 25 to 60 percent slopes. This map unit consists of very deep, steep and very steep, well drained soils on ridges and side slopes. A typical area of the map unit is about 60 percent Frederick soil, 30 percent Poplimento soil, and 10 percent other soils. Areas of the map unit commonly are long and narrow, and generally follow the ridges. They are about 400 to 5,000 feet long, and range from 3 to about 40 acres. Chert makes up more than 35 percent of the surface layer of the soils in the map unit. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown very gravelly loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red gravelly silty clay loam to a depth of about 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown very gravelly loam about 5 inches thick. The subsoil extends to a depth of about 50 inches. In the upper part it is strong brown gravelly clay loam to a depth of about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of about 39 inches. In the lower part it is yellowish red and strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of Hazleton and Laidig soils. Hazleton soils are on ridges near the highest elevations in this map unit. Laidig soils are along slope breaks below the lowest elevations. Frederick and Poplimento soils have more clay and fewer coarse fragments in the subsoil than Hazleton soils. Frederick and Poplimento soils are redder than Hazleton and Laidig soils. These included soils make up 10 percent of the map unit. Also included are areas of soils that have less chert in the surface layer and, in a few map units, areas of rock outcrops.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Surface runoff is rapid. The erosion hazard is severe if the soils are bare and unprotected. Tillage is impractical because of chert fragments in the surface layer. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of more than 60 inches. Natural fertility is medium, and organic matter content is low. The soils commonly are moderately acid or strongly acid throughout.

Nearly all areas of these soils are used as woodland.

These soils are not suited to cultivated crops, hay, or pasture because of slope and the very cherty surface layer.

Potential productivity for trees on these soils is moderately high on the north aspect and moderate on the south aspect. Slope is a severe limitation to use of logging equipment. Erosion is a severe hazard on logging roads and skid trails.

Slope is the main limitation to use of these soils for community development.

These soils are in capability subclass VIIs.

16B—Frederick-Poplimento loams, very rocky, 2 to 7 percent slopes. This map unit consists of very deep, gently sloping, well drained soils on undulating valley sides. A typical area of the map unit is about 40 percent Frederick soil, 35 percent Poplimento soil, and 20 percent other soils and 5 percent areas of rock outcrops. Areas of the map unit commonly are irregularly oval or long and narrow. They are about 300 to 2,000 feet long, and range from 3 to about 25 acres. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam to a depth of about 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown loam about 5 inches thick. The subsoil extends to a depth of 50 inches. In the upper part it is strong brown clay loam to a depth of about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of about 39 inches. In the lower part it is mostly strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of Oaklet, Swimley, and Timberville soils. Oaklet and Swimley soils are scattered throughout the map unit. Timberville soils are in depressions and along drainageways in this map unit. Also included are areas of soils that are moderately deep to bedrock and areas of severely eroded soils. The included soils make up about 20 percent of the map unit.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Runoff is medium. Natural fertility is medium, and organic matter content is low. Tillage is impractical because of rock outcrops. The surface layer and the subsoil commonly are neutral to strongly acid. The root zone extends to a depth of about 60 inches. Depth to bedrock is variable. The shrink-swell potential in the subsoil is high.

Most areas of these soils are used for pasture. Some areas are used as woodland, some areas are used as orchards, and few areas are used for crops.

These soils are not suited to cultivated crops. Rock outcrops make the use of modern farm equipment impractical.

These soils are poorly suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on these soils is moderately high. The low strength of the clayey subsoil is a moderate limitation to use of logging equipment.

Rock outcrops are the main limitation to use of these soils for community development.

These soils are in capability subclass VIs.

16C—Frederick-Poplimento loams, very rocky, 7 to 15 percent slopes. This map unit consists of very deep, strongly sloping, well drained soils on sloping and rolling valley sides. A typical area of the map unit is about 45 percent Frederick soil, 35 percent Poplimento soil, and 15 percent other soils. Rock outcrops cover about 5 percent of the surface. Areas of the map unit commonly are irregularly oval or long and narrow. They are about 300 to 2,500 feet long, and range from 3 to about 70 acres. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam to a depth of about 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown loam about 5 inches thick. The subsoil extends to a depth of about 50 inches. In the upper part it is strong brown clay loam to a depth of

about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of about 39 inches. In the lower part it is yellowish red and strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of Oaklet, Swimley, and Timberville soils. Oaklet and Swimley soils are scattered throughout this map unit. Timberville soils are along drainageways. Also included are areas of soils that are moderately deep to bedrock and areas of severely eroded soils. The included soils make up about 15 percent of the map unit.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Runoff is medium. The erosion hazard is severe. Natural fertility is medium, and organic matter content is low. Rock outcrops interfere with tillage. The surface layer and the subsoil commonly are neutral to strongly acid. The root zone extends to a depth of about 60 inches. Depth to bedrock is variable. The shrink-swell potential in the subsoil is high.

Most areas of this soil are used as pasture, woodland, and orchards. A few areas are used for hay, and a few areas are used for cultivated crops.

These soils are not suited to cultivated crops. Rock outcrops interfere with tillage. Crops respond well to lime and fertilizer. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are poorly suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within grazing capacity, using rotation grazing, deferred grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion.

Potential productivity for trees on these soils is moderately high. The low strength of the clayey subsoil is a moderate limitation to use of logging equipment.

Rock outcrops are the main limitation to use of these soils for community development.

These soils are in capability subclass VIs.

16D—Frederick-Poplimento loams, very rocky, 15 to 25 percent slopes. This map unit consists of very deep, moderately steep, well drained soils on valley sides. A typical area of this map unit is about 45 percent Frederick soil, 40 percent Poplimento soil, and 10 percent other soils and 5 percent areas of rock outcrop. Areas of this map unit commonly are irregularly oval or long and narrow. They are about 300 to 2,500 feet long, and range from 3 to about 80 acres. The Frederick and Poplimento soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam to a depth of about 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown loam about 5 inches thick. The subsoil extends to a depth of about 50 inches. In the upper part it is strong brown clay loam to a depth of about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of about 39 inches. In the lower part it is mostly strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these Frederick and Poplimento soils in mapping are small areas of Oaklet, Swimley, and Timberville soils. Oaklet and Swimley soils are scattered throughout this map unit. Timberville soils are along drainageways. Also included are soils that are moderately deep to bedrock and areas of severely eroded soils. These included soils make up about 10 percent of the map unit.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Runoff is rapid. The erosion hazard is severe. Natural fertility is medium, and organic matter content is low. Tillage is very difficult if not impractical because of rock outcrops. The surface layer and the subsoil commonly are neutral to strongly acid. The root zone extends to a depth of about 60 inches. Depth to bedrock is variable. The shrink-swell potential in the subsoil is high.

Most areas of these soils are used as woodland. Some areas are used for pasture, and a few areas are used as orchards.

These soils are not suited to cultivated crops and poorly suited to hay and pasture because of rock outcrops and slope.

Potential productivity for trees on these soils is moderately high. Slope and the low strength of the clayey subsoil are severe limitations to use of logging equipment.

Rock outcrops and slope are the main limitations to use of these soils for community development.

These soils are in capability subclass VIs.

17C—Frederick-Poplimento-Rock outcrop complex, 2 to 15 percent slopes. This map unit consists of very deep, gently sloping and strongly sloping, well drained soils and areas of Rock outcrop on undulating and rolling valley sides. A typical area of the map unit is about 30 percent Frederick soil, 25 percent Poplimento soil, 25 percent areas of Rock outcrop, and 20 percent other

soils. Areas of the map unit are irregularly shaped or elongated. They are about 300 to 4,000 feet long, and range from 3 to more than 50 acres. The Frederick and Poplimento soils and the areas of Rock outcrop are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red silty clay loam to a depth of about 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown loam about 5 inches thick. The subsoil extends to a depth of about 50 inches. It is strong brown clay loam to a depth of about 9 inches and yellowish red and strong brown, mottled clay to a depth of 39 inches. Below that, it is mostly strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of Oaklet, Swimley, and Timberville soils. Oaklet and Swimley soils are scattered throughout this map unit. Timberville soils are in concave areas and along drainageways. Also included are soils that are moderately deep and shallow to bedrock and areas of severely eroded soils. These included soils make up about 20 percent of the map unit.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Surface runoff is medium. The erosion hazard is severe. The surface layer of these soils is friable; however, tillage is impractical because of rock outcrops. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of more than 60 inches. Bedrock, however, is at a depth of less than 60 inches in some places. Natural fertility is medium, and organic matter content is low. The soils commonly are moderately acid or strongly acid.

Most areas of this map unit are used as woodland. Some areas are used for pasture, and a few areas are in urban use.

These soils are not suited to cultivated crops, hay, or pasture because of rock outcrops. Tillage is impractical because of rock outcrops. Pasture tends to be droughty during dry seasons.

Potential productivity for trees on these soils is moderately high. Rock outcrops are a moderate limitation to use of logging equipment.

Rock outcrops are the main limitation to use of these soils as sites for septic tank absorption fields, trench sanitary landfills, shallow excavations, dwellings, small commercial buildings, and recreation areas. These soils are a poor source of roadfill and topsoil.

These soils are in capability subclass VIIs.

17E—Frederick-Poplimento-Rock outcrop complex, 15 to 45 percent slopes. This map unit consists of deep, moderately steep, steep, and very steep, well drained soils and areas of Rock outcrop on valley sides. A typical area of the map unit is about 30 percent Frederick soil, 25 percent Poplimento soil, 25 percent Rock outcrop, and 20 percent other soils. Areas of the map unit are irregularly shaped or elongated. They are about 300 to 5,000 feet long, and range from 3 to more than 200 acres. The Frederick and Poplimento soils and the areas of Rock outcrop are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Frederick soil is dark brown loam about 7 inches thick. The subsoil extends to a depth of 50 inches or more. It is yellowish red silty clay loam to a depth of about 12 inches. Below that, it is yellowish red and yellowish brown, mottled clay and yellowish red and yellowish brown silty clay.

Typically, the surface layer of the Poplimento soil is dark yellowish brown loam about 5 inches thick. The subsoil extends to a depth of about 50 inches. In the upper part it is strong brown clay loam to a depth of about 9 inches. In the next part it is yellowish red and strong brown, mottled clay to a depth of about 39 inches. In the lower part it is mostly strong brown silty clay loam. The substratum is red and strong brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of Oaklet, Swimley, and Timberville soils. Oaklet and Swimley soils are scattered throughout this map unit. Timberville soils are along drainageways. Also included are soils that are moderately deep and shallow to bedrock and areas of severely eroded soils. These included soils make up about 20 percent of the map unit.

Permeability is moderate in the Frederick soil and moderately slow in the Poplimento soil. The available water capacity is moderate in both soils. Surface runoff is rapid. The erosion hazard is severe. The surface layer of these soils is friable, but tillage is impractical because of rock outcrops. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of 60 inches or more, except where depth to bedrock is shallower. Natural fertility is medium, and organic matter content is low. The soils commonly are neutral to strongly acid.

Most areas of these soils are used as woodland. Some areas are used for pasture, and a few areas are used as orchards.

These soils are not suited to cultivated crops, hay, or pasture because of rock outcrops. Tillage is impractical because of rock outcrops. Pasture tends to be droughty during dry seasons.

Potential productivity for trees on these soils is moderately high on the north aspect and moderate on the south aspect. Slope and rock outcrops are severe limitations to use of logging equipment. The rate of seedling mortality and the windthrow hazard are slight on the north aspect on the Frederick and Poplimento soils.

The rate of seedling mortality is moderate and the windthrow hazard is slight on the south aspect on the Frederick and Poplimento soils.

Rock outcrops and slope are the main limitations to use of these soils for community development.

These soils are in capability subclass VIIs.

18B—Gainesboro-Lehew complex, 2 to 7 percent slopes. This map unit consists of moderately deep, gently sloping, well drained soils on ridgetops and in undulating areas. A typical area of the map unit is about 45 percent Gainesboro soil, 30 percent Lehew soil, and 25 percent other soils. Areas of the map unit are long, narrow to broad, and irregularly shaped. They are about 600 to 5,000 feet long, and range from 10 to more than 100 acres. The Gainesboro and Lehew soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Gainesboro soil is reddish brown channery loam about 8 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown channery silt loam and very channery silty clay loam. The substratum, to a depth of 32 inches, is a reddish brown extremely channery silty clay loam. Shale bedrock is at a depth of 32 inches.

Typically, the surface layer of the Lehew soil is reddish brown channery fine sandy loam about 9 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown very channery and extremely flaggy fine sandy loam. The substratum, to a depth of 35 inches, is reddish brown extremely flaggy fine sandy loam. Hard sandstone bedrock is at a depth of 35 inches.

Included with these soils in mapping are intermingled areas of Berks and Dekalb soils. The included soils make up 25 percent of the map unit.

Permeability is moderately rapid in the Gainesboro soil and rapid in the Lehew soil. The available water capacity is very low in both soils. Runoff is medium. The erosion hazard is moderate. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 26 to 30 inches. The surface layer and the subsoil are moderately acid to very strongly acid except where the soils have been limed. Bedrock is at a depth of 20 to 40 inches.

Most areas of these soils are used for cultivated crops and pasture and hay. Some areas are used as orchards, and some areas are used as woodland.

These soils are well suited to cultivated crops. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a major management concern. The soils are droughty during dry periods. Crops respond well to lime and fertilizer. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees is moderately high on the Gainesboro soil and moderate on the Lehew soil. These soils are managed mainly for pine. The rate of seedling mortality is slight on the Gainesboro and Lehew soils.

Depth to bedrock and permeability are the main limitation to use of these soils for community development. On the Lehew soil, permeability is also a limitation for septic tank absorption fields. If this soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

These soils are in capability subclass IIe.

18C—Gainesboro-Lehew complex, 7 to 15 percent slopes. This map unit consists of moderately deep, strongly sloping, well drained soils on ridgetops and in rolling areas. A typical area consists of about 40 percent Gainesboro soil, 35 percent Lehew soil, and 25 percent other soils. These soils are intermingled so closely that it was not practical to map them separately. Areas of the map unit are long, narrow to broad, and irregularly shaped. They are about 600 to 5,000 feet long, and range from 10 to about 100 acres.

Typically, the surface layer of the Gainesboro soil is reddish brown channery loam about 8 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown channery silt loam and very channery silty clay loam. The substratum, to a depth of 32 inches, is reddish brown extremely channery silty clay loam. Shale bedrock is at a depth of 32 inches.

Typically, the surface layer of the Lehew soil is reddish brown channery fine sandy loam about 9 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown very channery and extremely flaggy fine sandy loam. The substratum, to a depth of 35 inches, is reddish brown extremely flaggy fine sandy loam. Hard sandstone bedrock is at a depth of 35 inches.

Included with these soils in mapping are intermingled areas of Berks and Dekalb soils. The included soils make up 25 percent of the map unit.

Permeability is moderately rapid in the Gainesboro soil and rapid in the Lehew soil. The available water capacity is very low in both soils. Runoff is medium to rapid. The

erosion hazard is severe. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 26 to 30 inches. The surface layer and the subsoil are moderately acid to very strongly acid, except where the soils have been limed. Bedrock is at a depth of 20 to 40 inches.

Most areas of these soils are used as woodland. Some areas are used for pasture. A few areas are used for hay and cultivated crops.

These soils are moderately well suited to cultivated crops. Erosion is a severe hazard if cultivated crops are grown. Controlling erosion is a major management concern. The soils are droughty during dry periods. Crops respond well to lime and fertilizer. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees is moderately high on the Gainesboro soil and moderate on the Lehew soil. These soils are managed mainly for pine. The rate of seedling mortality is slight on the Gainesboro and Lehew soils.

Depth to bedrock and slope are the main limitations to use of these soils for community development. On the Lehew soil, permeability is also a limitation for septic tank absorption fields. If this soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

These soils are in capability subclass IIIe.

18D—Gainesboro-Lehew complex, 15 to 25 percent slopes. This map unit consists of moderately deep, moderately steep, well drained soils on side slopes of ridges. A typical area of the map unit is about 40 percent Gainesboro soil, 40 percent Lehew soil, and 20 percent other soils. Areas of the map unit are long, narrow to broad, and irregularly shaped. They are about 600 to 5,000 feet long, and range from 5 to about 100 acres. The Gainesboro and Lehew soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Gainesboro soil is reddish brown channery loam about 8 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown channery silt loam and very channery silty clay loam. The substratum, to a depth of 32 inches, is reddish brown very channery silty clay loam. Shale bedrock is at a depth of 32 inches.

Typically, the surface layer of the Lehew soil is reddish brown channery fine sandy loam about 9 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown very channery and extremely flaggy fine sandy loam. The substratum, to a depth of about 35 inches, is reddish brown very flaggy fine sandy loam. Hard sandstone bedrock is at a depth of 35 inches.

Included with these soils in mapping are intermingled areas of Dekalb and Wiekert soils. Also included are small areas of red, channery soils that are shallow to bedrock. The included soils make up 20 percent of the map unit.

Permeability is moderately rapid in the Gainesboro soil and rapid in the Lehew soil. The available water capacity is very low in both soils. Runoff is rapid. The erosion hazard is severe. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 26 to 30 inches. The surface layer and the subsoil are moderately acid to very strongly acid. Bedrock is at a depth of 20 to 40 inches.

Most areas of these soils are used as woodland. Some areas are used for pasture.

These soils are poorly suited to cultivated crops. Erosion is a severe hazard if cultivated crops are grown. Controlling erosion is a major management concern. The soils are droughty during dry periods. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees is moderately high on the Gainesboro soil and moderate on the Lehew soil. Slope is a moderate limitation to use of logging equipment. The rate of seedling mortality is moderate on

the Gainesboro soils and slight on the Lehew soils. These soils are managed mainly for pine.

Slope and depth to bedrock are the main limitations to use of these soils for community development. On the Lehew soil, permeability is also a limitation for septic tank absorption fields. If this soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

These soils are in capability subclass IVe.

18E—Gainesboro-Lehew complex, 25 to 65 percent slopes. This map unit consists of moderately deep, steep and very steep, well drained soils on side slopes of ridges. A typical area is about 45 percent Gainesboro soil, 40 percent Lehew soil, and 15 percent other soils. Areas of the map unit are long, narrow to broad, and irregularly shaped. They are about 600 to 8,000 feet long, and range from 10 to about 250 acres. The Gainesboro and Lehew soiis are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Gainesboro soil is reddish brown channery loam about 8 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown channery silt loam and very channery silty clay loam. The substratum, to a depth of 32 inches, is reddish brown very channery silty clay loam. Shale bedrock is at a depth of 32 inches.

Typically, the surface layer of the Lehew soil is reddish brown flaggy fine sandy loam about 9 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown very channery and extremely flaggy fine sandy loam. The substratum, to a depth of 36 inches, is reddish brown extremely flaggy fine sandy loam. Sandstone bedrock is at a depth of 35 inches.

Included with these soils in mapping are intermingled areas of Dekalb and Weikert soils. Also included are small areas of red, channery soils that are shallow to bedrock. The included soils make up 25 percent of the map unit.

Permeability is moderately rapid in the Gainesboro soil and rapid in the Lehew soil. The available water capacity is low in both soils. Runoff is rapid. The erosion hazard is severe. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 26 to 30 inches. The surface layer and subsoil are moderately acid to very strongly acid. Bedrock is at a depth of 20 to 40 inches.

Nearly all areas of these soils are used as woodland. A few areas are used for pasture.

These soils are not suited to cultivated crops, hay, pasture because erosion is a severe hazard. Controlling erosion is a major management concern. These soils are droughty during dry periods.

Potential productivity for trees is moderately high on the north aspect or the Gainesboro soils and moderate on that on the Lehew soil. Potential productivity is moderate on the south aspect on the Gainesboro and Lehew soils. In some areas slope is a severe limitation to use of logging equipment. The rate of seedling mortality is moderate on both aspects on the Gainesboro soil and slight on both aspects on the Lehew soil.

Slope and depth to bedrock are the main limitations to use of these soils for community development. On the Lehew soil, permeability is a limitation for septic tank absorption fields. If this soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope. These soils are a poor source of topsoil and roadfill.

The limitations to use of the included areas of Weikert and Dekalb soils for community development are similar to those of the Gainesboro and Lehew soils.

The soils in this map unit are in capability subclass VIe.

19C—Gilpin channery loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on ridgetops in the western part of the county. Slopes are mainly smooth, but in some places are complex. They are 150 to 600 feet long. Areas of this soil commonly are long and winding, and cover about 3 to 30 acres.

Typically, the surface layer is dark brown channery loam 3 inches thick. The subsurface layer is yellowish brown channery loam 5 inches thick. The subsoil extends to a depth of about 24 inches. In the upper part it is yellowish brown channery loam to a depth of about 14 inches. In the lower part it is yellowish brown very channery loam. The substratum, to a depth of 37 inches, is strong brown extremely channery silt loam. Weathered shale bedrock is at a depth of 37 inches.

Included with this soil in mapping are small areas, generally less than 3 acres each, of Berks, Lehew, and Sequoia soils. Berks and Lehew soils are scattered throughout this map unit. Sequoia soils are along slope breaks near the lower edge of the map unit. The included soils make up about 25 percent of the map unit.

Permeability in this Gilpin soil is moderate to moderately rapid, and the available water capacity is low. Surface runoff is medium. The surface layer is friable, but sandstone fragments interfere with tillage. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of 37 inches, but is restricted below a depth of 24 inches by sandstone and shale fragments. The surface layer and the subsoil are strongly acid or very strongly acid except where the soil has been limed. Weathered sandstone bedrock is at a depth of 37 inches.

Most areas of this soil are used as woodland. Some areas are used as pasture, and a few areas are used for cultivated crops and hay.

This soil is poorly suited to cultivated crops. The channers in the surface layer interfere with tillage.

Erosion is a moderate or severe hazard if cultivated crops are grown or if vegetation is sparse. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, liming and fertilizing, and crop residue management help to increase the organic matter content, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within grazing capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control runoff. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. The equipment limitation is slight.

The channery surface layer, depth to bedrock, and slope are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

20B—Guernsey silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is mainly at and near the bases of mountains and foothills, but is also near streams. Areas of this soil are irregularly winding, irregularly rectangular, and irregularly circular. They are about 500 to 4,500 feet long, and range from 3 to more than 100 acres.

Typically, the surface layer is dark yellowish brown silt loam about 12 inches thick. The subsoil extends to a depth of about 54 inches. It is yellowish brown, mottled gravelly silty clay loam to a depth of about 20 inches. Below that, it is strong brown and yellowish brown, mottled clay. The substratum is yellowish brown, mottled clay to a depth of 60 inches or more.

Included with this Guernsey soil in mapping are areas of Library and Oaklet soils. Library soils are in slight depressions and along waterways. Oaklet soils are on ridges and along slope breaks near the edge of this map unit. Also included are small areas of Pagebrook soils, which are subject to flooding by overflow from adjacent streams. These included soils make up about 15 percent of the map unit.

Permeability of this Guernsey soil is moderately slow, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of more than 60 inches. Natural fertility is medium, and organic matter content is moderate. The surface layer commonly is moderately acid or strongly acid, except where the soil has been limed. The subsoil is strongly acid to neutral. The seasonal high water table is at a depth of 2 to 3 1/2 feet from January through April.

Most areas of this soil are used for pasture and hay. Some areas are used for cultivated crops, and a few areas are used as woodland.

This soil is well suited to cultivated crops. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a management concern. Crops respond well to lime and fertilizer. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. The soil generally is not managed for trees.

The seasonal high water table and the clayey subsoil are the main limitations to use of this soil for community development. The seasonal high water table is a limitation of the soil as a site for septic tank absorption fields, sewage lagoons, area sanitary landfills, and dwellings with basements. The clayey subsoil is a limitation to use of the soil as daily cover for sanitary landfills, as roadfill, and as a site for trench sanitary landfills, shallow excavations, dwellings with basements, and local roads and streets.

This soil is in capability subclass IIe.

20C—Guernsey silt loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and moderately well drained. It is mainly at and near the bases of mountains and foothills, but is also near streams. Areas of this soil are irregularly winding, irregularly rectangular, and irregularly circular. They are about 500 to 4,000 feet long, and range from 3 to about 50 acres.

Typically, the surface layer is dark yellowish brown silt loam about 12 inches thick. The subsoil is mostly

yellowish brown, mottled clay about 42 inches thick. The substratum is yellowish brown, mottled clay to a depth of 60 inches or more.

Included with this Guernsey soil in mapping are areas of Library and Oaklet soils. Library soils are in slight depressions and along waterways. Oaklet soils are on ridges and along slope breaks near the edge of this map unit. Also included are small areas of Pagebrook soils, which are subject to flooding by overflow from adjacent streams. Also included in some map units are small areas of soils that have a gravelly surface layer. These included soils make up about 15 percent of the map unit.

Permeability of this Guernsey soil is moderately slow, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of more than 60 inches. Natural fertility is medium, and organic matter content is moderate. The surface layer commonly is moderately acid or strongly acid except where the soil has been limed. The subsoil is strongly acid to neutral. The seasonal high water table is at a depth of 2 to 3 1/2 feet from January to April.

Most areas of this soil are used for pasture and hay. Some areas are used for cultivated crops, and few areas are used as woodland.

This soil is moderately well suited to cultivated crops. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a major management concern. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and the organic matter content, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes, and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. The soil generally is not managed for trees.

The seasonal high water table, slope, and the clayey subsoil are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

21C—Hayter cobbly loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on foot slopes and side slopes. Slopes are smooth or complex, and are 500 to 3,000 feet long. Areas of the soil commonly are elongated, and range from 5 to 50 acres or more.

The surface layer is yellowish brown cobbly loam 9 inches thick. The subsoil extends to a depth of 47 inches. In the upper part it is strong brown clay loam to a depth of 15 inches. In the next part it is yellowish red, mottled clay loam to a depth of 26 inches. In the lower part it is yellowish red, mottled cobbly clay loam. The substratum is strong brown, mottled cobbly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Frederick, Guernsey, and Sequoia soils. Frederick and Guernsey soils commonly are along slope breaks near the lower edge of this map unit. Rock fragments in Hayter soils are mostly sandstone, and those in Sequoia soils are shale. The included soils make up about 25 percent of the map unit.

Permeability of this Hayter soil is moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable, but cobblestones interfere somewhat with tillage. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of more than 60 inches, but in many areas is restricted below a depth of 45 inches by rock fragments. Natural fertility and organic matter content are low. The surface layer and the subsoil commonly are strongly acid or moderately acid, except where the soil has been limed.

Most areas of this soil are used as woodland. Some areas are used for pasture. A few areas are used for hay crops and cultivated crops.

This soil is moderately well suited to cultivated crops. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a major management concern. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled.

The cobbly loam surface layer, the clayey subsoil, and slope are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

21D—Hayter cobbly loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained. It is on foot slopes and side slopes. Slopes are smooth or complex and 500 to 2,500 feet long. Areas of this soil commonly are elongated, and range mainly from 5 to 35 acres.

The surface layer is yellowish brown cobbly loam 9 inches thick. The subsoil extends to a depth of 47 inches. In the upper part it is strong brown clay loam to a depth of 15 inches. In the next part it is yellowish red, mottled clay loam to a depth of 26 inches. In the lower part it is yellowish red, mottled cobbly clay loam. The substratum is strong brown, mottled cobbly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Frederick, Poplimento, and Sequoia soils. Frederick and Poplimento soils commonly are along slope breaks near the lower edge of this map unit. Sequoia soils are scattered throughout the map unit. The included soils make up about 20 percent of this map unit.

Permeability in this Hayter soil is moderately rapid, and the available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable, but cobblestones interfere somewhat with tillage. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of more than 60 inches, but in many areas is restricted below a depth of 45 inches by rock fragments. Natural fertility and organic matter content are low. The surface layer and the subsoil commonly are strongly acid or moderately acid except where the soil has been limed.

Most areas of this soil are used as woodland. Some areas are used for pasture.

This soil is poorly suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. Slope is a moderate limitation to use of heavy logging equipment.

Slope, the cobbly surface layer, and the clayey subsoil are the main limitations to use of this soil for community development.

This soil is in capability subclass IVe.

22C—Hayter very cobbly loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on foot slopes and side slopes. Slopes are smooth and complex and 500 to 3,000 feet long. Areas of this soil commonly are elongated or irregularly shaped, and range mainly from 5 to 60 acres. Sandstone and chert fragments, mostly 3 to 10 inches in diameter, make up 35 to 60 percent of the surface layer.

Typically, the surface layer is yellowish brown very cobbly loam about 9 inches thick. The subsoil extends to a depth of about 47 inches. In the upper part it is strong brown clay loam to a depth of about 15 inches. In the middle part it is yellowish red, mottled clay loam to a depth of about 26 inches. In the lower part it is yellowish red, mottled cobbly clay loam. The substratum is strong brown, mottled cobbly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Frederick, Guernsey, and Sequoia soils. Frederick and Guernsey soils commonly are along slope breaks near the lower edge of this map unit. Sequoia soils are scattered throughout the map unit. Also included in some map units are areas of soils that have a very stony surface layer. The included soils make up about 25 percent of the map unit.

Permeability in this Hayter soil is moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is slight. Tillage is impractical because of sandstone and chert fragments in the surface layer. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of more than 60 inches, but in many areas is restricted below a depth of 45 inches by coarse fragments. Natural fertility and organic matter content are low. The soil commonly is strongly acid or very strongly acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is poorly suited to cultivated crops. The very cobbly loam surface layer interferes with tillage and limits crop production. If the surface is cleared of cobbles the soil is moderately well suited. Erosion is a moderate hazard.

This soil is poorly suited to hay and moderately well suited to pasture. Establishing and maintaining a mixture

of grasses and legumes and preventing overgrazing are pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. Low strength of the clayey subsoil is a moderate limitation to use of heavy logging equipment.

The very cobbly surface layer, the clayey subsoil, and slope are the main limitations to use of this soil for community development.

This soil is in capability subclass IVs.

22D—Hayter very cobbly loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained. It is on foot slopes. Slopes are smooth and complex and 500 to 3,000 feet long. Areas of this soil commonly are elongated or irregularly shaped, and range mainly from 5 to 50 acres. Sandstone and chert fragments, mostly 3 to 10 inches in diameter, make up 35 to 60 percent of the surface layer.

Typically, the surface layer is yellowish brown very cobbly loam 9 inches thick. The subsoil extends to a depth of about 47 inches. In the upper part it is strong brown clay loam to a depth of 15 inches. In the middle part it is yellowish red, mottled clay loam to a depth of about 26 inches. In the lower part it is yellowish red, mottled cobbly clay loam. The substratum is strong brown, mottled cobbly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Frederick, Poplimento, and Sequoia soils. Frederick and Poplimento soils commonly are along slope breaks near the lower edge of this map unit. Sequoia soils are in strips scattered throughout the map unit. Also included in some map units are areas of soils that have a very stony surface layer. The included soils make up about 25 percent of the map unit.

Permeability in this Hayter soil is moderately rapid, and the available water capacity is moderate. Surface runoff is moderately rapid. The erosion hazard is moderate. Tillage is impractical because of sandstone and chert fragments in the surface layer. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of more than 60 inches, but in many areas is restricted below a depth of 45 inches by rock fragments. Natural fertility and organic matter content are low. The soil commonly is strongly acid or moderately acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops. Tillage is impractical and crop production is limited because of the very cobbly surface layer. If the surface is cleared of cobbles, the soil is poorly suited. Erosion is a severe hazard.

This soil is poorly suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high on the north aspect and moderate on the south aspect. Seedlings survive and grow well if competing vegetation is controlled. Low strength of the clayey subsoil and slope are moderate limitations to use of heavy logging equipment.

The very cobbly surface layer, the clayey subsoil, and slope are the main limitations to use of this soil for community development.

This soil is in capability subclass VIs.

22E—Hayter very cobbly loam, 25 to 40 percent slopes. This soil is very deep, steep and very steep, and moderately well drained and well drained. It is on side slopes. Slopes are smooth and complex and 500 to 3,000 feet long. Areas of this soil commonly are elongated or irregularly shaped, and range mainly from 5 to 50 acres. Sandstone and chert fragments, mostly 3 to 10 inches in diameter, make up 35 to 60 percent of the surface layer.

The surface layer is yellowish brown very cobbly loam about 9 inches thick. The subsoil extends to a depth of about 47 inches. In the upper part it is strong brown clay loam to a depth of about 15 inches. In the next part it is yellowish red, mottled clay loam to a depth of about 26 inches. In the lower part it is yellowish red, mottled cobbly clay loam. The substratum is strong brown, mottled cobbly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are Frederick, Laidig, and Poplimento soils. Frederick and Poplimento soils commonly are scattered in strips throughout this map unit. Laidig soils are along slope breaks near the lower edge of the map unit. Also included in some map units are areas of soils that have a very stony surface layer. The included soils make up about 25 percent of the map unit.

Permeability in this Hayter soil is moderately rapid, and the available water capacity is moderate. Surface runoff is rapid. The erosion hazard is severe if the soil is bare

and unprotected. Tillage is impractical because of chert fragments in the surface layer. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of more than 60 inches, but in many areas is restricted below a depth of 45 inches by coarse fragments. Natural fertility and organic matter content are low. The soil commonly is strongly acid or moderately acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops, hay, or pasture because of slope and the very cobbly surface layer.

Potential productivity for trees on this soil is moderately high on the north aspect and moderate on the south aspect. Seedlings survive and grow well if competing vegetation is controlled. In some areas slope is a severe limitation to use of heavy logging equipment.

Slope is the main limitation to use of this soil for community development.

This soil is in capability subclass VIIe.

23C—Hazleton very stony sandy loam, 7 to 15 percent slopes. This soil is very deep, sloping, and well drained. It is on mountaintops and ridgetops in the western part of the county. Areas of this soil are narrow, long and winding, irregularly rectangular, or irregularly shaped. They are 900 to 3,000 feet long, and range from about 10 to 50 acres. Sandstone fragments more than 10 inches in diameter cover 3 to 15 percent of the surface.

Typically, the surface layer is channery sandy loam about 2 inches thick. The subsurface layer is dark gray very channery fine sandy loam about 2 inches thick. The subsoil extends to a depth of about 47 inches. In the upper part it is yellowish brown very channery sandy loam to a depth of about 24 inches. In the next part it is very channery sandy loam to a depth of about 38 inches. In the lower part it is brown channery sandy clay loam. The substratum is very pale brown, mottled extremely stony loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Dekalb and Laidig soils. Dekalb soils are at the higher elevations in this map unit. Laidig soils are near the lower edge of the map unit. Also included are extensive areas of soils where stones cover 15 to 50 percent of the surface. These included soils make up about 25 percent of the map unit.

Permeability in this Hazleton soil is rapid, and the available water capacity is low. Surface runoff is medium. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 51 inches. Natural fertility and organic matter content are low. The soil is strongly acid or very strongly acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops because of stones on the surface. Stones damage tillage equipment and interfere with planting. If the surface is cleared of stones, the soil is moderately well suited. The soil tends to be droughty during the growing season. The hazard of erosion is moderate if the soil is used for cultivated crops or if vegetation is sparse.

This soil is not suited to hay because of stones on the surface. It is moderately well suited to pasture if cleared of trees and stones. Clearing the surface, establishing and maintaining a mixture of grasses and legumes, and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing is needed to increase the available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled.

Rock fragments in the soil, stones on the surface, permeability, and slope are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

This soil is in capability subclass VIs.

23D—Hazleton very stony sandy loam, 15 to 25 percent slopes. This soil is very deep, moderately steep, and well drained. It is on mountaintops and side slopes in the western part of the county. Areas of the soil are narrow to broad, long and winding, irregularly rectangular, or irregularly shaped. They are 1,000 to 3,000 feet long, and range from about 50 to more than 100 acres. Sandstone fragments more than 10 inches in diameter cover 3 to 15 percent of the surface.

Typically, the surface layer is dark gray channery sandy loam about 2 inches thick. The subsurface layer is yellowish brown very channery fine sandy loam about 2 inches thick. The subsoil extends to a depth of 47 inches. In the upper part it is yellowish brown very channery sandy loam to a depth of 24 inches. In the middle part it is brown very channery sandy loam to a depth of 38 inches. In the lower part it is brown, mottled channery sandy clay loam. The substratum is very pale brown, mottled extremely stony loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Dekalb, Laidig, and Weikert soils. Dekalb soils are at the higher elevations in this map unit. Laidig soils are near the lower edge of the map unit and have a fragipan. Weikert soils are scattered throughout the map unit. Also included are some areas of soils where stones cover 15 to 50 percent of the surface. The included soils make up about 25 percent of the map unit.

Permeability in this Hazleton soil is rapid, and the available water capacity is low. Surface runoff is rapid. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 51 inches. Natural fertility and organic matter content are low. The soil is strongly acid or very strongly acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops because of stones on the surface. The stones damage tillage equipment and interfere with planting. If the surface is cleared of stones, the soil is poorly suited because of slope. The soil tends to be droughty during the growing season. Erosion is a severe hazard if the soil is used for cultivated crops or if vegetation is sparse.

This soil is not suited to hay because of stones on the surface. It is moderately well suited to pasture if the surface is cleared of trees and stones. Clearing the surface, establishing and maintaining a mixture of grasses and legumes, and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing is required to increase the available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled. In some areas slope is a moderate limitation to the safe operation of heavy logging equipment.

Slope, permeability, rock fragments in the soil, and stones on the surface are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

This soil is in capability subclass VIs.

23E—Hazleton very stony sandy loam, 25 to 65 percent slopes. This soil is deep, steep and very steep, and well drained. It is on mountaintops and side slopes in the western part of the county. Areas of this soil are narrow to broad, long and winding, irregularly rectangular, or irregularly shaped. They are about 1,000 to 8,000 feet long, and range from about 50 to more than 750 acres. Sandstone fragments more than 10 inches in diameter cover 3 to 15 percent of the surface.

Typically, the surface layer is dark gray channery sandy loam about 2 inches thick. The subsurface layer is yellowish brown very channery fine sandy loam about 2 inches thick. The subsoil extends to a depth of 47 inches. In the upper part it is yellowish brown very channery sandy loam to a depth of about 24 inches. In the middle part it is brown very channery sandy loam to a depth of about 38 inches. In the lower part it is brown channery sandy clay loam. The substratum is very pale brown, mottled extremely stony loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Dekalb, Laidig, and Weikert soils. Dekalb soils are at the higher elevations in this map unit. Laidig soils are near the lower edge of the map unit. Unlike Hazleton soils, Laidig soils have a fragipan. The included soils make up about 25 percent of the map unit.

Permeability in this Hazleton soil is rapid, and the available water capacity is low. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable. Tillage is impractical because of slope and stones on the surface. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 51 inches. Natural fertility and organic matter content are low. The soil is strongly acid or very strongly acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops, hay, or pasture because of slope and stones on the surface.

Potential productivity for trees on this soil is moderately high on the north aspect and moderate on the south aspect. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled. In some areas slope is a severe limitation to the safe operation of heavy logging equipment.

Slope and permeability are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

This soil is in capability subclass VIIs.

24E—Hazleton extremely stony sandy loam, 25 to 65 percent slopes. This soil is deep, steep and very steep, and well drained. It is on mountaintops and side slopes in the western part of the county. Areas of this soil are narrow to broad, long and winding, irregularly rectangular, or irregularly shaped. They are 1,000 to 4,500 feet long, and range from about 50 to more than 150 acres. Sandstone fragments more than 10 inches in diameter cover 15 to 50 percent of the surface.

Typically, the surface layer is dark gray channery sandy loam about 2 inches thick. The subsurface layer is yellowish brown very channery fine sandy loam about 2 inches thick. The subsoil extends to a depth of about 47 inches. In the upper part it is yellowish brown very channery sandy loam to a depth of about 24 inches. In the middle part it is brown very channery sandy loam to a depth of about 38 inches. In the lower part it is brown channery sandy clay loam. The substratum is very pale brown, mottled extremely stony loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Dekalb, Laidig, and Weikert soils. Dekalb soils are at the higher elevations in this map unit. Laidig soils are near the

lower edge of the map unit. Weikert soils are scattered throughout the map unit. Unlike Hazleton soils, Laidig soils have a fragipan. The included soils make up about 25 percent of the map unit.

Permeability in this Hazleton soil is rapid, and the available water capacity is low. Surface runoff is rapid. The erosion hazard is severe. The surface layer is friable. Tillage is impractical because of slope and stones on the surface. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 51 inches. Natural fertility and organic matter content are low. The soil is strongly acid or very strongly acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops, hay, or pasture because of slope and stones on the surface.

Potential productivity for trees on this soil is moderately high on the north aspect and moderate on the south aspect. The soil is managed for hardwoods and pine. Seedlings survive and grow well if competing vegetation is controlled. In some areas slope is a severe limitation to the safe operation of heavy logging equipment.

Slope, permeability, and stones on the surface are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

This soil is in capability subclass VIIs.

25C—Laidig very stony fine sandy loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on broad, lower mountain foot slopes in the western part of the county. Areas of this soil commonly are narrow to broad and winding or irregularly shaped. Slopes are mostly rolling and about 800 to 4,000 feet long. The areas range from 10 to more than 100 acres. Stones, mostly sandstone, cover 3 to 15 percent of the surface.

Typically, the surface layer is covered by a layer of loose leaves and twigs and black organic matter 5 inches thick. The surface layer is light yellowish brown channery fine sandy loam about 2 inches thick. The subsoil extends to a depth of 60 inches or more. It is brownish yellow fine sandy loam and yellowish brown, mottled channery loam to a depth of 36 inches. Below that, it is yellowish brown, mottled, brittle channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of Berks, Buchanan, and Weikert soils. Berks soils are along slope breaks near the upper edge of this map unit. Buchanan soils are in the less sloping areas along the lower edge of the map unit. The shallow Weikert soils commonly are along drainageways. Also included are areas of deep, well drained soils that have fewer coarse fragments, by volume, than Laidig soils. Also included are areas of extremely stony soils and areas of soils that are not stony. The included soils make up about 25 percent of the map unit.

Permeability in this Laidig soil is moderate above the fragipan and moderately slow in the fragipan. The available water capacity is low. Runoff is medium. The erosion hazard is moderate. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 36 inches. Root growth and the downward movement of water are severely restricted by the fragipan. The surface layer and the subsoil commonly are very strongly acid or strongly acid. Generally bedrock is deep and does not affect the use of the soil. The seasonal high water table is at a depth of 2 1/2 to 4 feet from January through March.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops because of stones on the surface. Stones can damage tillage equipment and interfere with planting. If the surface is cleared of stones, the soil is moderately well suited. The soil tends to be droughty during the growing season. Erosion is a moderate hazard if the soil is used for cultivated crops or if vegetation is sparse.

This soil is not suited to hay because of stones on the surface. The soil is well suited to pasture if the surface is cleared of trees and stones. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for pine and hardwoods. The rate of seedling mortality and the windthrow hazard are slight.

Rock fragments in the soil, permeability in the fragipan, and stones on the surface are the main limitations to use of this soil for community development.

This soil is in capability subclass VIs.

25D—Laidig very stony fine sandy loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and well drained. It is on broad mountain foot slopes and mountain side slopes in the western part of the county. Areas of this soil commonly are narrow to broad and winding or irregularly shaped, and range from 10 to about 150 acres. Slopes are smooth and complex and about 1,000 to 5,000 feet long. Stones, mostly sandstone, cover 3 to 15 percent of the surface.

Typically, the surface layer is covered by a layer of loose leaves and twigs and black organic matter 5 inches thick. The surface layer is yellowish brown

channery fine sandy loam about 2 inches thick. The subsoil extends to a depth of 60 inches or more. It is brownish yellow fine sandy loam and yellowish brown, mottled channery loam to a depth of 36 inches. Below that, it is yellowish brown, mottled, brittle channery sandy loam called a fragipan.

Included with this Laidig soil in mapping are small areas of Berks, Buchanan, and Weikert soils. Berks soils are along slope breaks near the upper edge of this map unit. Buchanan soils are in the less sloping areas along the lower edge of the map unit. The shallow Weikert soils commonly are along drainageways. Also included are small areas of deep, well drained soils that have fewer rock fragments throughout than Laidig soils. Also included are areas of extremely stony soils and areas of soils that are not stony. The included soils make up about 25 percent of the map unit.

Permeability in this Laidig soil is moderate above the fragipan and moderately slow in the fragipan. The available water capacity is low. Runoff is rapid. The erosion hazard is severe. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 36 inches. Root growth and the downward movement of water are severely restricted by the fragipan. The surface layer and the subsoil commonly are very strongly acid or strongly acid. Generally bedrock is deep and does not affect use of this soil. The seasonal high water table is at a depth of 2 1/2 to 4 feet from January through March.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops because of stones on the surface. Stones damage tillage equipment and interfere with planting. If the surface is cleared of stones, it is poorly suited because of slope. The soil tends to be droughty during the growing season. Erosion is a severe hazard if the soil is used for cultivated crops or if vegetation is sparse.

This soil is not suited to hay because of stones on the surface. It is moderately well suited to pasture if the surface is cleared of trees and stones. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for pine and hardwoods. The rate of seedling mortality and the windthrow hazard are slight.

Rock fragments in the soil, permeability in the fragipan, slope, and stones on the surface are the main limitations to use of this soil for community development.

This soil is in capability subclass VIs.

25E—Laidig very stony fine sandy loam, 25 to 65 percent slopes. This soil is deep, steep and very steep, and well drained. It is on mountain side slopes in the western part of the county. Areas of this soil commonly are narrow to broad and winding or irregularly shaped, and range from 20 to about 200 acres. Slopes are smooth and complex and about 1,000 to 6,000 feet long. Stones, mostly sandstone, cover 3 to 15 percent of the surface.

Typically, the surface layer is covered by a layer of loose leaves and twigs and black organic matter about 5 inches thick. The surface layer is yellowish brown channery fine sandy loam about 2 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part it is brownish yellow channery fine sandy loam to a depth of about 13 inches. In the next part it is yellowish brown channery loam to a depth of about 36 inches. In the lower part it is yellowish brown, mottled, brittle channery sandy loam called a fragipan.

Included with this Laidig soil in mapping are small areas of Berks, Hazleton, and Weikert soils. Berks soils are moderately deep. They are along slope breaks near the upper edge of this map unit. Hazleton soils are near the upper edge of the map unit. Weikert soils are shallow. They are commonly along drainageways. Also included are areas of extremely stony soils and areas of soils that do not have stones. The included soils make up about 25 percent of the map unit.

Permeability in this Laidig soil is moderate above the fragipan and moderately slow in the fragipan. The available water capacity is moderate. Runoff is very rapid. The erosion hazard is severe. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 36 inches. Root growth and the downward movement of water are severely restricted by the fragipan. The surface layer and the subsoil commonly are very strongly acid or strongly acid. Generally bedrock is deep and does not affect the use of the soil. The seasonal high water table is at a depth of 2 1/2 to 4 feet from January through March.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops. Tillage is impractical because of steep slopes. Stones damage tillage equipment and interfere with planting. The soil tends to be droughty during the growing season. The hazard of erosion is severe.

This soil is not suited to hay and pasture. Clearing the surface of trees and stones, establishing and maintaining a mixture of grasses and legumes, and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases

runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the available nutrients in the soil.

Potential productivity for trees on this soil is moderately high on the north aspect and moderate on the south aspect. The soil is managed for pine and hardwoods. Slope is a severe limitation to use of heavy logging equipment.

Slope, rock fragments in the soil, permeability in the fragipan, and stones on the surface are the main limitations to use of this soil for community development.

This soil is in capability subclass VIIs.

26C—Lehew channery fine sandy loam, 7 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on broad, convex mountaintops. Slopes are smooth to irregular, commonly complex, and about 400 to 5,000 feet long. Areas of this soil follow the mountain ridges, and commonly are long and winding. They range from 5 to more than 90 acres.

Typically, the surface layer is reddish brown channery fine sandy loam about 9 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown very channery and very flaggy sandy loam. The substratum, to a depth of 35 inches or more, is reddish brown extremely flaggy sandy loam. Sandstone bedrock is at a depth of 35 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Berks, Dekalb, and Gainesboro soils. Berks soils are in the lower areas of this map unit. Dekalb soils are near the steeper areas of the map unit. Gainesboro soils are scattered throughout the map unit. These included soils make up 10 percent of the map unit. Also included are areas of Lehew soils that are on slopes of less than 7 percent and that make up about 15 percent of the map unit. Also included are small areas of flaggy or stony soils and small areas of soils that have a subsoil of silt loam and a shaly substratum. These included soils make up about 5 percent of the map unit.

Permeability in this Lehew soil is moderately rapid, and the available water capacity is very low. Runoff is medium. Tilth is fair. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 20 to 26 inches, but is restricted by sandstone and shale fragments. The surface layer and the subsoil are very strongly acid, except where the soil has been limed. Bedrock is at a depth of 20 to 40 inches.

Most areas of this soil are used as pasture and woodland.

This soil is moderately well suited to cultivated crops. It is droughty during the growing season. In places rock outcrops interfere with tillage operations. The hazard of erosion is moderate to severe if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, crop residue management, growing cover crops, and including grasses and legumes in the cropping system help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within grazing capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine. Limitations to use of logging equipment and the rate of seedling mortality are slight.

Slope, permeability, and depth to bedrock are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

This soil is in capability subclass IIIe.

26D—Lehew channery fine sandy loam, 15 to 25 percent slopes. This soil is moderately deep, sloping to moderately steep, and well drained to excessively drained. It is on broad, convex mountaintops. Slopes are smooth to irregular and commonly complex. Areas of this soil follow the mountain ridges and commonly are long and winding. They range from 5 to more than 80 acres.

Typically, the surface layer is reddish brown channery fine sandy loam about 9 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown very channery and very flaggy sandy loam. The substratum, to a depth of 35 inches, is reddish brown extremely flaggy sandy loam. Sandstone bedrock is at a depth of 35 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Berks, Dekalb, and Gainesboro soils. Berks soils are in the lower areas of this map unit. Dekalb soils are near the steeper areas in the map unit. Gainesboro soils are scattered throughout the map unit. These included soils make up 10 percent of the map unit. Also included are small areas of flaggy or stony soils and small areas of soils that have a silt loam subsoil and a shaly

substratum. These included soils make up about 5 percent of the map unit.

Permeability in this Lehew soil is moderate to rapid, and the available water capacity is very low. Runoff is medium to rapid. Tilth is fair. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 20 to 26 inches, but is restricted by shale fragments. The surface layer and the subsoil are very strongly acid, except when the soil has been limed. Bedrock is at a depth of 20 to 40 inches.

Most areas of this soil are used as pasture and woodland.

This soil is poorly suited to cultivated crops. It is droughty during the growing season. In places rock outcrops interfere with tillage operations. The hazard of erosion is moderate to severe if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, crop residue management, growing cover crops, and including grasses and legumes in the cropping system help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and erosion. Using stocking rates within grazing capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine. In some areas slope is a moderate limitation to use of logging equipment.

Slope, depth to bedrock, and permeability are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

This soil is in capability subclass IVe.

26E—Lehew channery fine sandy loam, 25 to 45 percent slopes. This soil is moderately deep, steep, and well drained to excessively drained. It is on the upper side slopes of mountains. Slopes are smooth to irregular, commonly complex, and about 150 to 600 feet long. Areas of this soil follow the mountain ridges, and commonly are long and winding. They range from 5 to more than 150 acres.

Typically, the surface layer is reddish brown channery fine sandy loam about 8 inches thick. The subsoil, to a depth of about 26 inches, is reddish brown very channery and extremely flaggy sandy loam. The substratum, to a depth of about 35 inches, is reddish brown extremely flaggy sandy loam. Sandstone bedrock is at a depth of 35 inches.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Berks, Dekalb, and Gainesboro soils. Berks soils are in the lower areas of this map unit. Dekalb soils are near the steeper areas in the map unit. Gainesboro soils are scattered throughout the map unit. These included soils make up 10 percent of the map unit. Also included are small areas of flaggy or stony soils. These included soils make up about 5 percent of the map unit.

Permeability in this Lehew soil is moderate to rapid, and the available water capacity is very low. Runoff is rapid. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 20 to 26 inches. The surface layer and the subsoil are very strongly acid, except where the soil has been limed. Bedrock is at a depth of 20 to 40 inches.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops. It is droughty during the growing season. Erosion is a severe hazard if cultivated crops are grown. Controlling erosion is a major management concern.

This soil is not suited to hay or pasture.

Potential productivity for trees on this soil is moderately high on the north aspect and moderate on the south aspect. The soil is managed for hardwoods and pine. Slope is a severe limitation to use of logging equipment.

Slope, depth to bedrock, and permeability are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope.

This soil is in capability subclass VIIe.

27—Library silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and somewhat poorly drained. It is on terraces along streams. Slopes are about 500 to 3,000 feet long. Areas of this soil range from 3 to 60 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsurface layer is light brownish gray silt loam about 5 inches thick. The subsoil, to a depth of about 36 inches, is yellowish brown, mottled silty clay and light gray, mottled clay. The substratum, to a depth of about 55 inches, is olive gray, mottled very channery silty clay. Shale bedrock is at a depth of about 55 inches.

Included with this soil in mapping are small areas of Guernsey and Pagebrook soils. Guernsey soils are at the

highest elevations in this map unit. Pagebrook soils are near drainageways. Also included are small areas of very poorly drained soils. The included soils make up about 10 percent of the map unit.

Permeability in this Library soil is slow, and the available water capacity is moderate. Runoff is moderate. The erosion hazard is moderate. Tilth is good, but the soil breaks up into clods if tilled when too wet or too dry. Natural fertility is medium, and organic matter content is moderate. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of about 60 inches, but is restricted by shale fragments below a depth of about 36 inches. The surface layer and the subsoil in the upper part are moderately acid to strongly acid, except where the soil has been limed. The subsoil in the lower part is slightly acid to mildly alkaline. Generally, bedrock is deep and does not affect the use of the soil. Seepage and runoff from adjacent, higher lying areas accumulates on this soil. The seasonal high water table is at a depth of 1/2 foot to 1 1/2 feet from October through May.

Most areas of this soil are used for pasture and hay. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops if drainage is installed and if seepage and flooding are controlled. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain the organic matter content and soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. The growing season for alfalfa is short because of the seasonal high water table. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within grazing capacity, deferred grazing, using rotation grazing, and liming and fertilizing are needed to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Hardwoods grow well on this soil. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet and thus does not support heavy logging equipment.

The seasonal high water table, seepage, the low strength of the clayey subsoil, and runoff from adjacent, higher lying areas are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIw.

28—Lobdell silt loam. This soil is deep, nearly level, and moderately well drained. It is on the flood plains of many streams in the county. Areas of the soil commonly are long and winding. They range from about 3 to 40 acres. Slope ranges from 0 to 3 percent. The soil is subject to flooding.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil, to a depth of 44 inches, is dark brown silt loam and brown, mottled silt loam. The substratum is yellowish brown, mottled loam to a depth of 60 inches or more.

Included with this soil in mapping are areas, generally less than 3 acres each, of Pagebrook and Wheeling soils. Pagebrook soils are near the base of adjoining slopes. The well drained Wheeling soils commonly are at the highest elevations in this map unit. Also included, in depressions, are small ares of soils that are somewhat poorly drained and poorly drained. The included soils make up about 15 percent of the map unit.

Permeability in this Lobdell soil is moderate, and the available water capacity is high. The soil is subject to occasional flooding. Surface runoff is slow. The erosion hazard is slight. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of more than 60 inches. Natural fertility is medium, and organic matter content is moderate. The surface layer commonly is moderately acid or strongly acid, and the subsoil is moderately acid to neutral. The soil is subject to occasional flooding for brief periods from January through April. The seasonal high water table is at a depth of 2 to 3 1/2 feet from December through April.

Most areas of this soil are used for pasture, and some areas are used for hay and as woodland. A few areas are used for cultivated crops.

This soil is fairly suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within grazing capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The rate of seedling mortality is slight. The soil is soft when wet, and thus does not support logging equipment.

Flooding and wetness are the main limitations to use of this soil for community development.

This soil is in capability subclass IIw.

29—Massanetta loam. This soil is very deep, nearly level, and moderately well drained. It is on the flood plains of spring-fed streams flowing from limestone bedrock. Areas of the soil commonly are narrow to broad, long, and winding. They are about 500 to 9,000 feet long. They range from 5 to more than 100 acres. Slope ranges from 0 to 4 percent. The soil is subject to flooding.

Typically, the surface layer is very dark gray loam about 9 inches thick. The subsoil, to a depth of 22 inches, is very dark gray loam and dark yellowish brown clay loam. The substratum is mostly very dark grayish brown and dark gray silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Guernsey and Pagebrook soils. Guernsey soils are at the base of sloping areas adjacent to this map unit. Pagebrook soils are in slight depressions scattered throughout the map unit. Also included are small areas of clayey soils that have concentrations of lime. Also included in a few map units are areas of rock outcrops. The included soils and areas of rock outcrops make up about 10 percent of the map unit.

Permeability in this Massanetta soil is moderate, and the available water capacity is high. Surface runoff is slow. The erosion hazard is slight. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of more than 60 inches. Natural fertility and organic matter content are high. The soil is mildly alkaline or moderately alkaline throughout. It is subject to occasional flooding of very brief duration from May through September. The seasonal high water table is at a depth of 2 to 3 1/2 feet from January through April.

Most areas of this soil are used for cultivated crops, hay, and pasture. A few areas are used as orchards.

This soil is well suited to cultivated crops. Crops respond well to fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is soft when wet, and thus does not support logging equipment.

Wetness and flooding are the main limitations to use of this soil for community development.

This soil is in capability subclass IIw.

30B—Monongahela gravelly loam, 2 to 7 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on terraces along the major streams. Slopes are smooth and about 500 to 1,500 feet long. Areas of the soil commonly are irregularly round or irregular in shape or, less commonly, are parallel to the course of the adjacent stream. They range from 3 to about 25 acres.

Typically, the surface layer is brown gravelly loam about 7 inches thick. The subsoil extends to a depth of about 43 inches. In the upper part it is yellowish brown loam and gravelly loam to a depth of about 20 inches. In the next part, to a depth of about 31 inches, it is yellowish brown, mottled, brittle gravelly clay loam called a fragipan. In the lower part it is strong brown, mottled gravelly clay loam. Bedrock is at a depth of 43 inches.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres each, of Berks, Weikert, and Zoar soils. Berks and Weikert soils are along slope breaks near the upper edge of this map unit. Zoar soils commonly are in narrow strips in the map unit. The included soils make up 15 percent of the map unit.

Permeability in this Monongahela soil is moderate above the fragipan and moderately slow or slow in the fragipan. The available water capacity is low. Runoff is slow to medium. Tilth is good, but natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 20 inches. Root growth is severely restricted by the fragipan, which commonly is at a depth of about 18 to 24 inches. The surface layer and the subsoil commonly are strongly acid or very strongly acid, except where the soil has been limed. Bedrock generally is moderately deep. The seasonal high water table is at a depth of 1 1/2 to 3 feet from December through April.

Most areas of this soil are used for pasture. Some areas are used for cultivated crops and hay. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops. The soil is droughty during the growing season. The hazard of erosion is moderate if cultivated crops are grown. Controlling erosion is a moderate management concern. Using conservation tillage, growing cover crops, liming and fertilizing, crop residue management, and including grasses and legumes in the cropping system help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil.

Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is well suited to hay and pasture. The growing season for alfalfa commonly is short because of the seasonal high water table and restricted root growth. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. The equipment limitation is slight.

The seasonal high water table, permeability in the fragipan, and depth to bedrock are the main limitations to use of this soil for community development.

This soil is in capability subclass IIe.

31B—Nicholson silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on smooth, convex valley sides. Slopes are smooth, commonly complex, and about 500 to 1,500 feet long. Commonly, areas of this soil are long and winding and follow the hilltops. They range from 3 to about 25 acres.

Typically, the surface layer is dark brown silt loam about 11 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part it is yellowish brown silty clay loam to a depth of about 18 inches. In the next part, to a depth of about 26 inches, it is yellowish brown, mottled, brittle silty clay loam called a fragipan. In the lower part it is strong brown and yellowish brown silty clay loam.

Included with this soil in mapping are small intermingled areas, generally less than 3 acres each, of Frederick, Oaklet, and Poplimento soils. Nicholson soils have a fragipan, but these other soils do not. These other soils make up 15 percent of the map unit.

Permeability in this Nicholson soil is moderate above the fragipan and moderately slow or slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. Tilth is good. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of about 18 inches. Root growth is severely restricted by the fragipan, which commonly is at a depth of about 18 to 30 inches. The surface layer and the subsoil above the fragipan commonly are moderately acid to strongly acid, except where the soil has been limed. Below the fragipan the subsoil is strongly acid to moderately alkaline. Generally, bedrock is deep and does not affect the use of the soil. The seasonal high water table is at a depth of 1 1/2 to 2 1/2 feet from January through April.

Most areas of this soil are used as orchards. Some areas are used for cultivated crops and hay. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops. The soil is droughty during the growing season. The hazard of erosion is moderate if cultivated crops are grown. Controlling erosion is a moderate management concern. Using conservation tillage, growing cover crops, crop residue management, and including grasses and legumes in the cropping system help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the available nutrients in the soil.

This soil is well suited to hay and pasture. The growing season for alfalfa commonly is short because of the seasonal high water table and restricted root growth. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. The equipment limitation is slight.

The seasonal high water table and permeability in the fragipan are the main limitations to use of this soil for community development.

This soil is in capability subclass IIe.

32B—Oaklet silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on the smoother valley sides. Slopes are smooth and commonly complex and 500 to 6,000 feet long. Areas of this soil are irregularly shaped and range mainly from 3 to 200 acres.

The surface layer is dark brown silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish brown silt loam to a depth of 11 inches. Below that, it is yellowish brown clay, dark yellowish brown and light olive brown clay, dark yellowish brown and yellowish brown, mottled clay, and yellowish brown clay.

Included with this soil in mapping are Frederick, Pagebrook, and Poplimento soils. Frederick and Poplimento soils are intermingled throughout this map unit. Pagebrook soils are in shallow depressions and along waterways. Also included, in some map units, are scattered areas of rock outcrops. The included soils and areas of rock outcrops make up about 15 percent of the map unit.

Permeability in this Oaklet soil is slow, and the available water capacity is moderate. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easily tilled when moist, but breaks up into clods if tilled when too wet or too dry. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of 60 inches or more. Natural fertility is medium, and organic matter content is low. The surface layer commonly is medium acid, except where the soil has been limed. The subsoil commonly is medium acid through mildly alkaline.

Most areas of this soil are used for cultivated crops, hay, and pasture (fig. 5) and as orchards. A few areas are used as woodland.

This soil is well suited to cultivated crops, pasture, and hay. Crops respond well to lime and fertilizers. Controlling erosion is a management concern. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. The low strength of the clayey subsoil is a moderate limitation to use of heavy logging equipment.

Permeability, low strength, shrinking and swelling, and the clayey subsoil are the main limitations to use of this soil for community development.

Figure 5.—Pasture in an area of Oaklet silt loam, 2 to 7 percent slopes, in foreground, and in an area of Guernsey silt loam, 7 to 15 percent slopes, in background. Woodland is in an area of Hayter cobbly loam, 15 to 25 percent slopes. This Oaklet soil is prime farmland.

This soil is in capability subclass IIe.

32C—Oaklet silt loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on rolling uplands in the valley. Slopes are 500 to 5,000 feet long. Areas of this soil are irregularly shaped, and range mainly from 3 to 80 acres.

The surface layer is dark brown silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish brown silt loam to a depth of about 11 inches. Below that, it is yellowish brown clay, dark yellowish brown and light olive brown clay, dark yellowish brown and yellowish brown, mottled clay, and yellowish brown clay.

Included with this soil in mapping are Carbo, Frederick, and Poplimento soils intermingled throughout this map unit. Also included in some map units are scattered areas of rock outcrops. Also included are areas of soils that have slopes of more than 15 percent. The included soils make up about 25 percent of the map unit.

Permeability in this Oaklet soil is slow, and the available water capacity is moderate. Surface runoff is moderately rapid. The erosion hazard is severe. The surface layer is friable and easily tilled when moist, but breaks up into clods if tilled when too wet or too dry. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of 60 inches or more. Natural fertility is medium, and organic matter content is low. The surface layer commonly is medium acid, except where the soil has been limed. The subsoil commonly is medium acid to mildly alkaline.

Most areas of this soil are used for cultivated crops, hay, and pasture and as orchards. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops. Crops respond well to lime and fertilizers. Controlling erosion is a major management concern. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming helps to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. The low strength of the clayey subsoil is a moderate limitation to use of heavy logging equipment. Erosion is a hazard on logging roads and skid trails.

Permeability, low strength, the shrinking and swelling, slope, and the clayey subsoil are limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

33C—Opequon-Chilhowie silty clays, very rocky, 3 to 15 percent slopes. This map unit consists of gently sloping and strongly sloping, well drained soils on narrow to moderately broad, convex valley sides. A typical area of this map unit is about 50 percent shallow Opequon soil, 40 percent moderately deep Chilhowie soil, and 5 percent other soils. Rock outcrops cover about 5 percent of the surface. Areas of this map unit commonly are irregularly shaped or long and narrow. They are about 300 to 1,500 feet long. They range from 3 to about 30 acres. The Opequon and Chilhowie soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Opequon soil is dark yellowish brown silty clay loam about 3 inches thick. The subsoil is brown silty clay loam and reddish brown clay to a depth of about 15 inches. Limestone bedrock is at a depth of about 15 inches.

Typically, the surface layer of the Chilhowie soil is dark yellowish brown silty clay about 7 inches thick. The subsoil extends to a depth of about 17 inches. In the upper part it is brown clay to a depth of about 12 inches. In the lower part it is dark yellowish brown clay. The substratum is yellowish brown very channery silty clay to a depth of about 27 inches. Limestone bedrock is at a depth of about 27 inches.

Included with these soils in mapping are small areas, less than 2 acres each, of soils that have a yellowish red or red clay subsoil and a surface layer and subsoil 20 to 25 inches thick. These included soils make up 5 percent of this map unit. Also included are areas of soils where rock outcrops cover less than 5 percent or as much as 50 percent of the surface. Also included are a few areas of soils that have a surface layer of channery silty clay or very channery silty clay.

Permeability in these Opequon and Chilhowie soils is slow, and the available water capacity is very low. Runoff is rapid. The erosion hazard is severe. The surface layer is firm and tends to break up into clods if tilled. Rock outcrops interfere greatly with tillage. Natural fertility is high, and the organic matter content is low. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of 20 inches in the Opequon soil and 40 inches in the Chilhowie soil. The surface layer and the subsoil commonly are slightly acid to mildly alkaline. Bedrock is at a depth of 12 to 20 inches in the Opequon soil and 20 to 40 inches in the Chilhowie soil.

Nearly all areas of this map unit are used as woodland or are idle.

These soils are not suited to cultivated crops, hay, or pasture. They are very droughty during the growing season. Rock outcrops interfere with tillage and haying operations.

Potential productivity for trees on these soils is moderate. Seedling survival is affected by droughtiness during the growing season and by the crust that tends to form on the surface layer. The windthrow hazard, because of rooting depth, is severe on the Opequon soil and moderate on the Chilhowie soil. The surface layer is slippery when wet, and thus does not support to heavy logging equipment.

Depth to bedrock, rock outcrops, and the clayey subsoil are limitations to use of these soils for community development.

These soils are in capability subclass VIs.

33E—Opequon-Chilhowie silty clays, very rocky, 15 to 45 percent slopes. This map unit consists of moderately steep to very steep, well drained soils on narrow to broad, convex valley sides. A typical area of this map unit is about 50 percent shallow Opequon silty clay, 40 percent moderately deep Chilhowie silty clay, and 5 percent other soils. Rock outcrops cover about 5 percent of the surface. Areas of this map unit commonly are irregularly shaped or long and narrow to broad. They are about 300 to 4,000 feet long. They range from 3 to about 90 acres. The Opequon and Chilhowie soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Opequon soil is dark yellowish brown silty clay about 3 inches thick. The subsoil is brown silty clay loam and reddish brown clay to a depth of about 15 inches. Limestone bedrock is at a depth of about 15 inches.

Typically, the surface layer of the Chilhowie soil is dark yellowish brown silty clay about 7 inches thick. The subsoil extends to a depth of about 17 inches. In the upper part it is brown clay to a depth of 12 inches. In the lower part it is dark yellowish brown clay to a depth of 27 inches. The substratum is yellowish brown very channery silty clay. Limestone bedrock is at a depth of 27 inches.

Included with these soils in mapping are small areas, less than 2 acres each, of soils that have a yellowish red or red clay subsoil and a surface layer and subsoil that are 20 to 25 inches thick. These included soils make up 5 percent of this map unit. Also included are areas of soils where rock outcrops cover less than 5 percent or as much as 50 percent of the surface. Also included are some areas of soils that have a surface layer of channery silty clay or very channery silty clay.

Permeability in these Opequon and Chilhowie soils is moderately slow, and the available water capacity is low. Runoff is rapid to very rapid. The erosion hazard is severe. The silty clay surface layer is firm, and tends to break up into clods if tilled. Rock outcrops interfere with tillage. Natural fertility is high, and organic matter content is low. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of 20 inches in the Opequon soil and 40 inches in the Chilhowie soil. The surface layer and the subsoil commonly are slightly acid to mildly alkaline. Bedrock is at a depth of 12 to 20 inches in the Opequon soil and 20 to 40 inches in the Chilhowie soil.

Nearly all areas of this map unit are used as woodland.

These soils are not suited to cultivated crops, hay, or pasture. They are very droughty during the growing season. Rock outcrops and slope interfere with tillage and limit haying operations.

Potential productivity for trees on both the north and south aspects on these soils is moderate. Seedling survival is affected by droughtiness during the growing season and by the crust that tends to form on the surface layer. The windthrow hazard, because of rooting depth, is severe on both aspects on the Opequon soil and moderate on both aspects on the Chilhowie soil. The surface layer is slippery when wet, and thus does not support heavy logging equipment. In some areas slope is a severe limitation to its use.

Depth to bedrock, rock outcrop, slope, and the clayey subsoil are the main limitations to use of these soils for community development.

These soils are in capability subclass VIIs.

34—Pagebrook silt loam. This soil is very deep, nearly level to gently sloping, and moderately well drained. It is on the flood plains of the small and large streams in the valley and in foothills. Areas of this soil commonly are long and winding and narrow to broad. They are about 500 to 2,500 feet long. They range from 3 to 50 acres. Slope ranges from 0 to 5 percent. This soil is subject to flooding.

Typically, the surface layer is dark brown silt loam about 12 inches thick. The subsoil extends to a depth of about 42 inches. In the upper part it is yellowish brown, mottled silt loam to a depth of about 21 inches. In the middle part it is dark yellowish brown and light yellowish brown, mottled clay to a depth of about 36 inches. In the lower part it is yellowish brown, mottled clay. The substratum is yellowish brown, mottled, gravelly silty clay to a depth of 60 inches or more.

Included with this soil in mapping are areas, generally less than 3 acres each, of Carbo and Library soils. Carbo soils are well drained. They are on the highest parts of this map unit. Library soils are somewhat poorly drained. They are in depressions and along waterways. Also included are small areas of soils that have a surface layer of silty clay loam and small areas of soils that have chert fragments on the surface. The included soils make up about 15 percent of the map unit.

Permeability in this Pagebrook soil is slow, and the available water capacity is moderate. Surface runoff is

slow. The erosion hazard is slight. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is high. The root zone extends to a depth of more than 60 inches. Natural fertility is high, and organic matter content is low. The surface layer and the subsoil commonly are moderately acid to neutral. The substratum is neutral to moderately alkaline. The soil is subject to frequent, very brief flooding from October through March. The seasonal high water table is at a depth of 2 to 4 feet from December through March.

Most areas of this soil are used for pasture, and some areas are used for cultivated crops and as woodland.

This soil is moderately well suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion.

Potential productivity for trees on this soil is moderately high. Northern red oak, yellow poplar, black walnut, and eastern white pine are suited to this soil. The rate of seedling mortality is moderate. The soil is soft when wet, and thus does not support logging equipment.

Flooding, the clayey subsoil, and shrinking and swelling are the main limitations to use of this soil for community development. Flooding limits use of the soil as a site for septic tank absorption fields, sanitary landfills, shallow excavations, dwellings, and local roads and streets. The clayey subsoil limits use of the soil as daily cover for landfills. Shrinking and swelling limits use of the soil as a site for dwellings and local roads and streets.

This soil is in capability subclass IIIs.

35—Pagebrook silty clay loam. This soil is very deep, nearly level, and moderately well drained. It is on flood plains of large streams in the valley. Commonly, areas of this soil are long and winding and closely parallel to streams. They range from 3 to 30 acres. Slope ranges from 0 to 2 percent. This soil is subject to flooding.

Typically, the surface layer is very dark gray silty clay loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. It is mostly dark brown clay to a depth of about 30 inches. Below that, it is mostly dark yellowish brown, mottled channery clay.

Included with this soil in mapping are areas, generally less than 3 acres each, of Guernsey and Library soils. Guernsey soils are moderately well drained, and Library soils are somewhat poorly drained. Guernsey soils are on toe slopes along the upper edge of this map unit, and Library soils are in depressions and along poorly defined waterways. Also included are small areas of soils where limestone bedrock is at a depth of less than 60 inches. The included soils make up less than 5 percent of the map unit.

Permeability in this Pagebrook soil is slow, and the available water capacity is moderate. Surface runoff is very slow. The erosion hazard is slight. The surface layer can be worked only in a narrow range of moisture content. It breaks up into clods if the soil is tilled when too wet. The root zone extends to a depth of more than 60 inches, but is restricted below a depth of 24 inches by the seasonal high water table and by gravel in the soil. Natural fertility is high, and organic matter content is moderate. Commonly the surface layer and the upper part of the subsoil are moderately acid to neutral. The lower part of the subsoil is neutral to moderately alkaline. The soil is subject to frequent flooding of very brief duration from October through March. The seasonal high water table is at a depth of 2 to 4 feet from December to March.

Most areas of this soil are used for pasture, some areas are used for cultivated crops, and a few areas are used as woodland.

This soil is moderately well suited to cultivated crops. Crops respond well to fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is moderately well suited to hay and well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Most legumes cannot be grown because of wetness. Overgrazing causes surface compaction and reduces infiltration. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and fertilizing help to maintain a good stand of grasses and legumes and to increase infiltration.

Potential productivity for trees on this soil is moderately high. Wetness and the low strength of the clayey subsoil are moderate limitations to use of logging equipment.

Flooding is the main limitation to use of this soil as a site for septic tank absorption fields, sanitary landfills, daily cover for landfills, shallow excavations, dwellings, and local roads and streets. Shrinking and swelling is also a limitation for many kinds of urban use.

This soil is in capability subclass IIIs.

36—Pits, quarries, and dumps. This map unit consists of open excavations from which limestone, shale, and sand have been mined and of piles of spoil from quarries. Pits, quarries, make up about 70 percent of this map unit, and Dumps make up 30 percent. The soil material has been removed during excavation or covered with waste material. Areas of this map unit are mainly devoid of vegetation, and in some pits, pools of water are common.

Limestone quarries are in the eastern part of the county. They range mainly from 5 to 100 acres. Most of the limestone is used in road construction. Some is used as agricultural lime or in making cement.

The shale quarries are scattered throughout the county. They are as much as 10 acres.

One of the larger sand pits is near Virginia Route 704 in Gore. Smaller sand pits are in the area of Star Tannery. The pits range mainly from 1 acre to 50 acres. They are a source of sand for use in building and in making glass and other commercial products.

Areas of pits, quarries, and dumps are poorly suited to cultivated crops, hay and pasture, and to use as woodland and as habitat for wildlife. Very little soil material, depth to bedrock, and droughtiness are the main limitations.

Areas of this map unit are fairly suited to poorly suited to urban and recreation use. Onsite investigation is needed to determine the suitability of each site for a specific use. Some of the larger pits that contain water can be used for fish ponds.

This map unit has not been assigned to a capability subclass.

37D—Schaffenaker very stony loamy sand, 7 to 25 percent slopes. This soil is moderately deep, strongly sloping and moderately steep, and well drained. It is on ridgetops, side slopes, and foot slopes. Areas of this soil commonly are narrow to broad, long and winding, and irregularly shaped. They are about 800 to 5,500 feet long. They range from 5 to more than 50 acres. Sandstone fragments more than 10 inches in diameter cover 3 to 15 percent of the surface.

Typically, the surface layer is covered by a layer of leaves, twigs, and pine needles and black organic matter about 4 inches thick. The surface layer is dark grayish brown loamy sand about 2 inches thick. The subsoil, to a depth of 23 inches, is brown, yellowish brown, and strong brown loamy sand. The substratum, to a depth of about 32 inches, is strong brown very gravelly loamy sand. Sandstone bedrock is at a depth of about 32 inches.

Included with this soil in mapping are small intermingled areas of Dekalb soils. Also included are a few areas of soils where stones cover less than 3 percent of the surface. The included soils make up 10 percent of this map unit.

Permeability in this Schaffenaker soil is rapid, and the available water capacity is very low. Surface runoff is slow. The erosion hazard is slight. The surface layer is loose or very friable, but tillage is impractical because of stones on the surface. The shrink-swell potential is low. The root zone extends to a depth of about 32 inches, but is somewhat restricted by sandstone fragments. Natural fertility and organic matter content are very low. The soil is extremely acid or very strongly acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops, hay, or pasture. Tillage is impractical because of the very stony surface. The soil is droughty.

Potential productivity for trees on this soil is moderate. Slope and stones on the surface are moderate limitations to use of logging equipment. The rate of seedling mortality is moderate. Plant competition for conifers is moderate.

The rapid permeability and slope are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope. Ground water contamination is a hazard because in some places the soil does not adequately filter the effluent.

This soil is in capability subclass VIIs.

37E—Schaffenaker very stony loamy sand, 25 to 65 percent slopes. This soil is moderately deep, steep and very steep, and well drained. It is on ridgetops and side slopes. Areas of this soil commonly are narrow to broad, long and winding, and irregularly shaped. They are about 800 to 11,500 feet long. They range from 5 to more than 300 acres. Sandstone boulders and stones cover 3 to 15 percent of the surface.

Typically, the surface layer is dark grayish brown loamy sand about 2 inches thick. The subsoil, to a depth of about 23 inches, is brown, yellowish brown, and strong brown loamy sand. The substratum, to a depth of about 32 inches, is strong brown or very gravelly loamy sand. Bedrock is at a depth of about 32 inches.

Included with this soil in mapping are small areas of Dekalb soils. Also included are a few areas of soils where stones cover less than 3 percent of the surface. The included soils make up about 10 percent of this map unit.

Permeability in this Schaffenaker soil is rapid, and the available water capacity is very low. Surface runoff is medium. The erosion hazard is moderate. The surface layer is loose or very friable, but tillage is impractical because of stones on the surface. The shrink-swell potential is low. The root zone extends to a depth of about 32 inches, but is somewhat restricted by sandstone fragments below a depth of about 24 inches.

Natural fertility and organic matter content are low. The soil is extremely acid or very strongly acid throughout.

Nearly all areas of this soil are used as woodland.

This soil is not suited to cultivated crops, hay, or pasture. Tillage is impractical because of slope and the very stony surface. The soil is droughty.

Potential productivity for trees on both the north and south aspects on this soil is moderate. Slope is a severe limitation to use of logging equipment. The rate of seedling mortality is moderate on the north aspect and severe on the south aspect. Plant competition for conifers is moderate.

Slope and the rapid permeability are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, in places the effluent can seep to the surface downslope. Ground water contamination is a hazard because in some places the soil does not adequately filter the effluent.

This soil is in capability subclass VIIs.

38B—Sequoia silt loam, 2 to 7 percent slopes. This soil is deep, gently sloping, and well drained. It is on knolls and narrow ridgetops. Slopes are smooth, commonly complex, and about 120 to 400 feet long. Areas of the soil are irregularly circular or follow the ridges and are elongated or long and winding. They are 5 to 80 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil, to a depth of about 38 inches, is yellowish brown and yellowish red channery silty clay loam. The substratum to a depth of 60 inches or more is strong brown, highly weathered shale that crushes to silty clay.

Included with this soil in mapping are small intermingled areas of Berks, Weikert, and Zoar soils. Berks soils are moderately deep, and Weikert soils are shallow. Zoar soils are moderately well drained and not as red as this Sequoia soil. The included soils make up about 20 percent of this map unit.

Permeability in this Sequoia soil is moderately slow, and the available water capacity is moderate. Runoff is moderate. Tilth is fair. Natural fertility is low, and organic matter content is moderately low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of about 52 inches, but is somewhat restricted by shale fragments below a depth of about 38 inches. The surface layer and the subsoil commonly are very strongly acid or strongly acid except where the soil has been limed. Generally, hard bedrock is deep, and does not affect the use of the soil.

Most areas of this soil are used for pasture and hay. A few areas are used as woodland.

This soil is moderately well suited to cultivated crops. The hazard of erosion is moderate if cultivated crops are grown or if vegetation is sparse. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of nutrients in the soil.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for pine and hardwoods. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment.

Permeability, low strength, and the clayey subsoil are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

38C—Sequoia silt loam, 7 to 15 percent slopes. This soil is deep, strongly sloping, and well drained. It is on slightly convex side slopes of hilly uplands. Slopes are smooth, commonly complex, and about 200 to 800 feet long. Areas of this soil follow the ridges and are elongated or long and winding. They range from 5 to 80 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil, to a depth of about 38 inches, is yellowish brown and yellowish red channery silty clay loam. The substratum to a depth of 60 inches or more is strong brown, highly weathered shale that crushes to silty clay.

Included with this soil in mapping are small intermingled areas of Berks, Weikert, and Zoar soils. Berks soils are moderately deep, and Weikert soils are shallow. Zoar soils are moderately well drained and not as red as Sequoia soils. Also included are small areas of Sequoia soils on slopes of more than 15 percent. The included soils make up about 25 percent of this map unit.

Permeability in this Sequoia soil is moderately slow, and the available water capacity is low. Runoff is rapid. Tilth is fair. Natural fertility is low, and organic matter content is moderately low. The subsoil is slightly sticky. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of about 52 inches, but is somewhat restricted by shale fragments below a depth of about 38 inches. The surface layer and the subsoil commonly are very strongly acid or strongly acid, except

where the soil has been limed. Generally, hard bedrock is deep, and does not affect the use of this soil.

Most areas of this soil are used as woodland. A few areas are used as pasture.

This soil is poorly suited to cultivated crops. Erosion is a moderate hazard if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming helps to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for pine and hardwoods. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment.

Slope, permeability, low strength, and the clayey subsoil are the main limitations to use of this soil for community development.

This soil is in capability subclass IVe.

38D—Sequoia silt loam, 15 to 25 percent slopes. This soil is deep, moderately steep, and well drained. It is on slightly convex side slopes of hilly uplands. Slopes are smooth, commonly complex, and about 100 to 1,000 feet long. Areas of this soil follow the ridges and are elongated or long and winding. They are 5 to 100 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil, to a depth of about 38 inches, is yellowish brown and yellowish red channery silty clay loam. The substratum to a depth of 60 inches or more is strong brown, highly weathered shale that crushes to silty clay.

Included with this soil in mapping are small intermingled areas of Berks and Weikert soils. Berks soils are moderately deep, and Weikert soils are shallow. The included soils make up about 25 percent of this map unit.

Permeability in this Sequoia soil is moderately slow, and the available water capacity is low. Runoff is rapid. Tilth is fair. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of about 52 inches, but is somewhat restricted by shale fragments below a depth of about 38 inches. The surface layer and the subsoil commonly are very strongly acid or strongly acid, except where the soil has been limed. Generally, hard bedrock is deep, and does not affect the use of the soil.

Most areas of this soil are used as woodland. A few areas are used for pasture.

This soil is poorly suited to cultivated crops because erosion is a severe hazard. Controlling erosion is a major management concern. The low available water capacity, the acidity of the soil, and the low natural fertility are also management concerns. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to reduce runoff and to control erosion.

This soil is moderately well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for pine and hardwoods. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment.

Slope, permeability, low strength, and the clayey subsoil are the main limitations to use of this soil for community development.

This soil is in capability subclass VIe.

39B—Swimley silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is on ridges and side slopes in the valley. Slopes are smooth and commonly complex. Areas of this soil range from 3 to about 30 acres.

Typically, the surface layer is dark brown silt loam about 11 inches thick. The subsoil is red and yellowish red clay to a depth of about 60 inches or more.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Frederick soils. Swimley soils are redder in the subsoil than Frederick soils. The included soils make up about 10 percent of this map unit. Also included in some map units are scattered areas of rock outcrops.

Permeability in this Swimley soil is moderate, and the available water capacity is moderate. Runoff is medium. Tilth is fair. Natural fertility is medium, and organic matter content is low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of about 60 inches. The surface layer and the subsoil commonly are

slightly acid or neutral. Bedrock is at a depth of 67 inches or more.

Most areas of this soil are used for crops and pasture.

This soil is well suited to cultivated crops. The hazard of erosion is moderate if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, growing cover crops, liming and fertilizing, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine.

The clayey subsoil is the main limitation to use of this soil for community development.

This soil is in capability subclass IIe.

39C—Swimley silt loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and well drained. It is on ridges and side slopes in the valley. Slopes are smooth and commonly complex. Areas of this soil range from 3 to about 40 acres.

Typically, the surface layer is dark brown silt loam about 11 inches thick. The subsoil is red, yellowish red, and dark red clay to a depth of 60 inches or more.

Included with this soil in mapping are small intermingled areas, generally less than 2 acres each, of Frederick soils. Swimley soils are redder in the subsoil than Frederick soils. The included soils make up about 10 percent of this map unit. Also included in some map units are scattered areas of rock outcrops.

Permeability in this Swimley soil is moderate, and the available water capacity is moderate. Runoff is medium. Tilth is fair. Natural fertility is medium, and organic matter content is low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of about 60 inches. The surface layer and the subsoil commonly are slightly acid or neutral. Bedrock is at a depth of 67 inches or more.

Most areas of this soil are used for crops and pasture.

This soil is moderately well suited to cultivated crops. The hazard of erosion is moderate to severe if cultivated crops are grown. Controlling erosion is a major management concern. Using conservation tillage, growing cover crops, liming and fertilizing, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content in the surface layer, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes increased runoff and excessive erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for hardwoods and pine.

The clayey subsoil is the main limitation to use of this soil for community development.

This soil is in capability subclass IIIe.

40B—Timberville silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and well drained. It is near the heads of and along upland drainageways. Slopes commonly are smooth. Areas are long and winding, and range from about 3 to 80 acres.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part it is dark yellowish brown silt loam and strong brown silty clay loam, to a depth of about 28 inches. Below that, it is yellowish red and strong brown clay loam.

Included with this soil in mapping are small, intermingled areas of Carbo and Frederick soils on adjacent uplands. The included soils make up about 20 percent of this map unit.

Permeability in this Timberville soil is moderate, and the available water capacity is high. Surface runoff is medium. The erosion hazard is moderate. The surface layer is friable and easy to till. The shrink-swell potential in the upper part of the subsoil is low, and in the lower part is moderate. The thickness of the root zone and depth to bedrock are more than 60 inches. Natural fertility is high, and organic matter content is moderate. The soil ranges from very strongly acid to moderately acid, except where the soil has been limed. From April through October the soil is subject to frequent flooding of very brief duration by runoff from higher, adjacent areas.

Most areas of this soil are cultivated (fig. 6) and used for pasture (fig. 7). Some areas are used as woodland. This soil is prime farmland.

This soil is well suited to cultivated crops. Sometimes runoff from higher, adjacent areas causes brief flooding. This can delay field operations during the growing season. Row crops can be grown continuously on this soil. Crop yields can be increased by liming and fertilizing. Using conservation tillage helps to conserve moisture, to reduce runoff, and to control erosion.

This soil is poorly suited to fruits, nuts, and berries. Fruit buds commonly freeze because of poor air drainage.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes is a major pasture management concern. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, controlling weeds, and liming and fertilizing help to maintain a good stand of grasses and legumes.

The potential productivity for trees on the soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled.

Flooding and low strength in the surface layer and in the upper part of the subsoil are the main limitations to use of this soil for community development, especially septic tank absorption fields, sewage lagoons, sanitary landfills, shallow excavations, dwellings, small commercial buildings, local roads and streets, and most types of recreation.

This soil is in capability subclass IIw.

41B—Weikert-Berks channery silt loams, 2 to 7 percent slopes. This map unit consists of shallow and moderately deep, gently sloping, well drained soils on a smooth and undulating landscape and on ridgetops. A typical area of this map unit is about 50 percent Weikert soils, 40 percent Berks soil, and 10 percent other soils. Slopes are smooth and complex and about 300 to 3,000 feet long. Many of the larger areas of this map unit are dissected by shallow drainageways 50 to 100 feet apart. Areas of this map unit commonly follow the ridges and are long and winding. They range mainly from 3 to 60 acres. The Weikert and Berks soils are intermingled so closely that it was not practical to map them separately.

Figure 6.—Corn in an area of Timberville silt loam, 2 to 7 percent slopes. Row crops can be grown continuously on this prime farmland.

Figure 7.—Pasture in an area of Timberville silt loam, 2 to 7 percent slopes, in foreground, and corn in an area of Oaklet silt loam, 7 to 15 percent slopes, behind the tree line. This Timberville soil is prime farmland.

Typically, the surface layer of the Weikert soil is brown channery silt loam about 3 inches thick. The subsoil is yellowish brown very channery silt loam about 9 inches thick. The substratum is yellowish brown extremely channery silt loam to a depth of about 15 inches. Acid shale bedrock is at a depth of 15 inches.

Typically, the surface layer of the Berks soil is dark brown channery silt loam about 8 inches thick. The subsoil is yellowish brown very channery silt loam about 14 inches thick. The substratum is strong brown extremely channery silt loam to a depth of about 30 inches. Acid shale bedrock is at a depth of about 30 inches.

Included with these soils in mapping are small, intermingled areas, generally less than 3 acres each, of Sequoia soils. Sequoia soils are deep, and have more clay throughout than these Weikert and Berks soils. Also included are small areas of wet soils and small areas of rock outcrops along the tops and noses of ridges. The included soils make up 10 percent of this map unit.

Permeability in the Weikert soil is moderately rapid and in the Berks soil is moderate. The available water capacity is very low. Runoff is medium. The erosion hazard is moderate. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 13 inches in the Weikert soil and about 30 inches in the Berks soil. The surface layer and the subsoil of these soils commonly are strongly acid to very strongly acid except where the soils have been limed. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Many areas of this soil are used for pasture and hay and as woodland. Some areas are used for cultivated crops. A few areas are in urban use.

These soils are poorly suited to cultivated crops. They are very droughty during the growing season. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to increase the organic matter content to improve and soil tilth, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are poorly suited to hay and moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion.

Potential productivity for trees is moderate on the Weikert soil and moderately high on the Berks soil. These soils are managed mainly for hardwoods and pine. Seedling survival is affected by droughtiness during the growing season. The rate of seedling mortality is severe on the Weikert soil and moderate on the Berks soil. The windthrow hazard is moderate on the Weikert soil and slight on the Berks soil.

Depth to bedrock is the main limitation to use of these soils for community development.

These soils are in capability subclass IIIe.

41C—Weikert-Berks channery silt loams, 7 to 15 percent slopes. This map unit consists of shallow and moderately deep, strongly sloping, well drained soils on a rolling landscape and on the tops and noses of ridges. A typical area of the unit is about 50 percent Weikert soils, 40 percent Berks soil, and 10 percent other soils. Slopes are smooth and complex and about 300 to 4,000 feet long. Many of the larger areas of the map unit are dissected by shallow drainageways 50 to 100 feet apart. Commonly, areas of the map unit are long and winding and follow the ridges. They range mainly from 3 to 150 acres. The Weikert and Berks soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Weikert soil is brown channery silt loam about 3 inches thick. The subsoil is yellowish brown very channery silt loam about 9 inches thick. The substratum is yellowish brown extremely channery silt loam to a depth of about 15 inches. Acid shale bedrock is at a depth of about 15 inches.

Typically, the surface layer of the Berks soil is dark brown channery silt loam about 8 inches thick. The subsoil is yellowish brown and strong brown channery and extremely channery silt loam about 14 inches thick. The substratum is strong brown extremely channery silt loam to a depth of about 30 inches. Acid shale bedrock is at a depth of about 30 inches.

Included with these soils in mapping are small intermingled areas, generally less than 3 acres each, of Sequoia soils. Sequoia soils are deep, and have more clay throughout than these Weikert and Berks soils. Also included are small areas of wet soils and small areas of rock outcrops along the tops and noses of ridges. The included soils make up 10 percent of this map unit.

Permeability in the Weikert soil is moderately rapid and in the Berks soil is moderate. The available water capacity is very low. Runoff is rapid. The erosion hazard is severe. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 30 inches in the Berks soil and about 13 inches in the Weikert soil. The surface layer and the subsoil of these soils commonly are strongly acid to very strongly acid, except where the soils have been limed. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Many areas of these soils are used as woodland. Some areas are used for pasture and hay. A few areas are used for cultivated crops, and a few areas are in urban use.

These soils are poorly suited to cultivated crops. They are very droughty during the growing season. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

These soils are poorly suited to hay and moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees is moderate on the Weikert soil and moderately high on the Berks soil. The soil is managed mainly for hardwoods and pine. Seedling survival is affected by droughtiness during the growing season. The rate of seedling mortality is severe on the Weikert soil and moderate on the Berks soil. The windthrow hazard is moderate on the Weikert soil and slight on the Berks soil.

Depth to bedrock is the main limitation to use of these soils for community development.

These soils are in capability subclass IVe.

41D—Weikert-Berks channery silt loams, 15 to 25 percent slopes. This map unit consists of shallow and moderately deep, moderately steep, well drained soils on side slopes and ridges. A typical area of the map unit is about 55 percent Weikert soil, 35 percent Berks soil, and 10 percent other soils. Generally, areas of the map unit are long and winding and irregularly shaped, and follow the ridges. They are about 300 to 8,000 feet long. They range from 3 to more than 300 acres. The Weikert and Berks soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Weikert soil is dark brown channery silt loam about 3 inches thick. The subsoil is yellowish brown very channery silt loam about 9 inches thick. The substratum is extremely channery silt loam to a depth of about 15 inches. Acid shale bedrock is at a depth of about 15 inches.

Typically, the surface layer of the Berks soil is dark brown channery silt loam about 8 inches thick. The subsoil is yellowish brown very channery and extremely

channery silt loam about 14 inches thick. The substratum is strong brown extremely channery silt loam to a depth of about 30 inches. Acid shale bedrock is at a depth of about 30 inches.

Included with these soils in mapping are small intermingled areas of Gainesboro and Lehew soils. Also included are areas of soils that have stones on the surface and small areas of rock outcrops along the tops and noses of ridges. The included soils make up 10 percent of this map unit.

Permeability in these Weikert and Berks soils is moderately rapid, and the available water capacity is very low. Surface runoff is rapid. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 20 inches in the Weikert soil and 40 inches in the Berks soil. The soils commonly are strongly acid or very strongly acid throughout. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Most areas of these soils are used as woodland, and some areas are used for pasture. A few areas are used for cultivated crops and hay.

These soils are not suited to cultivated crops because they are very droughty during the growing season and because erosion is a severe hazard.

These soils are poorly suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees is moderate on the Weikert soil and moderately high on the Berks soil. The rate of seedling mortality is severe on the Weikert soil and moderate on the Berks soil. These soils are managed for hardwoods and pine.

Depth to bedrock and slope are the main limitations to use of these soils for community development.

These soils are in capability subclass VIe.

41E—Weikert-Berks channery silt loams, 25 to 65 percent slopes. This map unit consists of shallow and moderately deep, steep and very steep, well drained soils on side slopes and ridges. A typical area of the map unit is about 60 percent Weikert soils, 30 percent Berks soils, and 10 percent other soils. Generally, areas of the map unit are long and winding and irregularly shaped, and follow the ridges. They are about 300 to 8,500 feet long. They range from 3 to more than 500 acres. The Weikert and Berks soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Weikert soil is dark grayish brown channery silt loam about 3 inches thick. The subsoil is yellowish brown very channery silt loam about 9 inches thick. The substratum is yellowish brown extremely channery silt loam to a depth of about 15 inches. Acid shale bedrock is at a depth of about 15 inches.

Typically, the surface layer of the Berks soil is dark brown channery silt loam about 8 inches thick. The subsoil is yellowish brown very channery and extremely channery silt loam about 14 inches thick. The substratum is strong brown very channery silt loam to a depth of about 30 inches. Acid shale bedrock is at a depth of about 30 inches.

Included with these soils in mapping are small areas of Gainesboro and Lehew soils. Also included are areas of very stony soils and small areas of rock outcrops along the tops and noses of ridges (fig. 8). The included soils make up 10 percent of this map unit.

Permeability in the Weikert and Berks soils are moderately rapid, and the available water capacity is very low. Surface runoff is very rapid. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 20 inches in the Weikert soil and 40 inches in the Berks soil. The soils commonly are strongly acid or very strongly acid throughout. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Nearly all areas of these soils are used as woodland.

These soils are not suited to cultivated crops, hay, or pasture. Tillage is impractical because of steep slopes. The soils are very droughty during the growing season. Erosion is a severe hazard.

Potential productivity for trees is moderate on the north aspect on the Weikert soil and moderately high on the Berks soil. Potential productivity is moderate on the south aspect on the Weikert and Berks soils. The rate of seedling mortality is severe on the Weikert soil and moderate on the Berks soil. In some areas slope is a severe limitation to use of logging equipment. These soils are managed for hardwoods and pine.

Depth to bedrock and slope are the main limitations to use of these soils for community development.

These soils are in capability subclass VIIe.

42C—Weikert-Berks very stony silt loams, 7 to 15 percent slopes. This map unit consists of shallow and moderately deep, sloping, well drained soils on mountaintops, side slopes, and ridges. A typical area of this map unit is about 50 percent Weikert soils, 40 percent Berks soils, and 10 percent other soils. Commonly, areas of this map unit are long and winding and irregularly shaped, and follow the ridges. They are about 500 to 6,000 feet long, and range from 5 to more

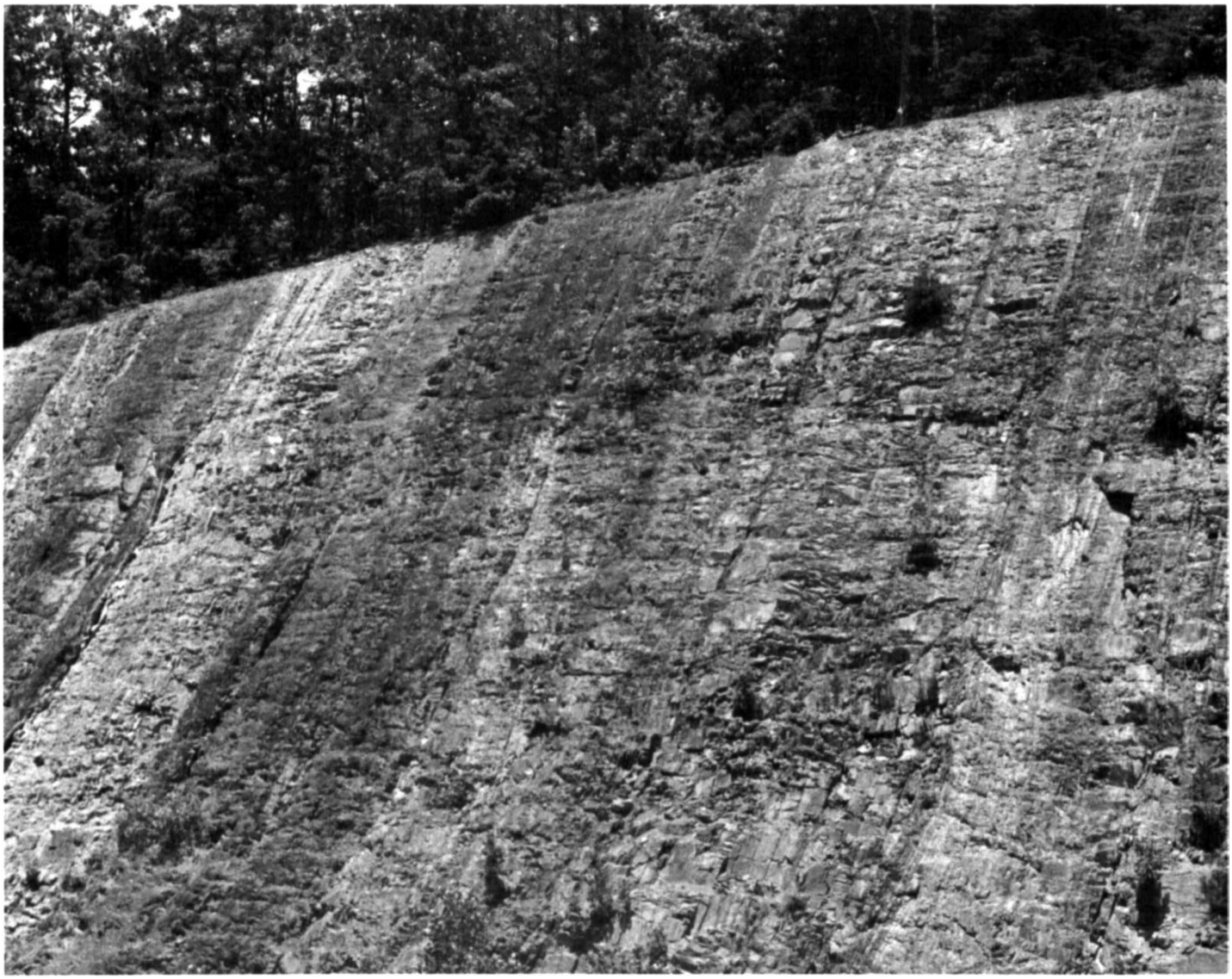

Figure 8.—Bedrock on a ridgetop and a nose slope in an area of Weikert-Berks channery silt loams, 25 to 65 percent slopes. Shale is the darker colored rock, and sandstone is the lighter colored.

than 50 acres. Stones cover 3 to 15 percent of the surface. The Weikert and Berks soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Weikert soil is dark grayish brown channery silt loam about 3 inches thick. The subsoil is yellowish brown very channery silt loam about 9 inches thick. The substratum is yellowish brown extremely channery silt loam to a depth of about 15 inches. Acid shale bedrock is at a depth of about 15 inches.

Typically, the surface layer of the Berks soil is dark brown channery silt loam about 8 inches thick. The subsoil is yellowish brown very channery silt loam about 14 inches thick. The substratum is strong brown very channery silt loam to a depth of about 30 inches. Acid shale bedrock is at a depth of about 30 inches.

Included with these soils in mapping are small, intermingled areas of Gainesboro and Lehew soils. Also included are areas of extremely stony soils, areas of soils that do not have stones on the surface, and small areas of rock outcrops along the tops and noses of ridges.

Permeability in these Weikert and Berks soils is moderately rapid, and the available water capacity is low.

Surface runoff is rapid. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 20 inches in the Weikert soil and 40 inches in the Berks soil. The soils commonly are strongly acid or very strongly acid throughout. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Nearly all areas of these soils are used as woodland.

These soils are not suited to cultivated crops because of stones and trees. Tillage is impractical because of the surface stones. If the surface is cleared of stones and trees the soil is poorly suited. The soils are very droughty during the growing season. Erosion is a severe hazard.

These soils are not suited to hay and pasture unless they are cleared of stones and trees.

Potential productivity for trees is moderate for the Weikert soil and moderately high for the Berks soil. The rate of seedling mortality is severe on the Weikert soil and moderate on the Berks soil. These soils are managed for hardwoods and pine.

Depth to bedrock and surface stoniness are the main limitations to use of these soils for community development.

These soils are in capability subclass VIs.

42D—Weikert-Berks very stony silt loams, 15 to 25 percent slopes. This map unit consists of shallow and moderately deep, moderately steep, well drained soils on mountaintops, side slopes, and ridges. A typical area of the map unit is about 55 percent Weikert soils, 35 percent Berks soils, and 10 percent other soils. Commonly, areas of the map unit are long and winding and irregularly shaped, and follow the ridges. They are about 500 to 14,000 feet long. They range from 5 to more than 500 acres. Stones cover 3 to 15 percent of the surface. The Weikert and Berks soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Weikert soil is dark grayish brown channery silt loam about 3 inches thick. The subsoil is yellowish brown very channery silt loam about 9 inches thick. The substratum is yellowish brown extremely channery silt loam to a depth of about 15 inches. Acid shale bedrock is at a depth of about 15 inches.

Typically, the surface layer of the Berks soil is dark brown channery silt loam about 8 inches thick. The subsoil is yellowish brown very channery silt loam about 14 inches thick. The substratum is strong brown very channery silt loam to a depth of about 30 inches. Acid shale bedrock is at a depth of about 30 inches.

Included with these soils in mapping are small areas of Gainesboro and Lehew soils. Berks and Weikert soils are yellower than Gainesboro and Lehew soils. Also included are areas of extremely stony soils, areas of soils that do not have stones on the surface, and small areas of rock outcrops along the tops and noses of ridges.

Permeability in the Weikert and Berks soils is moderately rapid, and the available water capacity is low. Surface runoff is rapid. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 20 inches in the Weikert soil and 40 inches in the Berks soil. The soils commonly are strongly acid or very strongly acid throughout. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Nearly all areas of these soils are used as woodland.

These soils are not suited to cultivated crops, hay, or pasture. Tillage is impractical because of surface stoniness. The soils are very droughty during the growing season. Erosion is a severe hazard.

Potential productivity for trees is moderate on the Weikert soil and moderately high on the Berks soil. The rate of seedling mortality is severe on the Weikert soil and moderate on the Berks soil. These soils are managed for hardwoods and pine.

Depth to bedrock, surface stoniness, and slope are the main limitations to use of these soils for community development.

These soils are in capability subclass VIs.

42E—Weikert-Berks very stony silt loams, 25 to 65 percent slopes. This map unit consists of shallow and moderately deep, steep and very steep, well drained soils on mountaintops, side slopes, and ridges. A typical area of the map unit is about 60 percent Weikert soils, 30 percent Berks soils, and 10 percent other soils. Commonly, areas of the map unit are long and winding and irregularly shaped, and follow the ridges. They are about 500 to 24,000 feet long, and range from 10 to more than 1,500 acres. Stones cover 3 to 15 percent of the surface. The Weikert and Berks soils are intermingled so closely that it was not practical to map them separately.

Typically, the surface layer of the Weikert soil is dark grayish brown channery silt loam about 3 inches thick. The subsoil is yellowish brown very channery silt loam about 9 inches thick. The substratum is yellowish brown extremely channery silt loam to a depth of about 15 inches. Acid shale bedrock is at a depth of 15 inches.

Typically, the surface layer of the Berks soil is dark brown channery silt loam about 8 inches thick. The subsoil is yellowish brown very channery silt loam about 14 inches thick. The substratum is strong brown very channery silt loam to a depth of about 30 inches. Acid shale bedrock is at a depth of about 30 inches.

Included with these soils in mapping are small areas of Gainesboro and Lehew soils. Also included are areas of extremely stony soils, areas of soils that do not have stones on the surface, and small spots of rock outcrops along the tops and noses of ridges.

Permeability in these Weikert and Berks soils is moderately rapid, and the available water capacity is low. Surface runoff is very rapid. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of about 7 inches in the Weikert soil and 22 inches in the Berks soil. The soils commonly are strongly acid or very strongly acid throughout. Bedrock is at a depth of 12 to 20 inches in the Weikert soil and 20 to 40 inches in the Berks soil.

Nearly all areas of these soils are used as woodland.

These soils are not suited to cultivated crops, hay, or pasture. Tillage is impractical because of surface stoniness. The soils are very droughty during the growing season. Erosion is a severe hazard.

Potential productivity for trees is moderate on the north aspect on the Weikert soil and moderately high on that of the Berks soil. Potential productivity is moderate on the south aspect on the Weikert and Berks soils. The rate of seedling mortality is severe on both aspects on the Weikert soil and moderate on those on the Berks soil. These soils are managed for hardwoods and pine.

Depth to bedrock and slope are the main limitations to use of these soils for community development.

These soils are in capability subclass VIIs.

43—Wheeling loam. This soil is very deep, nearly level, and well drained. It is on flood plains and on low terraces above the larger streams in the county. Areas of the soil commonly are long and winding, and follow the streams. They are about 500 to 5,000 feet long, and range from about 5 to more than 50 acres. Slope ranges from 0 to 3 percent. The soil is subject to flooding.

Typically, the surface layer of this soil is dark brown loam about 14 inches thick. The subsoil is brown loam, clay loam, and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Craigsville and Pagebrook soils. Craigsville soils are along stream banks and high water channels. Pagebrook soils are at the base of slopes near uplands. Also included are areas of soils that have a yellowish red surface layer and subsoil. The included soils make up about 20 percent of this map unit.

Permeability in this Wheeling soil is moderate in the subsoil to a depth of 50 inches and rapid below that depth. The available water capacity is moderate. Surface runoff is slow. The erosion hazard is slight. The surface layer is friable and easily tilled when moist, but breaks up into clods if the soil is tilled when too wet or too dry. The shrink-swell potential in the subsoil is low. The root zone extends to a depth of 60 inches or more. Natural fertility is medium, and organic matter content is moderate. The soil commonly is strongly acid or moderately acid throughout, except where the soil has been limed. The soil is subject to periodic flooding.

Most areas of this soil are used as pasture, hayland (fig. 9), or woodland. A few areas are used for cultivated crops.

This soil is well suited to cultivated crops. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to maintain soil tilth and the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. The windthrow hazard and the equipment limitation are slight.

Flooding and the rapid permeability in the lower part of the subsoil are the main limitations to use of this soil for community development. If the soil is used as a site for septic tank absorption fields, the ground water can be contaminated because the soil absorbs the effluent but in places does not adequately filter it.

This soil is in capability class I.

44B—Zoar silt loam, 2 to 7 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on slightly concave terraces along the larger rivers and streams and in upland depressions. Slopes are about 300 to 5,000 feet long. Areas of this soil range from 3 to 60 acres.

Typically, the surface layer is yellowish brown silt loam about 9 inches thick. The subsoil is yellowish brown and light brownish gray silty clay about 33 inches thick. The substratum to a depth of 60 inches or more is yellowish brown silty clay loam that has thin layers containing shale and sandstone channers.

Included with this soil in mapping are small areas of Berks, Guernsey, and Weikert soils. Berks and Weikert soils are in and near drainageways. Guernsey soils are along slope breaks near the upper edge of this map unit. Also included are small areas of very poorly drained soils. The included soils make up about 25 percent of the map unit.

Permeability in this Zoar soil is slow, and the available water capacity is moderate. Runoff is moderate. The erosion hazard is moderate. Tilth is good, but the soil breaks up into clods if tilled when too wet or too dry. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of about 60 inches. The surface layer and the subsoil in the upper part are strongly acid,

Figure 9.—Rolled bales of hay in an area of Wheeling loam. This prime farmland soil is well suited to hay.

except where the soil has been limed. The subsoil in the lower part is strongly acid or very strongly acid. Generally, bedrock is deep, and does not affect the use of the soil. The soil receives seepage and overflow from adjacent, higher lying areas. The seasonal high water table is at a depth of 1 1/2 to 2 1/2 feet from December through April.

Most areas of this soil are used for pasture (fig. 10) and hay. Some areas are used for cultivated crops. A few areas are used as woodland.

This soil is well suited to cultivated crops if drainage is installed and if seepage and flooding are controlled. The growing season for alfalfa is short because of the seasonal high water table. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for pine and hardwoods. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment.

The seasonal high water table, seepage, low strength, and flooding from overflow are the main limitations to use of this soil for community development.

This soil is in capability subclass IIe.

44C—Zoar silt loam, 7 to 15 percent slopes. This soil is very deep, strongly sloping, and moderately well drained. It is on slightly concave terraces along the larger rivers and streams and in upland depressions. Slopes are about 300 to 1,500 feet long, and range from 3 to 25 acres.

Typically, the surface layer is yellowish brown silt loam about 9 inches thick. The subsoil is yellowish brown and light brownish gray silty clay about 33 inches thick. The substratum to a depth of 60 inches or more is yellowish

brown silty clay loam that has thin layers containing shale and sandstone channers.

Included with this soil in mapping are small areas of Berks, Guernsey, and Weikert soils. The Berks and Weikert soils are in and near drainageways. Guernsey soils are along slope breaks near the upper edge of this map unit. Also included are small areas of very poorly drained soils. The included soils make up about 25 percent of the map unit.

Permeability in this Zoar soil is slow, and the available water capacity is moderate. Runoff is moderate. The erosion hazard is moderate. Tilth is good, but the soil breaks up into clods if tilled when too wet or too dry. Natural fertility and organic matter content are low. The shrink-swell potential in the subsoil is moderate. The root zone extends to a depth of about 60 inches. The surface layer and the subsoil in the upper part are strongly acid, and the subsoil in the lower part is strongly acid to very strongly acid, except where the soil has been limed. Generally, bedrock is deep and does not affect the use of the soil. The soil receives seepage and overflow from adjacent, higher lying areas. The seasonal high water table is at a depth of 1 1/2 to 2 1/2 feet from December through April.

Figure 10.—Pasture in an area of Zoar silt loam, 2 to 7 percent slopes (foreground) and Wheeling loam (background). The color contrast in the pasture is caused by differences in the internal drainage of the soils. Both soils are prime farmland. They are well suited to pasture.

Most areas of this soil are used for pasture and hay. Some areas are used for cultivated crops, and some areas are used as woodland.

This soil is moderately well suited to cultivated crops if drainage is installed and if seepage and flooding are controlled. The growing season for alfalfa is short because of the seasonal high water table. Crops respond well to lime and fertilizers. Using conservation tillage, growing cover crops, including grasses and legumes in the cropping system, and crop residue management help to improve soil tilth and to increase the organic matter content in the surface layer, to reduce crusting, to increase water infiltration, and to control erosion.

This soil is well suited to hay and pasture. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Overgrazing causes surface compaction and increases runoff and erosion. Using stocking rates within carrying capacity, deferred grazing, using rotation grazing, and liming and fertilizing help to maintain a good stand of grasses and legumes, to reduce runoff, and to control erosion. Liming is needed to offset the acidity of the soil. Fertilizing generally is required to increase the amount of available nutrients in the soil.

Potential productivity for trees on this soil is moderately high. The soil is managed for pine and hardwoods. Seedlings survive and grow well if competing vegetation is controlled. The soil is soft when wet, and thus does not support heavy logging equipment.

The seasonal high water table, seepage, low strength, flooding from overflow, and slope are the main limitations to use of this soil for community development.

This soil is in capability subclass IIIe.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 40,000 acres of prime farmland. That acreage makes up about 15 percent of the total acreage in the survey area and is mainly in the west-central part of the county. Many areas in the valleys of Sleepy Creek, Back Creek, and Hogue Creek are also prime farmland. The largest areas of prime farmland are in map units 1, 3, and 6 on the general soil map. Many scattered areas of prime farmland are in the other map units.

The soil map units that make up prime farmland in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed soil map units."

One of the soils in table 5 is classified as prime farmland if certain limitations of the soil are overcome. The measure needed to overcome the limitations of the soil is given in parentheses after the name of the map unit.

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 avoid 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 behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

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

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or 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

L. Mark Davis, district conservationist, Soil Conservation Service, helped to 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, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are 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 "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In 1980 about 105,750 acres in the survey area was used for crops and pasture, according to the most recent census data. Of this total, about 7,500 acres was used for row crops, mainly corn; 1,600 acres was used for close-growing crops, mainly wheat, oats, and barley; 16,800 acres was used for hay in rotation with other crops; 14,000 acres was used for permanent hay; 10,850 acres was used as apple and peach orchards; and 55,000 acres was used for pasture.

The acreage in cultivated crops in the county has been gradually increasing, and the acreage in pasture has been decreasing as beef cattle herds diminish. A considerable acreage of cropland and pasture has been converted to housing, industrial parks, and community development projects.

Soil erosion is a hazard on most cropland in the county. Controlling erosion is a major management concern. On most soils in the county, slope is more than 2 percent. Thus, these soils are subject to erosion.

Loss of the surface layer as a result of erosion reduces the productivity, the fertility, and the water-holding capacity of the soil. Erosion reduces productivity especially on soils that have a clayey subsoil, such as Frederick, Poplimento, and Carbo soils, and on soils in which bedrock is near the surface. Erosion also reduces productivity on soils that tend to be droughty, such as Weikert and Berks soils.

Soil erosion also results in sedimentation of streams. Controlling erosion minimizes sedimentation of streams and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Preparing a good seedbed through tillage is difficult on severely eroded spots because of the increased clay content and the decreased organic matter content in the present surface layer. A good stand of any crop is difficult to establish on the eroded spots because of the reduction both of available moisture capacity and soil-seed contact in the seedbed. Severely eroded spots are common along sharp slope breaks in cultivated areas.

Erosion control practices that provide a protective surface cover help to reduce runoff and to increase water infiltration. For example, using a cropping system that keeps a plant cover on the soil for extended periods can control erosion to amounts that will not reduce the productive capacity of the soils. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion and provide nitrogen and improve soil tilth for the following crop in the system.

Stripcropping and grassed waterways can be very effective in controlling erosion but are not used extensively in the survey area because they make the use of large machinery very difficult. These practices are best suited to soils that have smooth, uniform slopes. Terraces and diversions reduce the length of the slope and help to reduce runoff and to control erosion. They are most practical on deep, well drained soils that have long, smooth slopes. Contour tillage or terracing is not practical in most parts of the survey area because of irregular slopes. In many areas a substantial plant cover is needed to control erosion, especially on soils derived from shale or limestone.

Conservation tillage, leaving crop residue on the surface, and growing winter cover crops help to increase water infiltration, to reduce runoff, and to control erosion.

Soil fertility is low in most soils in the county. Most soils are very strongly acid or strongly acid, except where they have been limed. Maintaining the proper pH level enables crops to make more efficient use of fertilizers and soil moisture. Crops on most soils in the county respond well to lime and fertilizer if application is made according to soil tests.

Soil tilth is an important factor in seed germination and in water infiltration. Good tilth means the soils are granular and porous. However, poor tilth, results in cloddy soils, less soil-seed contact, and a poorer stand of plants.

On most soils used for crops in the county, the surface layer is silt loam, and organic matter content is low. Generally, the surface structure of these soils is weak, and rainfall causes the formation of a crust on the surface. The crust hardens when dry, reduces infiltration of water, and increases runoff. Regularly adding crop residue and other organic matter helps to improve soil structure and to reduce the formation of a crust.

Improving tilth is a management concern on soils that have a high clay content in the plow layer, such as Carbo, Chilhowie, and Oaklet soils, and in areas of most soils that are severely eroded. If these soils are plowed when wet, they tend to be cloddy when dry and a good seedbed is difficult to prepare.

Drainage is needed on a small acreage used for crops and pasture. Some soils are naturally so wet that the production of crops common to the area generally is not practical or possible, except where the soils are drained. These soils include the Blairton and Lobdell soils.

The design of surface and subsurface drainage systems varies with the kind of soil. In places a combination of surface and subsurface drainage can be used. Drains have to be more closely spaced in soils where permeability is slow than where permeability is moderate or rapid. Subsurface drainage can be used on soils where permeability is moderate. Some soils that have a fragipan can be drained by installing subsurface drains if the fragipan is deep enough for an adequate soil cover over the drain tile.

Field crops that can be grown in the survey area include corn, soybeans, sudex, and grain sorghum. Wheat, oats, barley, and rye are the common small grains.

Pasture in the county commonly consists of tall fescue, orchardgrass, and clovers. Korean lespedeza is grown for pasture in areas underlain by shale. Most improved pasture is seeded with mixtures of tall fescue and ladino clover. Cool-season pasture plants provide most spring and autumn grazing. Warm-season pasture plants, such as common and midland Bermudagrasses, do not grow well enough in the cool part of the year to provide suitable summer grazing.

Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the main concerns in pasture management. Overgrazing causes increased runoff and excessive erosion. Stocking rates within the carrying capacity, rotation grazing, deferred grazing, weed control, restricted grazing during wet periods, and lime and fertilizer are major pasture management practices. Stockpiling the accumulated growth of tall fescue for winter grazing reduces the need for hay.

The major hay plants are alfalfa, tall fescue, orchardgrass, and red clover. Most of the soils that formed in limestone, such as Carbo, Frederick, Oaklet, and Swimley soils, are suitable for growing alfalfa and clover. Maintaining a good stand of alfalfa requires a high level of soil fertility and proper management.

The main specialty crops are apples and peaches. Frederick County leads the state in apple production. More than 50 percent of the state's annual apple harvest is grown here. The unique combination of soils, relief, climate, and concentration of apple processing plants are the reasons for the county's importance in agriculture. Much of the local economy is dependent on fruit production and processing.

Other specialty crops include strawberries, Christmas trees, nursery plants, grapes, and truck crops. These crops are becoming increasingly popular as more and more small, part-time farmers look to develop small-scale, profitable enterprises.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops

that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. The levels are defined in the following paragraphs.

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 slight limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of each map is shown in table 6 and unit is given in the section "Detailed Soil Map Units"

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

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

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

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

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

Woodland Management and Productivity

Norman O. Wilson, forester, Soil Conservation Service, helped to prepare this section.

Woodland is the most extensive land use in Frederick County. About 141,000 acres, or 50 percent of the county, is woodland. About 40 percent of this total is classified as commercial woodland. Commercial woodland is woodland that is producing or is capable of producing in excess of 20 cubic feet per acre per year of industrial wood in natural stands.

Generally, there are two major forest types in the county. The oak-hickory forest type makes up 60 percent

of the commercial woodland. This type grows on Berks, Weikert, Gainesboro, and Lehew soils.

Some of the sparse stands of oak-hickory forest type can be improved by cutting the low quality trees for firewood. This allows the better trees to grow faster.

The oak-pine forest type makes up 40 percent of the commercial woodland. This type grows on Carbo, Chilhowie, and Oaklet soils.

In most areas of woodland potential productivity is moderate to low. In a few areas potential productivity is moderately high.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed in the tables. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 through 8, high; 9 through 11, very high; and 12 or more, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W*, excessive water in or on the soil; *D*, restricted rooting depth caused by bedrock, hardpan, or other restrictive layer; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, high content of rock fragments in the soil profile. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R,X,W,D,C,S, and F. In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 15. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities. The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *Slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 2 months. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 2 to 6 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 6 months. Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occuring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary. The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality.

Windthrow hazard is the likelihood of trees being uprooted (tipped over) by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions are a seasonal high water table and bedrock or a fragipan or other limiting layer. A rating of *slight* indicates that normally no trees are blown down by the wind. Strong winds may break trees but do not uproot them. A rating of *moderate* indicates that moderate or strong winds occasionally blow down a few trees during periods of soil wetness. A rating of *severe* indicates that moderate or strong winds may blow down many trees during periods of soil wetness. The use of specialized equipment that does not damage surficial root systems during partial cutting operations can help reduce windthrow. Care in thinning or no thinning also can help reduce windthrow.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those

that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, represents an expected volume produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand. One cubic meter per hectare equals 14.3 cubic feet per acre.

The first tree species listed under common trees for a soil is the indicator species for that soil. The indicator species is the species that is common in the area and is generally the most productive on the soil. The productivity class of the indicator species is the number used for the ordination symbol.

Trees to plant are those that are suited to the soil and are planted for commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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

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

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

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

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

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.

In table 9, 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 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 flood hazard. Soil temperature and soil moisture are also considerations. 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, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bluegrass, 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 flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are ragweed, curly dock, goldenrod, and Johnson grass.

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 hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are American hazel, autumn-olive, and hawthorne.

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, and red cedar.

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, slope, and surface stoniness. Examples of wetland plants are smartweed, arrowhead, burreed, pickerel weed, wild millet, 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 marshes, swamps, and ponds.

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

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, mourning dove, meadowlark, field sparrow, cottontail, 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, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

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

Engineering

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

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

The information is not site specific and does not eliminate the need for onsite investigation of the soils or

for testing and analysis by personnel experienced in the design and construction of engineering works.

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) 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 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or to 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 the 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, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of 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 and 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 needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench type 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 type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

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

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, or the water table to permit revegetation. The soil material used as 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 plant growth. Material from the surface

layer, therefore, should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have 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 the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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

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

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

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

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 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; embankments, dikes, and levees; and aquifer-fed

excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, and permeability of the aquifer. Depth to bedrock and the content of large stones affect the ease of excavation.

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 potential 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, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

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

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, such toxic substances as salts, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, 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 14 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 "Soil Series and Their Morphology."

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

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

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

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

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.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage

points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 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 consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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 shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

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

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. 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.

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.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

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 change is based on the soil fraction less than 2 millimeters in diameter. 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 in tons per acre per year. The 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 0.05 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 without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, 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 of 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 16 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 not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

Some soils in table 16 are assigned to two hydrologic soil groups. Dual grouping is used for some soils that are less than 20 inches deep to bedrock. The first letter applies to areas where the bedrock is cracked and pervious and the second letter to areas where the bedrock is impervious or where exposed bedrock covers more than 25 percent of the surface of the soil.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, or 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 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional, common,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *Common* is used when classification as occasional or frequent does not affect interpretations. 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. November-May, for example, means that flooding can occur during the period November through May. 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 absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

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. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. 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.

The two numbers in the "High water table-Depth" column 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 the water table exists 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 mainly 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 creates a severe corrosion environment. 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 is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*6*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten 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, 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 horizonation, plus *udult*, the suborder of the Ultisols that have a udic moisture regime).

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. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

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. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*4*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*6*). 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."

Berks Series

The Berks series consists of moderately deep, well drained soils in the mountains and valleys. These soils formed in residuum of shale, siltstone, and fine-grained sandstone. Slope ranges from about 2 to 65 percent.

Berks soils are commonly near Blairton, Clearbrook, Sequoia, and Weikert soils. Berks soils are better drained than Blairton and Clearbrook soils and have more shale fragments than Blairton soils. Berks soils are shallower to bedrock and have less clay than Sequoia soils. Berks soils are deeper to bedrock than the shallow Weikert soils.

Typical pedon of Berks channery silt loam, 7 to 15 percent slopes, 1/2 mile east of Virginia Route 664 and 75 yards north of Virginia Route 660:

Ap—0 to 8 inches; dark brown (10YR 4/3) channery silt loam; weak fine granular structure; friable, nonsticky and nonplastic; common fine roots; few fine pores; 20 percent shale channers; strongly acid; abrupt smooth boundary.

Bw1—8 to 14 inches; yellowish brown (10YR 5/4) very channery silt loam; weak fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; common very fine roots; many fine pores; 50 percent shale channers; very strongly acid; clear smooth boundary.

Bw2—14 to 22 inches; yellowish brown (10YR 5/4) very channery silt loam; weak very fine subangular blocky structure; friable, slightly sticky and nonplastic; common very fine roots; many fine discontinuous pores; 50 percent shale channers; very strongly acid; clear smooth boundary.

C—22 to 30 inches; strong brown (7.5YR 5/6) extremely channery silt loam; massive; friable, slightly sticky and nonplastic; few fine roots; few fine discontinuous pores; 80 percent shale channers; very strongly acid; clear irregular boundary.

Cr—30 inches; rippable shale.

The solum is 20 to 34 inches thick. Depth to bedrock is 20 to 40 inches. Shale and sandstone fragments range from 10 to 50 percent by volume, in the A horizon and from 25 to 75 percent in the B horizon. Shale fragments, range from 60 to 90 percent by volume, in the C horizon. Reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 3 or 4. It is channery, very channery, or very stony silt loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is channery or very channery silt loam or loam.

The C horizon is silt loam between fragments of shale or fine-grained sandstone.

Bedrock commonly is fractured shale and fine-grained sandstone.

Birdsboro Series

The Birdsboro series consists of very deep, well drained soils on flood plains and on low river terraces. These soils formed in alluvium of weathered red and gray acid shale. Slope ranges from 0 to 3 percent.

Birdsboro soils are commonly near Berks, Craigsville, Weikert, and Wheeling soils. Birdsboro soils are deeper to bedrock than Berks and Weikert soils. Birdsboro soils have fewer rock fragments throughout than Craigsville soils. Birdsboro soils are redder throughout than Wheeling soils.

Typical pedon of Birdsboro loam, approximately 100 yards south of Isaacs Creek, 800 yards west-northwest of Virginia Route 681, and 1.5 miles northeast of U.S. 522:

Ap—0 to 13 inches; dark brown (7.5YR 4/3) loam; weak fine granular structure; friable, nonsticky and nonplastic; few fine roots; few fine and medium pores; moderately acid; abrupt smooth boundary.

BE—13 to 21 inches; yellowish red (5YR 4/6) silt loam; many medium and coarse faint brown (7.5YR 4/4) mottles; moderate medium and coarse subangular blocky structure; friable, nonsticky and nonplastic; few fine roots; common fine and medium pores; strongly acid; gradual wavy boundary.

Bt1—21 to 34 inches; yellowish red (5YR 5/6) silty clay loam; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; friable, nonsticky and nonplastic; few fine roots; many fine and medium pores; few thin patchy clay films; few black stains; strongly acid; gradual wavy boundary.

Bt2—34 to 47 inches; yellowish red (5YR 5/6) silty clay loam; few medium faint reddish yellow (5YR 6/6) mottles; moderate medium and coarse subangular blocky structure; friable, nonsticky and nonplastic; few fine roots; common fine pores; common thick patchy clay films; common black stains on ped faces; strongly acid; clear smooth boundary.

Bt3—47 to 62 inches; yellowish red (5YR 5/6) silt loam; common coarse distinct light reddish brown (5YR 6/4) and common medium faint reddish yellow (5YR 6/6) mottles; moderate coarse subangular blocky structure; friable, nonsticky and nonplastic; few fine pores; common thick patchy clay films; many black stains on ped faces; strongly acid.

The solum is 40 to 70 inches thick. Depth to bedrock is more than 70 inches. Rock fragments in the A and B horizons range from 0 to 10 percent. Reaction is moderately acid or strongly acid, except where the soils have been limed.

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

The B horizon has hue of 7.5YR to 2.5YR, value of 4 to 6, and chroma of 4 to 6. It is loam, silt loam, or silty clay loam.

Some pedons have a C horizon that has hue of 10YR to 2.5YR, value of 2 to 6, and chroma of 3 to 6. It is loamy sand, sandy loam, loam, or their gravelly analogs.

Birdsboro soils in this survey area are a taxadjunct to the Birdsboro series because they have a thicker solum than that defined in the range of characteristics for the series. This difference does not significantly affect the use or behavior of the soils.

Blairton Series

The Blairton series consists of moderately deep, somewhat poorly drained to moderately well drained soils mainly in the valley region. These soils formed mainly in acid sandstone and gray acid shale. Slope ranges from 2 to 15 percent.

Blairton soils are commonly near the Berks, Clearbrook, Sequoia, and Weikert soils. Berks, Sequoia, and Weikert soils are well drained. Blairton soils have fewer shale fragments than Berks, Clearbrook, and Weikert soils. Blairton soils have less clay in the subsoil and are shallower to bedrock than Sequoia soils. Weikert soils are shallow.

Typical pedon of Blairton silt loam, 2 to 7 percent slopes, 3/4 mile east of U.S. 50, 3/4 mile southeast of Virginia Route 655:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; moderate fine and medium granular structure; friable, nonsticky and nonplastic; many fine and medium roots; common fine pores; many worm channels; 5 percent shale channers; slightly acid; abrupt smooth boundary.

Bt1—9 to 18 inches; yellowish brown (10YR 5/6) silty clay loam; few fine faint light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; friable, sticky and nonplastic; few medium roots; few fine pores; few worm channels; common thin clay films on faces of peds; 10 percent shale channers; moderately acid; abrupt smooth boundary.

Bt2—18 to 23 inches; light yellowish brown (10YR 6/4) channery silty clay loam; common medium distinct olive gray (5Y 5/2) and dark brown (7.5YR 4/4) mottles; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common thin clay films on faces of peds; 20 percent shale channers; very strongly acid; abrupt smooth boundary.

Bt3—23 to 30 inches; strong brown (7.5YR 5/6) channery silty clay loam; common medium distinct light olive gray (5Y 6/2) and light gray (5YR 7/1) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on faces of peds; few fine and medium pores; 20 percent shale channers; very strongly acid; clear smooth boundary.

C—30 to 36 inches; yellowish brown (10YR 5/6) very channery silt loam; many medium prominent light gray (5YR 7/1) and common fine distinct pale olive (5Y 6/4) mottles; weak thin platy structure; firm, sticky and plastic; common fine pores; 40 percent shale channers; very strongly acid; clear smooth boundary.

Cr—36 inches; acid shale bedrock; fractured shale has gray clay coatings.

The solum ranges from 20 to 40 inches in thickness. Depth to rippable bedrock is 20 to 40 inches. Rock fragments make up from 5 to 25 percent of the A horizon, 10 to 50 percent of the B horizon, and 30 to 70 percent of the C horizon. Reaction is strongly acid or very strongly acid, except where the soils have been limed.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam, loam, or their channery analogs.

The B horizon has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 4 to 6. It is silt loam, silty clay loam, or their channery or very channery analogs.

The C horizon is the same colors as the B horizon. It is loam, silt loam, or their channery, very channery, or extremely channery analogs.

Buchanan Series

The Buchanan series consists of very deep, somewhat poorly drained soils on mountains. These soils formed in colluvium of soils derived largely from acid sandstone and shale. Slope ranges from 2 to 15 percent.

Buchanan soils are commonly near Berks, Laidig, and Weikert soils. Unlike Berks and Weikert soils, Buchanan soils have a fragipan. The seasonal high water table is closer to the surface in Buchanan soils than in Berks and Weikert soils. Buchanan soils are somewhat poorly drained, and Berks, Laidig, and Weikert soils are well drained.

Typical pedon of Buchanan gravelly sandy loam, in an area of Buchanan very stony sandy loam, 7 to 15 percent slopes, approximately 3/4 mile southeast of Virginia Route 740, 3/4 mile south-southwest of Rock Enon Springs Lake, 500 yards northwest of power line:

Oi—6 to 3 inches; loose leaves and twigs.

Oe—3 inches to 0; black (10YR 2/1) organic mat.

A—0 to 5 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak fine subangular blocky structure; friable; many fine and common medium roots; many fine and common medium pores; 15 percent angular sandstone pebbles; very strongly acid; clear smooth boundary.

BA—5 to 12 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine subangular blocky structure; friable; common fine and medium and few coarse roots; many fine pores; 10 percent angular sandstone pebbles; very strongly acid; gradual wavy boundary.

Bt1—12 to 18 inches; strong brown (7.5YR 5/6) sandy loam; few fine faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; many fine pores; common thin patchy clay films; 10 percent angular sandstone channers; very strongly acid; clear wavy boundary.

Bt2—18 to 26 inches; strong brown (7.5YR 5/6) sandy clay loam; medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common fine pores; many thin patchy clay films; 10 percent sandstone channers; very strongly acid; clear wavy boundary.
Btx—26 to 46 inches; reddish brown (5YR 4/4) very gravelly sandy loam; moderate fine subangular blocky structure; firm and brittle, slightly sticky and nonplastic; many fine pores; common thin patchy clay films; 50 percent sandstone pebbles and cobbles; strongly acid; clear smooth boundary.
C—46 to 60 inches; light gray (5YR 7/1) gravelly silty clay loam; many coarse prominent yellowish red (5YR 5/8) mottles; massive; friable, slightly sticky and slightly plastic; common fine pores; 30 percent angular sandstone pebbles and cobbles; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 20 to 30 inches. Rock fragments make up from 5 to 40 percent in the A horizon, from 5 to 35 percent in the BA and Bt horizons, and from 15 to 60 percent in the Btx and C horizons. These consist mainly of sandstone and quartzite channers and pebbles. Reaction is strongly acid and very strongly acid throughout, except where the soils are limed.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4. It is loam, silt loam, sandy loam, or their gravelly analogs.

The BA and Bt horizons have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6. Low chroma mottles are common in this horizon. The BA and Bt horizons are clay loam, sandy clay loam, sandy loam, loam, or their channery or gravelly analogs.

The Btx horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 or 6. Low and high chroma mottles are common in this horizon. The Btx horizon is sandy loam, sandy clay loam, clay loam, or their channery, very channery, gravelly, or very gravelly analogs.

The C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 6. Low and high chroma mottles are common in this horizon. Texture is loam, sandy clay loam, clay loam, silty clay loam, or their gravelly, very gravelly, channery, or very channery analogs.

Carbo Series

The Carbo series consists of moderately deep, well drained soils in the limestone valley. These soils formed in residuum of limestone or interbedded limestone and calcareous shale. Slope ranges from 2 to 15 percent.

Carbo soils are commonly near Chilhowie and Oaklet soils. Carbo soils have a thicker solum and fewer rock fragments in the substratum than Chilhowie soils. Carbo soils have a thinner solum and are shallower to bedrock than Oaklet soils.

Typical pedon of Carbo silt loam, 2 to 7 percent slopes, 75 yards southwest of Virginia Route 652, 60 yards northwest of Virginia Route 651:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; few fine and medium roots; many fine and medium pores; neutral; abrupt smooth boundary.
Bt1—9 to 13 inches; dark brown (7.5YR 4/4) silty clay; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine pores; thick continuous clay films; 10 percent limestone channers and chert pebbles; neutral; gradual wavy boundary.
Bt2—13 to 19 inches; strong brown (7.5YR 5/6) clay; massive; firm, very sticky and very plastic; thick continuous clay films; common slickensides; neutral; gradual wavy boundary.
Bt3—19 to 26 inches; strong brown (7.5YR 5/6) clay that has yellowish red (5YR 5/6) and light olive brown (2.5Y 5/4) varigated streaks; massive; firm, very sticky and very plastic; thick continuous clay films; few dark colored oxide stains; neutral; clear broken boundary.
R—26 inches; limestone bedrock.

Solum thickness and depth to bedrock is 20 to 40 inches. Rock fragments are mainly limestone and chert. Reaction ranges from strongly acid to neutral.

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

The Bt horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 to 8.

Some pedons have a C horizon that has hue of 5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. It is silty clay or clay.

Chilhowie Series

The Chilhowie series consists of moderately deep, well drained soils in the valley. These soils formed in residuum of limestone and interbedded limestone and shale. Slope ranges from 2 to 45 percent.

Chilhowie soils are commonly near Carbo and Oaklet soils. Chilhowie soils have a thinner solum and have more rock fragments in the substratum than Carbo soils. Chilhowie soils are shallower to bedrock than Oaklet soils.

Typical pedon of Chilhowie silty clay loam, 2 to 7 percent slopes, approximately 1,500 feet north of intersection of Virginia Routes 671 and 668, 750 feet east of Virginia Route 671, 300 feet north of lane:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine granular structure; friable, slightly sticky and slightly plastic; many fine roots; many fine pores; 2 percent limestone channers; neutral; abrupt smooth boundary.
Bt1—7 to 12 inches; brown (7.5YR 4/4) clay; moderate coarse prismatic structure; firm, sticky and plastic; common fine roots; common fine pores; many thick patchy clay films; common slickensides; common black stains; 3 percent limestone channers; neutral; abrupt wavy boundary.
Bt2—12 to 17 inches; dark yellowish brown (10YR 4/6) clay; moderate coarse subangular blocky structure; very firm, sticky and plastic; common fine roots; common fine pores; many thick patchy clay films; common slickensides; 5 percent limestone channers; mildly alkaline; clear wavy boundary.
C—17 to 27 inches; yellowish brown (10YR 5/6) very channery silty clay; massive; very firm, sticky and plastic; few fine roots; few fine pores; common thin patchy clay films; common black stains; 35 percent limestone channers; moderately alkaline.
R—27 inches; limestone bedrock.

The solum is 10 to 20 inches thick. Depth to bedrock is 20 to 40 inches. Limestone and shale channers and flagstones make up 0 to 15 percent of the solum and 25 to 70 percent of the C horizon. Reaction in the solum ranges from slightly acid to mildly alkaline and in the substratum from neutral to moderately alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is silty clay loam or silty clay.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay or clay.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The fine earth fraction is silty clay or clay.

Clearbrook Series

The Clearbrook series consists of moderately deep, somewhat poorly drained soils in the valley. These soils formed in residuum of acid, gray shale and sandstone. Slope ranges from 2 to 15 percent.

Clearbrook soils are commonly near Berks, Blairton, Sequoia, and Weikert soils. Unlike Berks, Sequoia, and Weikert soils, Clearbrook soils have a perched seasonal high water table. Clearbrook soils have more shale fragments than Blairton and Sequoia soils, are shallower to bedrock than Sequoia soils, and are deeper to bedrock than Weikert soils.

Typical pedon of Clearbrook channery silt loam, 2 to 7 percent slopes, 0.6 mile southeast of U.S. Route 11, north 0.2 mile northeast of intersection of Virginia Routes 664 and 666:

Ap—0 to 7 inches; dark brown (10YR 4/3) channery silt loam; weak fine granular structure; friable, slightly sticky and nonplastic; many fine and very fine roots; 25 percent shale channers; slightly acid; abrupt wavy boundary.
Bt1—7 to 14 inches; pale brown (10YR 6/3) very channery silty clay loam; common fine distinct light gray (10YR 7/2) and many medium distinct yellowish brown (10YR 5/6) mottles; moderate fine and very fine subangular blocky structure; friable, slightly sticky and nonplastic; many fine and very fine roots; common fine pores; thin very patchy clay films on faces of peds; 45 percent shale channers; strongly acid; clear wavy boundary.
Bt2—14 to 23 inches; light gray (10YR 6/1) and light brownish gray (10YR 6/2) very channery silty clay loam; common fine distinct brown (7.5YR 5/4) mottles; strong fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films on faces of peds; few fine roots; 55 percent shale channers; strongly acid; clear wavy boundary.
C—23 to 27 inches; gray (10YR 6/1) extremely channery silty clay loam; common fine and medium distinct strong brown (7.5YR 5/6) and light olive gray (5Y 6/2) mottles; massive; friable, slightly sticky and plastic; few fine roots; 75 percent shale channers; strongly acid.
Cr—27 inches; soft, shale bedrock.

The solum ranges from 18 to 30 inches in thickness. Depth to bedrock is 20 to 40 inches. Fragments of shale range from 15 to 60 percent, by volume, in the Ap horizon, 25 to 60 percent in the B horizon, and 50 to 90 percent in the C horizon. Reaction in the solum is strongly acid or very strongly acid, unless the soils are limed.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3. It is channery silt loam or very channery silt loam.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. The fine earth texture is silt loam, silty clay loam, or silty clay. Mottles of chroma of 2 or less are in one or both layers of the Bt horizon, between a depth of 10 and 26 inches.

The C horizon has the same colors as the B horizon. The fine earth texture is silt loam, silty clay loam, or silty clay.

Craigsville Series

The Craigsville series consists of very deep, well drained soils on flood plains. These soils formed in moderately coarse textured alluvium. Slope ranges from 0 to 5 percent.

Craigsville soils are commonly near Berks, Birdsboro, Weikert, and Wheeling soils. Craigsville soils are on flood

plains, and Berks and Weikert soils are on uplands. Craigsville soils are deeper to bedrock than Berks and Weikert soils. Craigsville soils have more rock fragments throughout than Birdsboro and Wheeling soils.

Typical pedon of Craigsville cobbly sandy loam, 1 3/4 miles north of the intersection of Virginia Routes 685 and 681, 30 yards east of Brush Creek, 20 yards east of Virginia Route 681:

Oe—2 inches to 0; very dark grayish brown (10YR 3/2) organic mat.
A—0 to 5 inches; dark brown (10YR 3/3) cobbly sandy loam; weak fine granular structure; friable; many fine and medium roots; few fine pores; 25 percent sandstone cobbles and pebbles; very strongly acid; abrupt smooth boundary.
Bw1—5 to 13 inches; reddish brown (5YR 4/4) very cobbly sandy loam; weak fine subangular blocky structure; friable; many fine and medium roots; few fine pores; few clay coatings on sand grains; 35 percent sandstone cobbles and pebbles; very strongly acid; clear wavy boundary.
Bw2—13 to 23 inches; reddish brown (5YR 4/4) very cobbly sandy loam; weak fine and medium subangular blocky structure; very friable; few medium roots; few organic stains on faces of rock fragments; 50 percent sandstone cobbles, pebbles, and stones; very strongly acid; clear smooth boundary.
Bw3—23 to 37 inches; reddish brown (5YR 4/4) very cobbly sandy loam; weak fine and medium subangular blocky structure; very friable; few fine roots; 50 percent sandstone cobbles and pebbles; very strongly acid; clear wavy boundary.
C—37 to 60 inches; reddish brown (5YR 4/4) extremely cobbly sandy loam that has pockets of silt loam; massive; loose, very friable; few fine roots; 60 percent cobbles, pebbles, and stones; very strongly acid.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 60 inches. Rounded pebbles and cobbles make up 10 to 50 percent of the A horizon and 35 to 60 percent of the B and C horizons. Reaction is very strongly acid or strongly acid throughout, except where the soils are limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. It is sandy loam, cobbly sandy loam, or gravelly sandy loam.

The B horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 or 6. The fine earth texture is sandy loam or loam.

The C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. The fine earth texture is loamy sand or sandy loam. Some pedons have a thin layer that is less than 15 percent pebbles or cobbles.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils on mountains. These soils formed in residuum of sandstone and quartzite. Slope ranges from 7 to 65 percent.

Dekalb soils are commonly near Gainesboro, Hazleton, Laidig, and Lehew soils. Dekalb soils have more sand in the profile than Gainesboro soils, are shallower to bedrock than Hazleton and Laidig soils, and are yellower than Lehew soils.

Typical pedon of Dekalb channery loam in an area of Dekalb very stony loam, 25 to 65 percent slopes, on Timber Ridge, approximately 0.7 mile north of Virginia Route 701, 0.5 mile south of Virginia Route 127:

Oi—5 to 3 inches; loose leaves and twigs.
Oe—3 inches to 0; black (10YR 2/1) organic mat.
A—0 to 4 inches; dark brown (7.5YR 3/2) channery loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; many fine and medium pores; 25 percent sandstone channers; moderately acid; abrupt smooth boundary.
E—4 to 15 inches; brown (7.5YR 5/4) channery loam; moderate fine and medium granular structure; very friable; many fine, medium, and coarse roots; many fine and medium pores; 30 percent sandstone channers and flagstones; very strongly acid; clear wavy boundary.
Bw1—15 to 19 inches; strong brown (7.5YR 5/6) very channery loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; many fine pores; 35 percent sandstone channers; very strongly acid; clear wavy boundary.
Bw2—19 to 29 inches; strong brown (7.5YR 5/8) very channery loam; moderate fine and medium subangular blocky structure; friable; common fine and few medium roots; common fine pores; 40 percent sandstone channers and flagstones; very strongly acid; gradual wavy boundary.
C—29 to 35 inches; strong brown (7.5YR 5/8) extremely flaggy loam; massive; friable, slightly sticky and nonplastic; few fine roots; few fine pores; 70 percent sandstone flagstones and channers; strongly acid.
R—35 inches; fractured sandstone bedrock.

The solum thickness and depth to bedrock are 26 to 40 inches. Sandstone pebbles, channers, cobbles, and flagstones make up 20 to 30 percent of the A horizon, 30 to 50 percent of the B horizon, and 50 to 75 percent of the C horizon. Reaction is very strongly acid to moderately acid in the A and E horizons and very strongly acid or strongly acid in the B and C horizons.

The A and E horizons have hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. They are channery loam or channery sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 6 or 8. It is flaggy loam, channery loam, very channery loam, flaggy sandy loam, or channery sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is channery loam, very channery loam, extremely flaggy loam, channery sandy loam, or very channery sandy loam.

Frankstown Series

The Frankstown series consists of deep, well drained soils on mountains and in the valley. These soils formed in residuum of siltstone, limestone, and, in varying amounts, sandstone. Slope ranges from 2 to 35 percent.

Frankstown soils are commonly near Carbo, Frederick, and Poplimento soils. Frankstown soils are deeper to bedrock than the moderately deep Carbo soils, and are yellower in the upper part of the subsoil than Frederick and Poplimento soils.

Typical pedon of Frankstown channery silt loam, 7 to 15 percent slopes, 500 yards south of intersection of Virginia Routes 739 and 672, 75 yards west of Virginia Route 739:

Ap1—0 to 4 inches; dark brown (10YR 4/3) channery silt loam; weak fine granular structure; friable; many fine roots; many fine pores; 25 percent siltstone channers; neutral; abrupt wavy boundary.

Ap2—4 to 8 inches; dark yellowish brown (10YR 4/4) channery silt loam; moderate fine granular structure; friable; many fine roots; many fine pores; 20 percent siltstone channers; neutral; abrupt smooth boundary.

BA—8 to 15 inches; yellowish brown (10YR 5/8) channery silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; many fine pores; 15 percent siltstone channers; slightly acid; gradual smooth boundary.

Bt1—15 to 25 inches; strong brown (7.5YR 5/6) channery silty clay; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; many fine and medium pores; thin continuous clay films; 15 percent siltstone channers; moderately acid; abrupt wavy boundary.

Bt2—25 to 40 inches; strong brown (7.5YR 5/8) very channery silty clay that has pockets of clay; massive; friable; few fine pores; thin clay films on siltstone fragments; common black stains; 35 percent siltstone channers; moderately acid; broken discontinuous boundary.

C—40 to 62 inches; strong brown (7.5YR 5/6) clay that has many coarse distinct brownish yellow (10YR 6/8) mottles; massive; firm, sticky and plastic; moderately acid.

The solum is 24 to 48 inches thick. Depth to bedrock is more than 60 inches. The soil is moderately acid or strongly acid, except where the soils have been limed. Rock fragments, mostly siltstone, make up 10 to 35 percent of the Ap, BA, and Bt1 horizons, 35 to 60 percent of the Bt2 horizon, and 0 to 10 percent of the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. It is silt loam, channery silt loam, silty clay loam, or channery silty clay loam.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8. The BA and Bt1 horizons are silty clay loam, clay loam, silty clay, clay, or their channery or very channery analogs. The Bt2 horizon is very channery silty clay loam, very channery silty clay, or very channery clay.

The C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 or 8.

Frederick Series

The Frederick series consists of very deep, well drained soils on valley uplands. These soils formed in residuum of limestone. Slope ranges from about 2 to 60 percent.

Frederick soils are commonly near Frankstown, Poplimento, and Swimley soils. Unlike Frankstown soils, Frederick soils are redder in the B horizon. Unlike Frederick soils, Frankstown soils have fragments of siltstone. Frederick soils have a thicker solum than Poplimento soils, and are not as red as Swimley soils.

Typical pedon of Frederick loam, in an area of Frederick-Poplimento loams, 2 to 7 percent slopes, 700 yards south of intersection of Virginia routes 628 and 631, 20 yards north of lane:

Ap—0 to 7 inches; dark brown (7.5YR 4/4) loam; weak fine granular structure; friable; many fine roots; common fine pores; 5 percent angular chert pebbles; moderately acid; gradual wavy boundary.

BAt—7 to 12 inches; yellowish red (5YR 5/6) silty clay loam; moderate medium and fine subangular blocky structure; friable; few fine roots; many fine pores; 10 percent skeletons; 10 percent angular chert pebbles; moderately acid; clear wavy boundary.

Bt1—12 to 25 inches; yellowish red (5YR 4/6) clay; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; thick continuous clay films; common slickensides; moderately acid; gradual wavy boundary.

Bt2—25 to 47 inches; yellowish red (5YR 4/6) and yellowish brown (10YR 5/6) clay; few fine, distinct light yellowish brown (10YR 6/4) mottles; moderate medium and coarse subangular blocky structure; friable, slightly sticky and slightly plastic; thick continuous clay films; moderately acid; gradual wavy boundary.

Bt3—47 to 64 inches; yellowish red (5YR 4/6) and yellowish brown (10YR 5/6) clay; few medium distinct light yellowish brown (10YR 6/4) mottles; weak medium and coarse prismatic structure; friable, slightly sticky and slightly plastic; thick continuous clay films; common slickensides; strongly acid; gradual wavy boundary.
Bt4—64 to 72 inches; yellowish red (5YR 4/6) and yellowish brown (10YR 5/6) silty clay; weak medium and coarse prismatic structure; thick continuous clay films; few slickensides; strongly acid.

The solum is 60 inches or more thick. Depth to bedrock is more than 60 inches. The soil is moderately acid or strongly acid. Rock fragments, mostly chert, range from 0 to more than 50 percent, by volume, in the A horizon and from 0 to 30 percent in the B horizon.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. It is loam or silt loam.

The BA horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 or 8. It is silt loam, loam, silty clay loam, or clay loam. It has common to many skeletons.

The Bt horizon in the upper part has hue of 5YR to 7.5YR, value of 4 or 5, and chroma of 6 or 8. It is silty clay or clay.

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

Gainesboro Series

The Gainesboro series consists of moderately deep, well drained soils on mountain uplands. These soils formed in residuum of shale, siltstone, and fine-grained sandstone. Slope ranges from about 2 to 65 percent.

Gainesboro soils commonly are near Berks, Dekalb, Lehew, and Weikert soils. Unlike Berks and Dekalb soils, Gainesboro soils have hue redder than 7.5YR in the solum. Gainesboro soils have less sand and fewer sandstone fragments in the subsoil than Lehew soils. Gainesboro soils are deeper and redder than Weikert soils.

Typical pedon of Gainesboro channery loam, in an area of Gainesboro-Lehew complex, 2 to 7 percent slopes, 550 yards northwest of Virginia Route 694, 500 yards northeast of U.S. Route 522, 250 yards northeast of farm lane:

Ap—0 to 8 inches; reddish brown (5YR 5/3) channery loam; weak fine and medium granular structure; friable; many fine and very fine roots; 20 percent shale channers; slightly acid; abrupt smooth boundary.
Bt1—8 to 17 inches; reddish brown (5YR 4/4) channery silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; 25 percent shale channers; strongly acid; clear wavy boundary.
Bt2—17 to 26 inches; reddish brown (5YR 4/4) very channery silty clay loam; moderate fine and medium subangular blocky structure; firm; thin patchy clay films on faces of peds; 50 percent shale channers; very strongly acid; clear wavy boundary.
C—26 to 32 inches; reddish brown (5YR 4/4) extremely channery silty clay loam; massive; firm; few fine roots; 70 percent shale channers; moderately acid.
R—32 inches; reddish brown (2.5YR 4/4) hard sandstone bedrock.

The solum is 20 to 30 inches thick. Depth to bedrock is 20 to 40 inches. Channers and flagstones of shale, siltstone, and fine-grained sandstone make up 10 to 50 percent of the solum and from 50 to 90 percent of the substratum. Reaction ranges from very strongly acid through moderately acid, except where the soils have been limed.

The A horizon has hue of 5YR and 7.5YR, value of 2 to 5, and chroma of 2 to 4. It is silt loam or its channery or very channery analogs.

The B horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 3 and 4. It is silt loam, silty clay loam, clay loam, or their channery or very channery analogs.

The C horizon is similar in color to the B horizon, but commonly has more channers and flagstones.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils on mountains. These soils formed in residuum of shale, siltstone, and fine-grained sandstone. Slope ranges from 7 to 15 percent.

Gilpin soils commonly are near Berks, Dekalb, Gainesboro, and Lehew soils. Gilpin soils have more clay and fewer rock fragments in the control section than Berks, Dekalb, and Lehew soils. Gilpin soils have less clay and fewer rock fragments in the control section than Gainesboro soils.

Typical pedon of Gilpin channery loam, 7 to 15 percent slopes, approximately 40 yards west of Virginia Route 608, 2 miles north of U.S. Route 522:

Oe—3 inches to 0; loose leaves, twigs, and other partly decomposed organic material.
A—0 to 3 inches; dark brown (10YR 4/3) channery loam; weak fine granular structure; friable; many fine roots; 16 percent shale and sandstone channers; very strongly acid; abrupt wavy boundary.
E—3 to 8 inches; yellowish brown (10YR 5/4) channery loam; weak fine subangular blocky structure; friable; many fine roots; 20 percent shale and sandstone channers; very strongly acid; clear smooth boundary.
Bt1—8 to 14 inches; yellowish brown (10YR 5/6) channery loam; weak fine subangular blocky structure; friable, slightly sticky and nonplastic; many fine and common medium and coarse roots; few

patchy clay films; 20 percent sandstone and shale channers; very strongly acid; clear wavy boundary.
Bt2—14 to 24 inches; yellowish brown (10YR 5/6) very channery loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; common thin patchy clay films; 40 percent strongly weathered shale channers; very strongly acid; gradual wavy boundary.
C—24 to 37 inches; strong brown (7.5YR 5/6) extremely channery silt loam; massive; friable; few fine roots; 70 percent shale channers; very strongly acid.
Cr—37 inches; weathered shale bedrock.

The solum is 20 to 35 inches thick. Depth to bedrock is 20 to 40 inches. Reaction is strongly acid or very strongly acid. Shale and sandstone fragments range from 10 to 25 percent, by volume, in the A and E horizons. Shale or sandstone fragments range from 10 to 50 percent, by volume, in the B horizon, and average less than 35 percent, by volume. Shale or sandstone fragments range, by volume, from 35 to 90 percent, by volume, in the C horizon.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is loam, silt loam, or their channery analogs.

The E horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is loam, silt loam, or their channery analogs.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. They are loam, silt loam, or their channery or very channery analogs.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is the very channery or extremely channery analogs of loam or silt loam.

Guernsey Series

The Guernsey series consists of very deep, moderately well drained soils in the valley. These soils formed in colluvium. Slope ranges from 2 to 15 percent.

Guernsey soils commonly are near Frederick and Poplimento soils. Unlike the well drained Frederick and Poplimento soils, Guernsey soils have gray mottles in the subsoil.

Typical pedon of Guernsey silt loam, 2 to 7 percent slopes, 25 yards north of Virginia Route 672, approximately 250 yards east of intersection of Virginia Routes 672 and 677:

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure parting to weak fine granular; friable; many fine roots; many fine pores; 10 percent sandstone pebbles; neutral; abrupt smooth boundary.
BA—12 to 20 inches; yellowish brown (10YR 5/4) gravelly silty clay loam; few fine faint strong brown (7.5YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; many fine pores; few thin patchy clay films; 20 percent sandstone pebbles and cobbles; neutral; clear wavy boundary.
2Bt1—20 to 40 inches; strong brown (7.5YR 5/6) clay; many medium distinct red (2.5YR 4/8) and few fine distinct light gray (10YR 7/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, sticky and slightly plastic; few fine roots; few fine pores; thick patchy clay films; thin layers of sandy loam coatings on vertical prism faces; few black concretions; 5 percent angular sandstone pebbles; strongly acid; gradual smooth boundary.
2Bt2—40 to 54 inches; yellowish brown (10YR 5/6) clay; many medium distinct light gray (10YR 7/2) and light olive gray (5Y 6/2) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine pores; many thin continuous clay films; few slickensides; 5 percent angular sandstone pebbles; strongly acid; gradual wavy boundary.
2C1—54 to 68 inches; yellowish brown (10YR 5/4) clay; common medium distinct light gray (10YR 7/1) mottles; massive; firm, slightly sticky and slightly plastic; few fine pores; slightly acid; gradual wavy boundary.
2C2—68 to 72 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light gray (10YR 7/1) mottles; massive; friable, slightly sticky and nonplastic; mildly alkaline.

The solum is 40 to 60 inches thick or more. Depth to bedrock is 50 to 80 inches. Rock fragments make up 0 to 15 percent of the A horizon and 0 to 20 percent of the B and C horizons. Reaction is moderately acid or strongly acid in the A horizon, except where the soils have been limed. Reaction is strongly acid to neutral in the B horizon and slightly acid to moderately alkaline in the C horizon.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. In the upper part it is silt loam, silty clay loam, or their gravelly analogs. In the lower part it is silty clay loam, silty clay, clay, or their gravelly analogs.

The C horizon is similar in color to the B horizon. It is clay, clay loam, silty clay loam, or their gravelly analogs.

Hayter Series

The Hayter series consists of very deep, well drained soils on mountains. These soils formed in colluvium derived from limestone and sandstone. Slope ranges from 7 to 40 percent.

Hayter soils commonly are near Berks, Guernsey, Frederick, and Poplimento soils. Hayter soils are deeper

to bedrock and have more clay in the profile than Berks soils, and have more rock fragments in the profile than Guernsey, Frederick, and Poplimento soils.

Typical pedon of Hayter cobbly loam, 7 to 15 percent slopes, on Flint Ridge, approximately 175 yards east of Virginia Route 654, 0.8 mile north of Virginia Route 697, 0.5 mile west of U.S. Route 522 North:

Oi—2 inches to 1 inch; loose leaves and twigs.
Oe—1 inch to 0 inch; organic mat.
Ap—0 to 9 inches; yellowish brown (10YR 5/6) cobbly loam; moderate fine subangular blocky structure; friable, nonsticky; many fine and common medium roots; many fine pores; 20 percent angular sandstone cobbles; strongly acid; clear wavy boundary.
Bt1—9 to 15 inches; strong brown (7.5YR 5/6) clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine and medium roots; few fine pores; thin patchy clay films; 10 percent angular sandstone cobbles; strongly acid; gradual wavy boundary.
Bt2—15 to 26 inches; yellowish red (5YR 5/6) clay loam; many coarse distinct strong brown (7.5YR 5/6) mottles; strong fine and medium roots; few fine pores; thick patchy clay films; 10 percent angular sandstone pebbles; strongly acid; abrupt wavy boundary.
Bt3—26 to 47 inches; yellowish red (5YR 4/6) cobbly clay loam; few medium distinct pale brown (10YR 6/3) and few fine distinct yellowish brown (10YR 5/6) mottles; strong medium and coarse subangular blocky structure; firm, sticky and plastic; few fine roots; few fine pores; thick patchy clay films; 25 percent angular sandstone cobbles; strongly acid; clear wavy boundary.
2C—47 to 60 inches; strong brown (7.5YR 5/6) cobbly clay loam; common medium distinct pale brown (10YR 6/3) mottles; massive; very firm; common fine pores; 30 percent angular sandstone cobbles; strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 48 inches. Reaction is moderately acid or strongly acid throughout, except where they have been limed. Rock fragments, mostly sandstone and some weathered limestone and chert, range, from 10 to 50 percent, by volume, in the A horizon, 5 to 30 percent in the B horizon, and 25 to 50 percent in the C horizon. In many pedons few to many black stains and concretions are in the lower part of the B horizon.

The A horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam, sandy loam, silt loam or their cobbly, very cobbly, cherty or very cherty analogs.

The B horizon has hue of 5YR to 10YR, value of 4 to 5, and chroma of 6 or 8. There are high chroma mottles in the upper part of the B horizon, and low and high chroma mottles in the lower part. The B horizon is clay loam, sandy clay loam, or their cobbly analogs.

The C horizon, where present, is similar in colors to the B horizon. It is gravelly, very gravelly, cobbly, or very cobbly loam, clay loam, or clay.

Hazleton Series

The Hazleton series consists of deep, well drained soils on mountains. These soils formed in residuum of sandstone and quartzite. Slope ranges from 7 to 65 percent.

Hazleton soils commonly are near Dekalb, Laidig, and Weikert soils. Hazleton soils are deeper to bedrock than Dekalb soils, and have more sand and rock fragments than Laidig soils. Unlike Hazleton soils, Laidig soils have a fragipan. Hazleton soils are deeper to bedrock than Weikert soils.

Typical pedon of Hazleton channery sandy loam, in an area of Hazleton very stony sandy loam, 15 to 25 percent slopes, 1.9 miles southwest of Virginia Route 600 on top of Great North Mountain:

Oi—5 to 2 inches; loose leaves and twigs.
Oa—2 inches to 0; black (10YR 2/1) organic matter.
A—0 to 2 inches; dark gray (10YR 4/1) channery sandy loam; weak fine granular structure; very friable; common very fine and fine roots; many very fine discontinuous pores; 30 percent angular sandstone cobbles; very strongly acid; abrupt smooth boundary.
E—2 to 4 inches; yellowish brown (10YR 5/4) very channery fine sandy loam; weak fine granular structure; friable; few very fine and fine discontinuous pores; few medium and coarse roots; 40 percent angular sandstone channers; very strongly acid; clear wavy boundary.
Bw1—4 to 24 inches; yellowish brown (10YR 5/4) very channery sandy loam; weak fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; common very fine and fine discontinuous pores; common fine and few medium roots; 40 percent sandstone channers; very strongly acid; clear wavy boundary.
Bw2—24 to 38 inches; brown (7.5YR 4/4) very channery sandy loam; weak fine and medium subangular blocky structure; friable, nonsticky and nonplastic; common fine and few medium roots; common very fine and fine discontinuous pores; 40 percent sandstone channers; very strongly acid; gradual wavy boundary.
Bw3—38 to 47 inches; brown (7.5YR 4/4) channery sandy clay loam; common coarse distinct reddish brown (5YR 4/4) mottles; moderate; moderate medium subangular blocky structure; firm and slightly brittle, slightly sticky and nonplastic; few medium roots; common very fine and fine

discontinuous pores; clay coatings on sand grains; 30 percent sandstone channers; very strongly acid; clear wavy boundary.

C—47 to 60 inches; very pale brown (10YR 7/4) extremely flaggy loamy sand; common medium distinct brown (7.5YR 5/4) mottles; weak fine granular structure; very friable, nonsticky and nonplastic; common very fine discontinuous pores; 65 percent sandstone channers and flagstone; few fine roots; very strongly acid.

The solum ranges from 28 to 50 inches in thickness. Depth to bedrock is 50 inches or more. Sandstone fragments range from 10 to 60 percent, by volume, in the solum and from 35 to 70 percent in the C horizon. Reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. It is sandy loam or channery sandy loam.

The E horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is sandy loam, fine sandy loam, or their thin channery or very channery analogs.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam, loamy sand, sandy clay loam, or their channery or very channery analogs.

The C horizon has hue of 5YR to 10YR, value of 4 to 8, and chroma of 4 to 8. The fine earth texture is sandy loam or loamy sand.

Laidig Series

The Laidig series consists of very deep, well drained soils on mountains. These soils formed in colluvium derived mainly from acid sandstone and shale. Slope ranges from 7 to 65 percent.

Laidig soils commonly are near Buchanan, Dekalb, and Hazleton soils. Laidig soils are better drained than the somewhat poorly drained Buchanan soils and have more rock fragments, by volume, than Buchanan soils. Laidig soils are deeper to bedrock than the moderately deep Dekalb soils. Laidig soils have fewer rock fragments and less sand, by volume, than Hazleton soils.

Typical pedon of Laidig channery fine sandy loam, in an area of Laidig very stony fine sandy loam, 7 to 15 percent slopes, about 0.7 mile southwest of Virginia Route 704, about 5 miles south-southeast of U.S. Route 50:

Oi—5 to 3 inches; loose leaves and twigs.

Oa—3 inches to 0; black (10YR 2/1) organic matter.

A—0 to 2 inches; yellowish brown (10YR 5/4) channery fine sandy loam; weak fine granular structure; friable; many fine roots; few fine discontinuous pores; 20 percent angular sandstone channers; very strongly acid; abrupt smooth boundary.

BA—2 to 13 inches; brownish yellow (10YR 6/6) channery fine sandy loam; moderate fine subangular blocky structure; friable, slightly sticky and nonplastic; many fine and medium roots; common very fine and fine discontinuous pores; 15 percent angular sandstone channers; strongly acid; clear wavy boundary.

Bt1—13 to 24 inches; yellowish brown (10YR 5/6) channery loam; common fine distinct light yellowish brown (10YR 6/4) mottles; moderate fine subangular blocky structure; friable; common fine and medium roots; few very fine discontinuous pores; thin patchy clay films on ped faces and rock fragments; 25 percent sandstone channers and flagstones; very strongly acid; gradual wavy boundary.

Bt2—24 to 36 inches; yellowish brown (10YR 5/8) channery loam; common fine distinct strong brown (7.5YR 5/8) and few fine distinct pale brown (10YR 6/3) mottles; strong medium and coarse subangular blocky structure; brittle and firm, slightly sticky and nonplastic; few fine and medium roots; few very fine discontinuous pores; clay bridging between sand grains; 30 percent angular sandstone channers and flagstones; very strongly acid; abrupt smooth boundary.

Bx—36 to 60 inches; yellowish brown (10YR 5/8) channery sandy loam; many coarse distinct light gray (10YR 7/1) mottles; weak thick platy structure; firm and brittle, slightly sticky and nonplastic; few very fine discontinuous pores; thin patchy clay films on vertical fracture faces; 30 percent sandstone channers and flagstones; very strongly acid.

The solum ranges from 60 to 80 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 30 to 50 inches. Rock fragments range from 15 to 35 percent, by volume, in the A, BA, and Bt horizons and from 25 to 60 percent in the Bx and C horizons. The rock fragments consist mainly of sandstone and quartzite channers and flagstones. Reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6. It is loam, silt loam, fine sandy loam, or their channery or flaggy analogs.

The E horizon, where present, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 to 3. It is sandy loam, fine sandy loam, loam, silt loam, or their channery or flaggy analogs.

The BA and Bt horizons have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 8. These horizons are loam, sandy loam, sandy clay loam, or their channery or very channery analogs.

The Bx horizon has hue of 5YR, value of 4 to 6, and chroma of 4 to 8. The fine earth texture is sandy loam or sandy clay loam.

Some pedons have a C horizon that has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 1 to 8. Low and high chroma mottles are common in this horizon. The fine earth texture is sand loam, loam, or sandy clay loam.

Lehew Series

The Lehew series consists of moderately deep, well drained to excessively drained soils on mountains. These soils formed in residuum of interbedded, reddish brown sandstone, siltstone, and shale. Slope ranges from about 7 to 45 percent.

Lehew soils commonly are near Berks, Dekalb, Gainesboro, and Weikert soils. Lehew soils have more sand throughout than Berks and Gainesboro soils. Unlike Dekalb and Weikert soils, Lehew soils have hue redder than 7.5YR in the solum. Lehew soils are deeper to bedrock than Weikert soils.

Typical pedon of Lehew channery fine sandy loam, 7 to 15 percent slopes, 0.2 mile south of county road 701 and 75 yards east of county road 703:

Ap—0 to 9 inches; reddish brown (5YR 4/3) channery fine sandy loam; weak fine granular structure; friable; many fine and very fine roots; common fine pores; 15 percent sandstone channers; neutral; abrupt smooth boundary.

Bw1—9 to 15 inches; reddish brown (5YR 4/4) very channery sandy loam; weak very fine subangular blocky structure; friable; common fine roots; few worm channels and casts; 50 percent sandstone channers; moderately acid; abrupt wavy boundary.

Bw2—15 to 26 inches; reddish brown (5YR 4/4) very flaggy sandy loam; weak very fine subangular blocky structure; friable; few fine roots; many fine pores; few worm channels and casts; 50 percent sandstone flagstones; silt coatings on coarse fragments; strongly acid; clear wavy boundary.

C—26 to 35 inches; reddish brown (5YR 4/4) extremely flaggy sandy loam; massive; few fine roots; 70 percent sandstone flagstones; strongly acid; clear wavy boundary.

R—35 inches; hard sandstone bedrock.

The solum ranges from 15 to 30 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Sandstone and shale fragments as much as 12 inches long range from 10 to 30 percent, by volume, in the A horizon, from 25 to 60 percent in the B horizon, and from 35 to 70 percent in the C horizon. Reaction is strongly acid or very strongly acid except where the soils have been limed.

The A horizon has hue of 5YR to 10YR, value of 3 through 5, and chroma of 2 to 4. Its texture is fine sandy loam, loam, or their thin, channery analogs.

The B horizon has hue of 5YR to 2.5YR, value of 4 or 5, and chroma of 4 to 6. The fine earth texture is loam, sandy loam, or fine sandy loam.

The C horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 3 or 4. Its textures are the same as those of the B horizon.

Library Series

The Library series consists of very deep, somewhat poorly drained soils on terraces along the larger streams in the county. These soils formed in alluvium and colluvium. Slope ranges from 2 to 7 percent.

Library soils commonly are near Berks, Guernsey, Pagebrook, and Weikert soils. Berks and Weikert soils are well drained and are shallower to bedrock than Library soils. Guernsey and Pagebrook soils are moderately well drained.

Typical pedon of Library silt loam, 2 to 7 percent slopes, 20 yards northeast of Virginia Route 734, approximately 1 mile north of the intersection of Virginia Routes 734 and 127, in Sleepy Hollow:

Ap—0 to 9 inches; brown (10YR 5/3) silt loam; medium distinct brown (7.5YR 5/4) and few fine faint yellowish brown (10YR 5/6) mottles; moderate fine granular structure in the upper part and weak fine and medium subangular blocky structure in the lower part; friable; many fine and common medium roots; many fine pores; 2 percent shale channers; moderately acid; gradual smooth boundary.

E—9 to 14 inches; light brownish gray (2.5Y 6/2) silt loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable, slightly sticky and nonplastic; few fine and medium roots; few fine pores; common black stains and concretions; 2 percent shale channers; strongly acid; abrupt wavy boundary.

Bt1—14 to 21 inches; yellowish brown (10YR 5/6) silty clay; many coarse prominent light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common fine pores; thin continuous clay films; strongly acid; gradual wavy boundary.

Bt2—21 to 36 inches; light gray (5Y 6/1) clay; many coarse prominent yellowish brown (10YR 5/8) and few fine faint light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm, sticky and plastic; few fine roots; few fine pores; many thin patchy clay films; few old worm channels; 2 percent shale channers; neutral; gradual smooth boundary.

C—36 to 55 inches; olive gray (5Y 5/2) very channery silty clay; common medium prominent yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8)

mottles; massive; friable; 55 percent shale channers and flagstones; mildly alkaline.
R—55 inches; shale bedrock.

The solum is 30 to 40 inches thick. Depth to bedrock ranges from 40 to 60 inches. The A and E horizons are moderately acid or strongly acid, the B horizon is strongly acid to neutral, and the C horizon is slightly acid to mildly alkaline. Rock fragments, mostly shale, range from 0 to 5 percent, by volume, in the solum and from 20 to 65 percent in the substratum.

The Ap or A horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is silt loam or silty clay loam.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is silt loam or silty clay loam.

The Bt1 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. It is silty clay or clay.

The Bt2 horizon is neutral or has hue of 10YR to 5Y, value of 5 or 6, and chroma of 0 to 2. It is silty clay or clay.

The C horizon is neutral or has hue of 10YR to 5Y, value of 5 or 6, and chroma of 0 to 2. The fine earth texture is silty clay or clay.

Lobdell Series

The Lobdell series consists of very deep, moderately well drained soils in valleys near streams. These soils formed in alluvium derived from shale, sandstone, and limestone. Slope ranges from 0 to 3 percent.

Lobdell soils are near Berks, Frederick, and Weikert soils. Berks, Frederick, and Weikert soils are well drained soils. Unlike Berks, Frederick, and Weikert soils, Lobdell soils are subject to occasional flooding by overflow from adjacent streams. Lobdell soils are deeper to bedrock than the moderately deep Berks soils and the shallow Weikert soils.

Typical pedon of Lobdell silt loam, approximately 100 yards west of Virginia Route 681, 1.5 miles east-northeast of U.S. Route 522, 110 yards north of Back Creek:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; moderate fine granular structure; friable; many fine and medium roots; many fine pores; moderately acid; abrupt smooth boundary.
BA—9 to 22 inches; dark brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; many fine and medium roots; many fine pores; moderately acid; clear smooth boundary.
Bw1—22 to 33 inches; brown (7.5YR 4/4) silt loam; few fine faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; moderately acid; gradual smooth boundary.
Bw2—33 to 44 inches; brown (7.5YR 5/4) silt loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable; few fine pores; moderately acid; clear wavy boundary.
C—44 to 64 inches; yellowish brown (10YR 5/4) loam; common medium faint grayish brown (10YR 5/2) mottles; massive; few fine pores; moderately acid; clear wavy boundary.

The solum is 30 to 50 inches thick. Depth to bedrock is more than 60 inches. Rock fragments, mostly sandstone and shale, make up 0 to 5 percent of the solum. Except where the soils have been limed, reaction is moderately acid or strongly acid in the surface layer and moderately acid to neutral below.

The Ap and BA horizons have hue of 10YR, value of 4 or 5, and chroma of 3 to 6. They are silt loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or loam.

The C horizon has hue of 5Y to 10YR, value of 4 to 6, and chroma of 2 to 8, and in many pedons is variegated. It is loam, clay loam, silt loam, or their gravelly analogs.

Massanetta Series

The Massanetta series consists of very deep, moderately well drained soils on flood plains. These soils formed in alluvium derived from limestone. Slope ranges from 0 to 4 percent.

Massanetta soils commonly are near Carbo, Frederick, and Poplimento soils. Massanetta soils are grayer throughout and have less clay in the subsoil than Carbo, Frederick, and Poplimento soils. Massanetta soils have free carbonates, but these other soils do not.

Typical pedon of Massanetta loam, 0.6 mile west of U.S. Route 11, 0.4 mile northwest of intersection of Virginia Routes 649 and 651, 15 yards east of Opequon Creek:

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; very friable; few fine and very fine roots; common shells and flakes; violent effervescence; moderately alkaline; abrupt smooth boundary.
Bw1—9 to 16 inches; very dark gray (10YR 3/1) loam; weak fine subangular blocky structure; very friable; 10 percent calcium carbonate concretions up to 1 1/2 inches in diameter; many shells and flakes; violent effervescence; moderately alkaline; abrupt smooth boundary.
Bw2—16 to 22 inches; dark yellowish brown (10YR 4/4) clay loam; many fine distinct very dark gray (10YR 3/1) mottles; weak fine granular structure; friable; 10 percent calcium carbonate concretions up to 2 inches in diameter; many shells and shell pieces; violent effervescence; moderately alkaline; gradual smooth boundary.
C1—22 to 39 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; few fine roots; many

shells and shell pieces; violent effervescence; moderately alkaline; clear smooth boundary.
C2—39 to 54 inches; dark gray (10YR 4/1) silt loam; common fine distinct light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; friable; few fine roots; many shells and shell pieces; violent effervescence; moderately alkaline; clear smooth boundary.
C3—54 to 62 inches; brown (7.5YR 5/2) gravelly clay loam; few fine distinct olive yellow (2.5Y 6/6) and few fine prominent yellowish red (5YR 5/6) mottles; massive; friable, nonsticky and nonplastic; 30 percent rounded and angular pebbles; violent effervescence; moderately alkaline.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 60 inches. Rock fragments and calcium carbonate concretions range from 0 to 10 percent, by volume, in the solum and from 0 to 30 percent in the C horizon. Content of lime concretions and of gravel varies in the 2C and 3C horizons. Throughout, reaction is mildly alkaline or moderately alkaline and the soils effervesce with acid.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 1 to 3. It is loam or silt loam.

The B horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 1 to 4. It is loam, silt loam, silty clay loam, or clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 4. It is loam, silt loam, clay loam, silty clay loam, or their gravelly analogs.

Monongahela Series

The Monongahela series consists of deep, moderately well drained soils on terraces above the larger streams. These soils formed in old alluvium and terrace deposits derived from acid sandstone and shale. Slope ranges from 2 to 7 percent.

Monongahela soils commonly are near Berks, Weikert, and Zoar soils. Unlike Berks, Weikert, and Zoar soils, Monongahela soils have a fragipan. Monongahela soils have less clay and more rock fragments in the profile than the very deep Zoar soils.

Typical pedon of Monongahela gravelly loam, 2 to 7 percent slopes, approximately 0.6 mile northwest of Virginia Route 608, 1 mile northeast of U.S. Route 522 North, 300 yards southeast of Hogue Creek:

Ap—0 to 7 inches; brown (10YR 5/3) gravelly loam; weak fine granular structure; friable, nonsticky and nonplastic; common fine roots; many fine pores; 20 percent sandstone pebbles; moderately acid; abrupt smooth boundary.
Bt1—7 to 12 inches; yellowish brown (10YR 5/6) loam; few fine faint strong brown (7.5YR 5/8) mottles; moderate fine subangular blocky structure; friable, slightly sticky and nonplastic; few fine roots; many fine and medium pores; few thin clay films; 10 percent sandstone pebbles; moderately acid; clear smooth boundary.
Bt2—12 to 20 inches; yellowish brown (10YR 5/8) gravelly loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; few fine and medium roots; many fine pores; common thin clay films; 20 percent sandstone pebbles; strongly acid; abrupt smooth boundary.
Bx—20 to 31 inches; yellowish brown (10YR 5/8) gravelly clay loam; many coarse distinct brown (10YR 5/3) and few medium distinct light gray (10YR 6/1) mottles; moderate thin platy structure; very firm and brittle, slightly sticky and slightly plastic; few fine discontinuous pores; thick continuous brown (7.5YR 4/4) clay films; 25 percent sandstone pebbles and shale channers; strongly acid; abrupt wavy boundary.
BC—31 to 43 inches; strong brown (7.5YR 5/6) gravelly clay loam; few medium distinct light gray (10YR 6/1) mottles; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; 30 percent angular sandstone pebbles and shale channers; strongly acid; gradual wavy boundary.
R—43 inches; highly weathered sandstone bedrock.

The solum is 24 to 48 inches thick. Depth to the fragipan is 17 to 24 inches. Depth to bedrock is 40 to 60 inches. Content of rock fragments, mostly sandstone, is 10 to 25 percent above the fragipan, 10 to 35 percent in the fragipan, and 10 to 40 percent below the fragipan. Reaction is strongly acid or very strongly acid throughout, except where the soils have been limed.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is loam, silt loam, sandy loam, or their gravelly analogs.

Some pedons have a BA horizon that is loam, silt loam, or their gravelly analogs.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, clay, or their gravelly analogs.

The Bx horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, clay loam, sandy clay loam, or their gravelly analogs.

Some pedons have a C horizon that has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. Low chroma mottles are common. The C horizon is clay loam, silty clay loam, or their gravelly or channery analogs.

The Monongahela soils in this survey area are taxadjuncts to the Monongahela series because they have a thinner solum and are shallower to bedrock than the range defined for the series. These differences do not significantly affect the use or behavior of the soils.

Nicholson Series

The Nicholson series consists of deep, moderately well drained soils on ridges in the Shenandoah Valley. These soils formed in silty material underlain by residuum of limestone, shale, or siltstone. Slope ranges from 2 to 7 percent.

Nicholson soils commonly are near Frederick, Poplimento, and Timberville soils. Nicholson soils have more silt throughout than these other soils.

Typical pedon of Nicholson silt loam, 2 to 7 percent slopes, approximately 700 yards east-northeast of the intersection of Virginia Routes 625 and 633, 350 yards north of Virginia Route 633.

A—0 to 11 inches; dark brown (10YR 4/3) silt loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; common fine and medium roots; 10 percent sandstone cobbles; neutral; abrupt smooth boundary.

Bt1—11 to 18 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine subangular blocky structure parting to weak thin platy; friable, slightly sticky and slightly plastic; very few fine roots; many fine pores; thin patchy clay films on faces of peds; 10 percent sandstone cobbles; neutral; clear smooth boundary.

Btx—18 to 26 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct very pale brown (10YR 7/4) mottles; moderate medium subangular blocky structure parting to weak thick platy; firm and 70 percent of the mass is brittle, slightly sticky and slightly plastic; thin patchy clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—26 to 44 inches; strong brown (7.5YR 5/6) silty clay loam; many medium distinct yellowish brown (10YR 5/8) and common medium distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; many medium clay films on faces of peds; moderately acid; clear wavy boundary.

2Bt3—44 to 68 inches; yellowish brown (10YR 5/6) silty clay loam; many coarse prominent light gray (10YR 7/2) and common medium distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; firm, sticky and slightly plastic; common fine pores; thick continuous clay films; 10 percent chert pebbles; strongly acid; gradual wavy boundary.

2C—68 to 74 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct light gray (10YR 7/2) and common medium distinct light gray (10YR 7/4) mottles; massive; common black concretions; moderately acid.

The solum ranges from 40 to 80 inches in thickness. Depth to the fragipan ranges from 16 to 30 inches. Depth to limestone, calcareous shale, or siltstone ranges from 60 to 96 inches. Unless the soils have been limed, reaction ranges from very strongly acid through moderately acid from the surface layer through the fragipan and from strongly acid through mildly alkaline below the fragipan.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

The Btx horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 4 to 8. It is silt loam or silty clay loam.

The 2Bt horizon has hue of 2.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. It has few to many mottles. It is silty clay loam or clay.

The 2C and 2B horizons are similar in color and texture. Content of weathered siltstone or shale fragments in the 2C horizon ranges from 0 to 35 percent.

Oaklet Series

The Oaklet series consists of very deep, well drained soils on valley uplands. These soils formed in residuum of limestone. Slope ranges from 2 to 15 percent.

Oaklet soils commonly are near Carbo, Chilhowie, Frederick, and Poplimento soils. Oaklet soils are deeper to bedrock than Carbo and Chilhowie soils. Unlike Oaklet soils, Frederick and Poplimento soils have hue redder than 10YR in the subsoil. Oaklet soils have more black stains and concretions than Frederick and Poplimento soils.

Typical pedon of Oaklet silt loam, 2 to 7 percent slopes, 4 miles east of the intersection of county roads 629 and 625, 330 yards west of railroad tracks:

Ap—0 to 5 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; friable; many fine and very fine roots; few fine pores; 5 percent chert pebbles; slightly acid; abrupt smooth boundary.

BAt—5 to 11 inches; yellowish brown (10YR 5/8) silt loam; weak very fine and fine subangular blocky structure; friable; common fine roots; few fine pores; common worm casts and channels; common fine black iron and manganese concretions; slightly acid; clear smooth boundary.

Bt1—11 to 19 inches; yellowish brown (10YR 5/6) clay; moderate fine and medium subangular blocky structure; firm, sticky and plastic; few fine roots; common fine pores; thin patchy clay films; many medium black iron and manganese concretions; slightly acid; gradual wavy boundary.

Bt2—19 to 31 inches; dark yellowish brown (10YR 4/6) and light olive brown (2.5Y 5/4) clay; moderate medium subangular blocky structure; firm, sticky and plastic; thick patchy clay films; many medium black iron and manganese concretions; 5 percent

limestone pebbles; common slickensides; slightly acid; gradual wavy boundary.

Bt3—31 to 51 inches; dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/8) clay; few fine faint gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; thick patchy clay films; common slickensides; many medium black iron and manganese concretions; slightly acid; clear smooth boundary.

Bt4—51 to 63 inches; yellowish brown (10YR 5/8) clay; moderate medium subangular blocky structure; friable, sticky and plastic; 15 percent calcium carbonate concretions and chert pebbles; thick continuous clay films; common medium black iron and manganese stains; mildly alkaline.

The solum is 60 inches thick or more. Depth to hard bedrock is more than 60 inches. The content of coarse fragments, commonly angular chert, ranges from 0 to 20 percent in the A horizon and from 0 to 15 percent in the B horizon. Reaction ranges from strongly acid to slightly acid in the A horizon and the upper part of the B horizon and from very strongly acid to mildly alkaline in the lower part of the B horizon.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 or 4. The A horizon is silt loam, loam, or silty clay loam.

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

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Only the lower part of the Bt horizon has hue of 5YR. In most pedons the Bt horizon is underlain by hard limestone bedrock. Slickensides are in most pedons.

Opequon Series

The Opequon series consists of shallow, well drained soils on valley uplands. These soils formed in residuum of limestone. Slope ranges from 3 to 45 percent.

Opequon soils commonly are near Chilhowie, Frederick, Poplimento, and Swimley soils. Chilhowie soils are moderately deep, and Frederick, Poplimento, and Swimley soils are deep. Opequon soils have a finer textured surface layer than these other soils.

Typical pedon of Opequon silty clay, in an area of Opequon-Chilhowie silty clays, very rocky, 3 to 15 percent slopes, approximately 0.6 mile southwest of Virginia Route 758, 2 miles northwest of U.S. Route 11, 140 yards north of Cedar Creek:

Ap—0 to 3 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and few medium roots; 10 percent angular chert pebbles; slightly acid; abrupt smooth boundary.

Bt1—3 to 7 inches; brown (7.5YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable, sticky and plastic; few fine roots; few fine and medium discontinuous pores; many thin continuous clay films; 10 percent angular chert pebbles; neutral; clear wavy boundary.

Bt2—7 to 15 inches; reddish brown (2.5YR 4/4) clay; moderate fine and medium angular blocky structure; friable, very sticky and very plastic; few fine roots; few fine discontinuous pores; thick continuous clay films on faces of peds; neutral.

R—15 inches; limestone bedrock.

The solum is 8 to 20 inches thick. Depth to bedrock is 12 to 20 inches. Limestone fragments range from 5 to 35 percent, by volume, in the solum. Reaction in the solum ranges from slightly acid to mildly alkaline.

The A horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 or 4. It is silty clay loam, silty clay, or clay.

The B horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 3 to 8. It is silty clay loam, silty clay, clay, or their channery analogs.

Some pedons have a C horizon that has colors similar to those of the B horizon. It is very channery or very flaggy silty clay loam, clay loam, sandy clay loam, silty clay, or clay.

Pagebrook Series

The Pagebrook series are very deep, moderately well drained soils on flood plains. These soils formed in alluvium derived from limestone and, in lesser amounts, shale and sandstone. Slope ranges from 0 to 5 percent.

Pagebrook soils commonly are near Frederick, Oaklet, and Poplimento soils. Frederick, Oaklet, and Poplimento soils are well drained. Unlike these other soils, Pagebrook soils are subject to flooding from adjacent streams.

Typical pedon of Pagebrook silt loam, approximately 700 yards northwest of intersection of Virginia Routes 622 and 620, 75 yards northeast of Opequon Creek, 75 yards southwest of Virginia Route 620:

Ap—0 to 12 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; many fine pores; common stains and soft concretions; 2 percent sandstone pebbles; slightly acid; abrupt wavy boundary.

BA—12 to 21 inches; yellowish brown (10YR 5/4) silt loam; common medium faint grayish brown (2.5Y 5/2) and common fine distinct yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; slightly brittle, slightly plastic; few fine roots; common fine pores; common black concretions; 3 percent sandstone pebbles; neutral; gradual wavy boundary.

Bw1—21 to 36 inches; dark yellowish brown (10YR 4/4) and light yellowish brown (10YR 5/8) clay; few fine faint olive (5Y 5/3) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine pores; many slickensides; many black concretions and stains; 7 percent sandstone and chert pebbles; mildly alkaline; gradual wavy boundary.

Bw2—36 to 42 inches; yellowish brown (10YR 5/4, 5/6) clay; few fine faint grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable, sticky and plastic; few fine pores; many brown (10YR 5/3) slickensides; 4 percent sandstone pebbles; mildly alkaline; clear wavy boundary.

C—42 to 62 inches; yellowish brown (10YR 5/6) gravelly silty clay; common fine distinct grayish brown (2.5Y 5/2) mottles; massive; friable, sticky and plastic; few fine pores; 30 percent sandstone pebbles and shale channers; moderately alkaline.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 60 inches. Content of coarse fragments, mostly sandstone and shale, range from 0 to 10 percent in the A horizon, 0 to 15 percent in the B horizon, and 0 to 50 percent in the C horizon. Reaction ranges from medium acid through mildly alkaline in the A horizon and from slightly acid through moderately alkaline in the B and C horizons.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 or 4. It is clay, silty clay loam, or silt loam.

The B horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 6. It is clay, silty clay, or silty clay loam.

The C horizon is similar in color to the B horizon. It is clay, silty clay, silty clay loam, clay loam, or their gravelly analogs.

Poplimento Series

The Poplimento series consists of very deep, well drained soils on valley uplands. These soils formed in residuum of limestone and, in varying amounts, of sandstone and shale. Slope ranges from 2 to 60 percent.

Poplimento soils commonly are near Frankstown, Frederick, Oaklet, and Swimley soils. Poplimento soils are redder in the B and C horizons than Frankstown soils. Unlike Poplimento soils, Frankstown soils have fragments of siltstone. Poplimento soils have a higher base saturation than Frederick soils. Poplimento soils have less clay in the subsoil than Oaklet and Swimley soils.

Typical pedon of Poplimento loam, in an area of Frederick-Poplimento loams, 15 to 25 percent slopes, 0.6 mile north of Virginia Route 622, 0.6 mile west of Virginia Route 621, 400 yards northeast of the head of Stribling Run:

Ap—0 to 5 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure parting to weak fine granular; friable; many fine roots; common fine pores; 5 percent angular chert pebbles; slightly acid; clear smooth boundary.

BA—5 to 9 inches; strong brown (7.5YR 5/6) clay loam; common fine distinct brownish yellow (10YR 6/6) skeletons and few fine faint yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; common fine roots; few fine pores; few black iron and manganese concretions; slightly acid; gradual wavy boundary.

Bt1—9 to 14 inches; yellowish red (5YR 5/8) clay; few fine distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; few fine pores; thin patchy clay films; moderately acid; gradual wavy boundary.

Bt2—14 to 20 inches; strong brown (7.5YR 5/8) clay; few fine distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; few fine pores; thick continuous clay films; few black iron and manganese concretions; moderately acid; gradual irregular boundary.

Bt3—20 to 39 inches; yellowish red (5YR 5/6) clay; many fine prominent brownish yellow (10YR 6/8) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine pores; thick continuous clay films; common black stains; moderately acid; abrupt wavy boundary.

Bt4—39 to 50 inches; yellowish red (5YR 5/6) and strong brown (7.5YR 5/8) silty clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine pores; thin patchy clay films; many black stains; strongly acid; abrupt wavy boundary.

C—50 to 60 inches; red (2.5YR 4/6) and strong brown (7.5YR 5/6) silty clay loam; massive; friable, slightly sticky and slightly plastic; few black stains and concretions; strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is 60 inches or more. Except where the soils have been limed, reaction is moderately acid or strongly acid in the Ap and BA horizons and slightly acid to strongly acid in the Bt and C horizons. The upper part of the B horizon has few to common skeletons.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam or silt loam. Content of coarse fragments, mostly chert, ranges from 0 to 25 percent.

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

The Bt horizon has hue of 5YR to 7.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay, silty clay, or silty clay loam.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 6 or 8. It is clay, silty clay, silty clay loam, or their channery analogs. Content of coarse fragments, which consist of chert, siltstone, and sandstone, is 0 to 25 percent.

Schaffenaker Series

The Schaffenaker series consists of moderately deep, well drained soils on mountains. These soils formed in residuum of acid sandstone. Slope ranges from 7 to 65 percent.

Schaffenaker soils commonly are near Dekalb, Hazleton, and Laidig soils. Schaffenaker soils have fewer sandstone fragments throughout than Dekalb soils. Schaffenaker soils have more sand and fewer coarse fragments throughout than Hazleton soils. Schaffenaker soils have more sand throughout than the very deep Laidig soils.

Typical pedon of Schaffenaker very stony loamy sand, 7 to 25 percent slopes, at the base of Cacapon Mountain, approximately 0.7 mile west of U.S. Route 522:

Oi—4 to 2 inches; loose leaves, twigs, and pine needles.
Oe—2 inches to 0; black (10YR 2/1) organic mat.
A—0 to 2 inches; dark grayish brown (10YR 4/2) loamy sand; single grain; loose; common fine and medium roots; common fine pores; extremely acid; abrupt wavy boundary.
Bw1—2 to 4 inches; brown (10YR 5/3) loamy sand; single grain; loose; common fine and medium roots; few fine pores; extremely acid; clear wavy boundary.
Bw2—4 to 14 inches; yellowish brown (10YR 5/6) loamy sand; weak fine granular structure; very friable; few fine and common medium roots; few fine pores; 3 percent sandstone pebbles; very strongly acid; clear wavy boundary.
Bw3—14 to 23 inches; strong brown (7.5YR 5/6) loamy sand; weak fine granular structure; very friable; few fine and medium roots; common fine pores; 3 percent sandstone pebbles; very strongly acid; clear wavy boundary.
C—23 to 32 inches; strong brown (7.5YR 5/6) very gravelly loamy sand; single grain; loose; few fine roots; few fine pores; 40 percent angular sandstone pebbles; very strongly acid.
R—32 inches; sandstone bedrock.

Depth to bedrock is 24 to 40 inches. Reaction is extremely acid or very strongly acid. Content of rock fragments in the solum ranges from 0 to 20 percent.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. It is loamy sand or sand.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It is loamy sand or sand.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The content of rock fragments ranges from 20 to 50 percent.

Sequoia Series

The Sequoia series consists of deep, well drained soils in the valley and on mountains. These soils formed in residuum of shale. Slope ranges from 2 to 25 percent.

Sequoia soils commonly are near Berks, Clearbrook, and Weikert soils. Sequoia soils have a thicker solum than Berks soils. Unlike Sequoia soils, Weikert soils have an argillic horizon. Sequoia soils are better drained than Clearbrook soils. Unlike Clearbrook soils, they have hue redder than 10YR in the subsoil.

Typical pedon of Sequoia silt loam, 7 to 15 percent slopes, approximately 700 yards east of the junction of Virginia Routes 671 and 740, 350 yards east of Pine Grove Church:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; many fine roots; many fine and medium pores; 10 percent shale channers; medium acid; abrupt smooth boundary.
Bt1—8 to 15 inches; yellowish brown (10YR 5/4) channery silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; common fine and medium pores; thin patchy clay films; few skeletons; 20 percent shale channers; very strongly acid; clear smooth boundary.
Bt2—15 to 38 inches; yellowish red (5YR 5/6) channery silty clay loam; moderate fine and medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; common fine pores; thick patchy clay films; few skeletons; 20 percent shale channers; very strongly acid; clear wavy boundary.
Cr—38 to 62 inches; strong brown (7.5YR 5/6) soft shale that crushes to silty clay; massive and firm, slightly sticky and slightly plastic; very strongly acid.
R—62 inches; hard shale bedrock.

The solum is 20 to 40 inches thick. Depth to bedrock is commonly more than 60 inches. Content of rock fragments ranges from 0 to 10 percent in the A horizon and from 5 to 25 percent in the B horizon. Reaction is very strongly acid or strongly acid, except where the soils have been limed.

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

The B horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay loam or their channery or very channery analogs.

The C horizon has hue, value, and chroma similar to those of the B horizon. It is silt loam, silty clay loam, silty clay, or their channery or very channery analogs.

Swimley Series

The Swimley series consists of very deep, well drained soils on valley ridges and side slopes. These soils formed in residuum of limestone. Slope ranges from about 2 to 15 percent.

Swimley soils commonly are near Frederick, Oaklet, and Poplimento soils. Swimley soils have a darker surface layer than Frederick and Poplimento soils. Unlike Frederick and Poplimento soils, they have hue redder than 5YR in the subsoil. Unlike Oaklet soils, Swimley soils generally have hue redder than 5YR in the solum.

Typical pedon of Swimley silt loam, 2 to 7 percent slopes, 70 yards southeast of Virginia Route 649, 500 yards west of Virginia Route 624:

Ap—0 to 11 inches; dark brown (7.5YR 4/4) silt loam; weak very fine and fine subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine roots; many fine pores; neutral; abrupt smooth boundary.

Bt1—11 to 33 inches; red (2.5YR 4/6) clay; strong fine and medium subangular blocky structure; firm, sticky and plastic; thin continuous clay films; few very fine and fine roots; common fine pores; common fine black stains; few worm channels and casts; 5 percent angular quartz pebbles; neutral; clear smooth boundary.

Bt2—33 to 43 inches; red (2.5YR 5/6) clay; moderate medium subangular blocky structure; friable, sticky and plastic; thick continuous clay films; few very fine roots; few fine pores; common black stains; common slickensides; slightly acid; clear wavy boundary.

Bt3—43 to 60 inches; yellowish red (5YR 4/6) clay; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, sticky and plastic; thick continuous clay films; few very fine roots; few black stains; 10 percent angular limestone flagstones; common slickensides; neutral; gradual wavy boundary.

Bt4—60 to 67 inches; yellowish red (5YR 4/6) clay; common coarse prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, sticky and plastic; thick continuous clay films; common black stains; neutral.

R—67 inches; limestone bedrock.

Depth to bedrock and solum thickness are more than 60 inches. Rock fragments in the solum range, by volume, from 0 to 10 percent. Reaction is slightly acid or neutral.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 6. It is silt loam or loam.

The Bt horizon has hue of 2.5YR to 5YR, value of 3 to 5, and chroma of 4 to 8. It is silty clay or clay in the upper part and clay in the lower part.

Some pedons have a C horizon that has hue of 10R to 10YR. It is mottled. Its texture is silty clay or clay.

Timberville Series

The Timberville series consists of very deep, well drained soils in narrow to moderately broad, upland drainageways. These soils formed in loamy colluvium and alluvium derived from limestone, sandstone, and shale. Slope ranges from about 2 to 7 percent.

Timberville soils commonly are near Carbo, Frederick, and Poplimento soils. Timberville soils have less clay in the subsoil than these other soils and have a thicker solum than Carbo soils. Carbo soils are moderately deep.

Typical pedon of Timberville silt loam, 2 to 7 percent slopes, 1.1 miles northwest of the intersection of county road 628 and 732, 400 yards north of county road 628:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; moderate fine granular structure; friable; many fine roots; many fine pores; 2 percent iron concretions and 2 percent sandstone pebbles; slightly acid; abrupt smooth boundary.

BA—10 to 22 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; many fine pores; 10 percent skeletons; 1 percent iron concretions and 2 percent sandstone pebbles; slightly acid; gradual wavy boundary.

Bt1—22 to 28 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; thin very patchy clay films; 5 percent iron concretions and 5 percent sandstone pebbles; moderately acid; clear smooth boundary.

2Bt2—28 to 54 inches; yellowish red (5YR 4/6) clay loam; moderate medium and fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; medium patchy clay films; moderate acid; clear smooth boundary.

2Bt3—54 to 66 inches; strong brown (5YR 5/6) clay loam; many medium distinct light yellowish brown (10YR 6/4) mottles; weak medium and coarse subangular blocky structure; friable, slightly sticky and slightly plastic; medium patchy clay films; moderately acid.

Solum thickness and depth to bedrock are more than 60 inches. Depth to unconforming layers is 20 to 40 inches. Fragments of chert and sandstone make up 0 to 35 percent of the upper part of the solum and from 0 to

60 percent of the lower part. Reaction is moderately acid to very strongly acid, except where the soils have been limed.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 5. It is loam, silt loam, or their gravelly analogs.

The BA and Bt horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam, silty clay loam, clay loam, or their gravelly analogs.

The 2Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is silty clay, clay loam, silty clay loam, or their gravelly or very gravelly analogs.

Weikert Series

The Weikert series consists of shallow, well drained soils in the valley and on the mountains. These soils formed in residuum of acid shale or of interbedded shale, siltstone, and sandstone. Slope ranges from 2 to 65 percent.

Weikert soils commonly are near the Berks, Blairton, Clearbrook, and Sequoia soils. Weikert soils are shallower to bedrock than these other soils. Weikert soils throughout have more shale fragments, by volume, than Blairton soils. Weikert soils are better drained than Blairton and Clearbrook soils. Weikert soils have less clay than Sequoia soils.

Typical pedon of Weikert channery silt loam, in an area of Weikert-Berks channery silt loams, 15 to 25 percent slopes, 60 yards north of Klines Mill, 35 yards east of county road 709:

A—0 to 3 inches; dark brown (10YR 4/3) channery silt loam; weak fine and medium granular structure; friable, nonsticky and nonplastic; many fine roots; 25 percent shale channers; neutral; abrupt smooth boundary.

Bw—3 to 12 inches; yellowish brown (10YR 5/4) very channery silt loam; weak fine and medium granular structure obscured by shale fragments; friable, nonsticky and nonplastic; many fine roots; 55 percent shale channers; strongly acid; clear broken boundary.

C—12 to 15 inches; yellowish brown (10YR 5/4) extremely channery silt loam; massive; 65 percent shale channers; slightly acid.

R—15 inches; hard shale bedrock.

The solum thickness is 8 to 20 inches. Depth to bedrock is 12 to 20 inches. Content of fragments of shale, siltstone, and fine-grained sandstone ranges from 15 to 35 percent in the A horizon and from 35 to 60 percent in the B horizon.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 6. It is channery loam or silt loam.

The B and C horizons have hue of 10YR, value of 5 or 6, and chroma of 4 to 6. It is very channery or extremely channery silt loam or loam.

Wheeling Series

The Wheeling series consists of very deep, well drained soils on flood plains and on low river terraces. These soils formed in alluvium derived from limestone, sandstone, and shale. Slope ranges from 0 to 3 percent.

Wheeling soils are commonly near Berks, Birdsboro, Craigsville, and Zoar soils. Wheeling soils are deeper to bedrock than Berks soils. Wheeling soils are yellower throughout than Birdsboro soils. Wheeling soils have fewer coarse fragments throughout than Craigsville soils. Wheeling soils have less clay than Zoar soils.

Typical pedon of Wheeling loam, 900 yards southwest of U.S. Route 522, 200 yards northwest of Virginia Route 688, 300 yards south of railroad track, 20 yards north of Back Creek:

Ap—0 to 14 inches; dark brown (10YR 4/3) loam; weak fine subangular blocky structure parting to weak fine granular; friable; many fine roots; many fine pores; slightly acid; abrupt wavy boundary.

Bt1—14 to 24 inches; brown (7.5YR 4/4) loam; moderate fine and medium subangular blocky structure; friable; common fine roots; many fine pores; common thin clay films; common fine black stains and concretions; slightly acid; gradual wavy boundary.

Bt2—24 to 43 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; slightly sticky and slightly plastic; few fine roots; many fine pores; continuous thin clay films; few black stains; moderately acid; gradual wavy boundary.

Bt3—43 to 50 inches; brown (7.5YR 4/4) clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many fine pores; many thin patchy clay films; few black stains; moderately acid; gradual wavy boundary.

BC—50 to 60 inches; brown (7.5YR 4/4) sandy loam; common coarse distinct brown (10YR 5/3) mottles; weak medium subangular blocky structure parting to weak fine granular; many fine pores; moderately acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 72 inches. Content of rock fragments, mostly sandstone and quartz gravel, ranges from 0 to 10 percent in the A and B horizons. Reaction is moderately acid or strongly acid throughout except where the soils have been limed.

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

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam or clay loam.

Some pedons have a C horizon that has colors similar to those of the B horizon. It is loamy sand, sandy loam, loam, or their gravelly analogs.

Zoar Series

The Zoar series consists of very deep, moderately well drained soils on terraces and in upland depressions. These soils formed in colluvium. Slope ranges from 2 to 15 percent.

Zoar soils commonly are near Berks, Monongahela, Sequoia, and Weikert soils. Zoar soils are deeper to bedrock than Berks, Monongahela, and Weikert soils. The seasonal high water table is higher in Zoar soils than in Berks, Sequoia, and Weikert soils. Unlike Zoar soils, Monongahela soils have a fragipan.

Typical pedon of Zoar silt loam, 2 to 7 percent slopes, approximately 0.8 mile east-northeast of the intersection of Virginia Routes 608 and 681, 250 yards northwest of Virginia Route 608, 370 yards east of Back Creek:

Ap—0 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; many fine roots; many fine pores; 12 percent shale channers; neutral; abrupt smooth boundary.

Bt1—9 to 22 inches; yellowish brown (10YR 5/6) silty clay; moderate fine subangular blocky structure; friable, sticky and plastic; few fine roots; many fine pores; common thin patchy clay films; neutral; clear smooth boundary.

Bt2—22 to 28 inches; yellowish brown (10YR 5/6) silty clay; many medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; many fine pores; many thick clay films; very strongly acid; clear wavy boundary.

Btg—28 to 42 inches; light brownish gray (10YR 6/2) silty clay; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky and nonplastic; few fine and medium pores; many thick patchy clay films; 3 percent chert pebbles; very strongly acid; abrupt wavy boundary.

C—42 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct light gray (10YR 7/2) mottles; massive; friable, sticky and plastic; common fine and medium pores; 20 percent sandstone and shale channers between 49 and 54 inches; very strongly acid.

The solum is 30 to 45 inches thick. Depth to bedrock is more than 60 inches. Rock fragments make up less than 3 percent of the solum. Reaction is very strongly acid or strongly acid, except where the soils have been limed.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or loam.

The B horizon in the upper part has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. The B horizon in the lower part has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 to 3; it has yellowish brown, strong brown, or yellowish red mottles. It is silty clay loam or silty clay.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 to 4. It has gray, light gray, strong brown, or yellowish brown mottles. It is clay, silty clay, silty clay loam, clay loam, or their gravelly or channery analogs.

Formation of the Soils

This section briefly describes the factors of soil formation as they relate to the soils of Frederick County. It also explains the major processes in the development of soil horizons.

Factors of Soil Formation

Soils are the product of soil-forming processes acting on materials altered or deposited by geologic forces. The five soil-forming factors that contribute to the differences among soils are climate, parent material, plant and animal life, relief, and time (*5*). Climate and plant and animal life, especially vegetation, are the active forces in soil formation. Their effect on parent material is modified by relief and by the length of time the parent material has been in place. In places one factor dominates in the formation of the soil and determines most of its properties, but generally the kind of soil that develops is determined by the interaction of all factors.

Processes of Soil Horizon Differentiation

Soils are formed as the result of the physical weathering of parent rocks, the chemical weathering of rock fragments and organic matter, the transfer of materials, and the gains and losses of organic matter and minerals.

Soil formation begins with physical weathering of rocks. Large pieces of rock are broken into smaller pieces by frost action, expansion, contraction, and other forces. The rocks and rock fragments are further reduced to sand-, silt-, and clay-sized particles. These particles form the unconsolidated material in which plants can grow. When plants and animals die, organic matter is added to the mineral material.

Rock fragments and organic matter are chemically weathered by solution, carbonation, oxidation, reduction, and the action of weak acids. These chemical processes release iron, aluminum, calcium, and other elements in a form that plants can use.

Commonly, materials transfer from one part of the soil to another. Organic matter in suspension moves from the surface layer to the subsoil. Calcium and other elements are leached from the surface layer. To some extent, these elements are held by the clay in the subsoil or the substratum, but some are leached from the soil by percolating ground water.

Bases are absorbed by the roots of plants and stored in stems, leaves, and twigs. When plants die and decay, they return to the soil the elements they had absorbed in it. In most soils in the county, the translocation and development in place of clay minerals have had a strong influence on the development of soil horizons. As the soil develops, horizons gradually develop recognizable characteristics that make one horizon distinguishable from another.

Major Soil Horizons

The interaction of soil-forming factors result in distinguishable layers, or horizons, in a soil profile. The soil profile extends from the surface of the soil downward to materials that are little altered by the soil-forming processes.

Most soils have three major horizons, the A, B, and C horizons. Some soils have a fourth major horizon, the E horizon, between the A and B horizons. These major horizons can be further subdivided by the use of subscripts and letters to indicate changes within a horizon. A Bt2 horizon, for example, represents a layer within the B horizon of translocated clay eluviated from the A and E horizons.

The A horizon, or surface layer, has the largest accumulation of organic matter.

The E horizon is the layer of maximum leaching, or eluviation, of clay and iron.

The B horizon, or subsoil, lies beneath the A or the E horizon. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, and other elements leached from the layers above. In some soils the B horizon is formed by alteration in place, rather than by illuviation. The alteration may be caused by the oxidation and reduction of iron or by the weathering of clay minerals. The Bt horizon is a layer of accumulated clay. Generally, it is firmer, has a finer texture, and a stronger structure, and is brighter or redder than the A horizon. Most young soils do not have developed Bt horizons.

The C horizon is below the A and B horizons. It consists of material that has been little altered by the soil-forming processes, but that may have been modified by weathering.

Climate

Climate is important in the formation of soils because it influences the weathering of minerals. Weathering breaks down rocks into material on which the other soil-forming processes can act. Weathering is more rapid in a warm, humid climate than in a cold or dry climate. The type and abundance of vegetation are influenced by the amount of precipitation and the length of the growing season. Precipitation also affects the translocation and leaching of some products of weathering. Hard rains and frequent showers can cause excessive erosion.

The climate typical of the county causes intense leaching of water-soluble and colloidal material in many soils, including Frederick, Gilpin, and Sequoia soils. During the cold seasons the soils are frozen for only short periods and only to shallow depths; thus, the amount of weathering and the translocation of material are further increased. Even though the bedrock in some areas contains calcium, free carbonates of lime have not accumulated in the soil. This is attributable to leaching. Most of the soils are acid.

Climate varies locally for two reasons: differences in the degree and direction of slope and position of the slope on the landscape. Relief modifies the effect of climate on the soil. Relief accounts for significant differences among soils in mountain areas and in valley areas. A more detailed discussion of climate in Frederick County is given in the section 'Climate' in 'General Nature of the County.'

Parent Material

The sedimentary rocks of Frederick County belong to the Cambrian, Ordovician, Silurian, and Devonian Periods. These rocks are the parent material of most of the soils in the county.

The two broad classes of parent material in Frederick County are residual material and transported material. Residual material, or residuum, accumulated in place by the weathering of the underlying rock. The characteristics of residuum are related directly to those of the underlying rocks. Transported material is colluvium and alluvium. Alluvium was laid down by water, and colluvium was laid down by gravity both as unconsolidated deposits of clay, silt, sand, and rock fragments. The characteristics of the transported material are related to those of the soils or rocks from which this material originated.

The characteristics of a soil can be traced directly to its parent material. These include texture, mineral content, the kind and quantity of clay, natural fertility, and soil reaction.

In Frederick County the soils formed in residuum, alluvium, and colluvium. The soils that formed in residuum of shale and limestone are the most extensive in the county, and have a wide range of characteristics. The soils that formed in residuum of shale and siltstone include Berks and Weikert soils. The soils that formed in residuum of limestone, such as Frederick and Carbo soils, typically have a silty surface layer and a clayey subsoil. The soils that formed in residuum of sandstone are Hazleton soils, which are coarse textured.

Alluvium is commonly of recent origin, and is deposited during flooding. The soils that formed in alluvium vary widely in texture and development. These include Wheeling, Craigsville, and Lobdell soils.

Colluvium has accumulated dominantly along the lower mountain slopes. The soils that formed in colluvium are mainly coarse or medium textured. These include Laidig and Buchanan soils.

Plant and Animal Life

Biologic forces are important in the formation of soil in Frederick County. Trees, shrubs, grasses, and other herbaceous plants, as well as micro-organisms, earthworms, and other plant and animal life, are active agents in the soil-forming process. The kinds of plants and animals that live on and in the soil are determined by climate, parent material, relief, age of the soil, and other environmental factors. Where either climate or vegetation varies significantly, the soils vary accordingly.

Plants supply organic matter, and transfer moisture and plant nutrients from the lower horizons to the upper horizons. Organic matter decomposes and is mixed into the soil by micro-organisms and earthworms or by chemical reaction. The rate of decomposition is fairly rapid because of the favorable temperature, the generally abundant soil moisture, and the kinds of micro-organisms in the soil. Organic matter content in the soil is medium or low, and generally ranges from 1 to 3 percent, by volume, in the surface layer.

Originally, the vegetation in the county was a dense forest of hardwoods or of mixed hardwoods and pine. The density of the stands, the proportion of different species, and the kinds of ground cover varied to some extent. The forests are not likely the reason for all the differences in soil properties throughout the county. The leaves of deep-rooted deciduous trees vary in content of plant nutrients, but generally return more bases and phosphorus to the soils than coniferous trees.

As agriculture developed in Frederick County, human activities, such as the clearing of forests and the introduction of new kinds of plants, influenced soil formation. Cultivation and artificial drainage, as well as applications of lime and fertilizers, changed some characteristics of the soils. Human activities have caused accelerated erosion. Because of this loss, the soil in many areas is thinner, and vegetation is difficult to establish. Some soil material has been washed from sloping areas down to depressions and flood plains. Young, or immature, soils, such as Timberville and Birdsboro soils, formed in this washed material.

Relief

Relief or lay of the land affects the formation of soils by causing differences in internal drainage, surface runoff, soil temperature, and geologic erosion. Relief also affects the amount of radiant energy absorbed by the soils; this, in turn, affects native vegetation. Relief alters the effect of parent material on soil formation in that several different kinds of soils can form from the same kind of parent material.

Slope in Frederick County ranges from nearly level to very steep. In the steeper areas, runoff is rapid, little water percolates through the soil, there is little movement of clay and little translocation of bases, and soil material erodes as rapidly as it forms. Weikert and Berks soils formed under these conditions. In the gently sloping and strongly sloping areas, the soils are well drained and erosion generally is slight. The soils that formed in such areas are mature; that is, they have well-defined horizons. These include Oaklet, Frederick, and Pagebrook soils. Low-lying, flat areas or depressions are wet and often ponded, and drainage is restricted. Clearbrook and Blairton soils, which are mottled, formed in these kinds of environments.

Time

Time is important in soil formation. If the factors of soil formation have interacted long enough so that well-defined, genetically related horizons have formed, and the soil and its environment are in equilibrium, the soil is considered mature. Swimley and Poplimento soils are mature soils.

Soils that formed in the same kind of parent material but on a different topography do not necessarily mature in the same length of time. Weikert soils in steep areas do not have definite horizons because most soil formed has been removed as the result of erosion. However, Guernsey soils in strongly sloping areas have developed horizons.

Soils that form in material resistant to weathering require more time to mature than soils that form in easily weathered material. Soils on flood plains mature, that is, genetically related horizons in them develop, slowly or not at all if frequent alluvial deposits continue to occur.

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Glossary

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.

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.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, 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.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Carrying capacity. The maximum stocking rate possible without inducing damage to vegetation or related resources. The rate may vary from year to year because of fluctuating forage production.

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, limestone, or schist as much as 6 inches long along the longest axis. A single piece is called a 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.

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 (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

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.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A form of noninversion tillage that retains protective amounts of residue mulch on the surface throughout the year. Conservation tillage includes no-tillage, strip tillage, stubble mulching, and other types of noninversion tillage.

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.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Using that part of the plant or crop left in the field after harvest to protect or improve 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.

Depth to rock (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, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially

drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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.

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 the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

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.*

Fine textured soil. Sandy clay, silty clay, and clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Gravel. Rounded or angular fragments of rock up to 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, up to 3 inches (7.6 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying 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.

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. The major horizons are as follows:
O horizon.—An organic layer of fresh and decaying plant residue.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.
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 (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2)

granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying 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, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-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.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and 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).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

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.

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.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting 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 downward 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. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

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 degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

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. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multipled by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
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

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.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

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 wind 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 wind 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.

Substratum. The part of the soil below the solum.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

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 specifiying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material 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.

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.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

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.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1949-81 at Winchester, Virginia]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	41.5	23.9	32.7	74.0	3.0	94	2.45	3.57	1.26	5	7.4
February---	44.7	25.8	35.3	76.0	7.0	101	2.39	3.73	1.10	6	7.1
March------	53.9	32.6	43.3	84.0	18.0	257	3.11	4.27	2.01	7	6.0
April------	66.4	42.5	54.5	92.0	27.0	531	3.20	4.30	1.98	7	0.4
May--------	75.3	51.3	63.3	94.0	36.0	806	3.69	5.44	1.98	7	0
June-------	83.0	59.4	71.2	98.0	46.0	1,007	4.08	4.96	2.06	7	0
July-------	86.6	63.6	75.0	100.0	54.0	1,173	4.18	5.64	2.35	7	0
August-----	85.3	62.6	73.8	98.0	54.0	1,138	3.77	5.44	1.84	6	0
September--	78.9	56.1	67.5	95.0	40.0	900	3.24	4.31	1.90	5	0
October----	67.2	44.8	56.0	88.0	27.0	583	3.03	4.41	1.77	5	0
November---	54.9	35.8	45.4	82.0	17.0	287	2.69	4.40	1.20	5	1.4
December---	44.1	27.1	35.6	74.0	10.0	112	2.60	3.69	1.53	5	5.5
Year:											
Average---	65.1	43.8	54.5	---	---	---	---	---	---	---	---
Extreme---	---	---	---	103	-10	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,989.4	38.43	54.16	20.98	72	27.8

* 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 (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1949-81 at Winchester, Virginia]

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--	April 5	April 15	May 8
2 years in 10 later than--	March 29	April 12	April 23
5 years in 10 later than--	March 25	April 1	April 16
First freezing temperature in fall:			
1 year in 10 earlier than--	November 1	October 13	October 4
2 years in 10 earlier than--	November 7	October 21	October 7
5 years in 10 earlier than--	November 20	November 4	October 19

TABLE 3.--GROWING SEASON

[Recorded in the period 1949-81 at Winchester, Virginia]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	219	189	148
8 years in 10	225	197	172
5 years in 10	237	213	188
2 years in 10	258	227	198
1 year in 10	265	231	203

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1B	Berks channery silt loam, 2 to 7 percent slopes	8,270	3.0
1C	Berks channery silt loam, 7 to 15 percent slopes	9,510	3.4
2	Birdsboro loam	730	0.3
3B	Blairton silt loam, 2 to 7 percent slopes	9,450	3.4
3C	Blairton silt loam, 7 to 15 percent slopes	2,330	0.8
4B	Buchanan very stony sandy loam, 2 to 7 percent slopes	570	0.2
4C	Buchanan very stony sandy loam, 7 to 15 percent slopes	3,280	1.2
5B	Carbo silt loam, 2 to 7 percent slopes	1,210	0.4
5C	Carbo silt loam, 7 to 15 percent slopes	430	0.2
6C	Carbo-Oaklet silt loams, very rocky, 2 to 15 percent slopes	3,660	1.3
7C	Carbo-Oaklet-Rock outcrop complex, 2 to 15 percent slopes	2,880	1.0
8B	Chilhowie silty clay loam, 2 to 7 percent slopes	590	0.2
8C	Chilhowie silty clay loam, 7 to 15 percent slopes	430	0.2
9B	Clearbrook channery silt loam, 2 to 7 percent slopes	7,070	2.5
9C	Clearbrook channery silt loam, 7 to 15 percent slopes	1,070	0.4
10	Craigsville cobbly sandy loam	2,660	1.0
11C	Dekalb channery loam, 7 to 15 percent slopes	850	0.3
12E	Dekalb very stony loam, 25 to 65 percent slopes	800	0.3
13B	Frankstown channery silt loam, 2 to 7 percent slopes	900	0.3
13C	Frankstown channery silt loam, 7 to 15 percent slopes	1,150	0.4
13D	Frankstown channery silt loam, 15 to 25 percent slopes	620	0.2
13E	Frankstown channery silt loam, 25 to 35 percent slopes	310	0.1
14B	Frederick-Poplimento loams, 2 to 7 percent slopes	9,660	3.5
14C	Frederick-Poplimento loams, 7 to 15 percent slopes	14,450	5.2
14D	Frederick-Poplimento loams, 15 to 25 percent slopes	3,520	1.3
15C	Frederick-Poplimento very gravelly loams, 7 to 15 percent slopes	260	0.1
15D	Frederick-Poplimento very gravelly loams, 15 to 25 percent slopes	850	0.3
15E	Frederick-Poplimento very gravelly loams, 25 to 60 percent slopes	780	0.3
16B	Frederick-Poplimento loams, very rocky, 2 to 7 percent slopes	470	0.2
16C	Frederick-Poplimento loams, very rocky, 7 to 15 percent slopes	5,750	2.1
16D	Frederick-Poplimento loams, very rocky, 15 to 25 percent slopes	3,410	1.2
17C	Frederick-Poplimento-Rock outcrop complex, 2 to 15 percent slopes	3,270	1.2
17E	Frederick-Poplimento-Rock outcrop complex, 15 to 45 percent slopes	5,290	1.9
18B	Gainesboro-Lehew complex, 2 to 7 percent slopes	1,230	0.4
18C	Gainesboro-Lehew complex, 7 to 15 percent slopes	7,790	2.8
18D	Gainesboro-Lehew complex, 15 to 25 percent slopes	6,080	2.2
18E	Gainesboro-Lehew complex, 25 to 65 percent slopes	7,170	2.6
19C	Gilpin channery loam, 7 to 15 percent slopes	1,140	0.4
20B	Guernsey silt loam, 2 to 7 percent slopes	920	0.3
20C	Guernsey silt loam, 7 to 15 percent slopes	470	0.2
21C	Hayter cobbly loam, 7 to 15 percent slopes	720	0.3
21D	Hayter cobbly loam, 15 to 25 percent slopes	320	0.1
22C	Hayter very cobbly loam, 7 to 15 percent slopes	450	0.2
22D	Hayter very cobbly loam, 15 to 25 percent slopes	340	0.1
22E	Hayter very cobbly loam, 25 to 40 percent slopes	470	0.2
23C	Hazleton very stony sandy loam, 7 to 15 percent slopes	310	0.1
23D	Hazleton very stony sandy loam, 15 to 25 percent slopes	2,620	0.9
23E	Hazleton very stony sandy loam, 25 to 65 percent slopes	5,660	2.0
24E	Hazleton extremely stony sandy loam, 25 to 65 percent slopes	4,450	1.6
25C	Laidig very stony fine sandy loam, 7 to 15 percent slopes	2,310	0.8
25D	Laidig very stony fine sandy loam, 15 to 25 percent slopes	4,560	1.6
25E	Laidig very stony fine sandy loam, 25 to 65 percent slopes	5,690	2.0
26C	Lehew channery fine sandy loam, 7 to 15 percent slopes	830	0.3
26D	Lehew channery fine sandy loam, 15 to 25 percent slopes	930	0.3
26E	Lehew channery fine sandy loam, 25 to 45 percent slopes	1,080	0.4
27	Library silt loam, 2 to 7 percent slopes	1,140	0.4
28	Lobdell silt loam	630	0.2
29	Massanetta loam	1,360	0.5
30B	Monongahela gravelly loam, 2 to 7 percent slopes	320	0.1
31B	Nicholson silt loam, 2 to 7 percent slopes	430	0.2
32B	Oaklet silt loam, 2 to 7 percent slopes	8,800	3.2
32C	Oaklet silt loam, 7 to 15 percent slopes	3,570	1.3
33C	Opequon-Chilhowie silty clays, very rocky, 3 to 15 percent slopes	360	0.1
33E	Opequon-Chilhowie silty clays, very rocky, 15 to 45 percent slopes	800	0.3
34	Pagebrook silt loam	1,170	0.4

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
35	Pagebrook silty clay loam	880	0.3
36	Pits, quarries and dumps	1,150	0.4
37D	Schaffenaker very stony loamy sand, 7 to 25 percent slopes	370	0.1
37E	Schaffenaker very stony loamy sand, 25 to 65 percent slopes	490	0.2
38B	Sequoia silt loam, 2 to 7 percent slopes	830	0.3
38C	Sequoia silt loam, 7 to 15 percent slopes	880	0.3
38D	Sequoia silt loam, 15 to 25 percent slopes	410	0.1
39B	Swimley silt loam, 2 to 7 percent slopes	1,170	0.4
39C	Swimley silt loam, 7 to 15 percent slopes	1,050	0.4
40B	Timberville silt loam, 2 to 7 percent slopes	1,400	0.5
41B	Weikert-Berks channery silt loams, 2 to 7 percent slopes	1,560	0.6
41C	Weikert-Berks channery silt loams, 7 to 15 percent slopes	16,630	6.0
41D	Weikert-Berks channery silt loams, 15 to 25 percent slopes	23,430	8.4
41E	Weikert-Berks channery silt loams, 25 to 65 percent slopes	36,790	13.0
42C	Weikert-Berks very stony silt loams, 7 to 15 percent slopes	410	0.1
42D	Weikert-Berks very stony silt loams, 15 to 25 percent slopes	1,580	0.6
42E	Weikert-Berks very stony silt loams, 25 to 65 percent slopes	4,030	1.4
43	Wheeling loam	1,460	0.5
44B	Zoar silt loam, 2 to 7 percent slopes	1,880	0.7
44C	Zoar silt loam, 7 to 15 percent slopes	980	0.4
	Water	1,020	0.4
	Total	279,000	100.0

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. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
2	Birdsboro loam
3B	Blairton silt loam, 2 to 7 percent slopes
5B	Carbo silt loam, 2 to 7 percent slopes
13B	Frankstown channery silt loam, 2 to 7 percent slopes
14B	Frederick-Poplimento loams, 2 to 7 percent slopes
20B	Guernsey silt loam, 2 to 7 percent slopes
27	Library silt loam, 2 to 7 percent slopes (where drained)
28	Lobdell silt loam
29	Massanetta loam
32B	Oaklet silt loam, 2 to 7 percent slopes
38B	Sequoia silt loam, 2 to 7 percent slopes
39B	Swimley silt loam, 2 to 7 percent slopes
40B	Timberville silt loam, 2 to 7 percent slopes
43	Wheeling loam
44B	Zoar silt loam, 2 to 7 percent slopes

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. 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	Capability class and subclass	Corn	Apples	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Bu	Bu	Tons	Tons	AUM*
1B---------- Berks	IIe	80	---	35	---	3.0	4.5
1C---------- Berks	IIIe	75	---	35	---	2.5	4.0
2---------- Birdsboro	I	140	---	50	5.0	3.5	8.0
3B---------- Blairton	IIIw	75	---	35	---	2.5	5.0
3C---------- Blairton	IVe	70	---	30	---	2.0	4.0
4B, 4C---------- Buchanan	VIs	---	---	---	---	---	---
5B---------- Carbo	IIe	90	---	45	3.5	3.5	4.5
5C---------- Carbo	IIIe	80	---	40	3.0	3.0	4.5
6C---------- Carbo-Oaklet	IVe	75	400	40	3.5	3.0	4.5
7C**---------- Carbo-Oaklet-Rock outcrop	VIs	---	---	---	---	---	---
8B---------- Chilhowie	IIIe	75	---	---	---	2.5	4.5
8C---------- Chilhowie	IVe	70	---	---	---	2.5	4.5
9B---------- Clearbrook	IIIw	70	---	35	---	3.0	5.0
9C---------- Clearbrook	IIIe	65	---	30	---	2.5	4.5
10---------- Craigsville	IIIs	70	---	25	---	1.5	4.5
11C---------- Dekalb	IIIe	75	400	35	3.0	2.5	4.5
12E---------- Dekalb	VIIs	---	---	---	---	---	---
13B---------- Frankstown	IIe	125	550	45	4.5	3.5	7.0
13C---------- Frankstown	IIIe	120	550	40	4.5	3.5	7.0
13D---------- Frankstown	IVe	110	550	35	4.0	3.0	6.5

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Capability class and subclass	Corn	Apples	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Bu	Bu	Tons	Tons	AUM*
13E---------- Frankstown	VIe	---	---	---	---	---	---
14B---------- Frederick-Poplimento	IIe	130	550	48	4.5	3.5	7.0
14C---------- Frederick-Poplimento	IIIe	118	550	43	4.4	3.0	7.0
14D---------- Frederick-Poplimento	IVe	110	550	35	4.0	3.0	6.5
15C---------- Frederick-Poplimento	IVs	---	---	---	---	2.0	5.0
15D---------- Frederick-Poplimento	VIs	---	---	---	---	---	4.5
15E---------- Frederick-Poplimento	VIIs	---	---	---	---	---	---
16B---------- Frederick-Poplimento	VIs	---	---	---	---	---	6.0
16C---------- Frederick-Poplimento	VIs	---	---	---	---	---	6.0
16D---------- Frederick-Poplimento	VIs	---	---	---	---	---	5.5
17C**---------- Frederick-Poplimento-Rock outcrop	VIIs	---	---	---	---	---	3.0
17E**---------- Frederick-Poplimento-Rock outcrop	VIIs	---	---	---	---	---	---
18B---------- Gainesboro-Lehew	IIe	89	400	---	---	3.0	6.0
18C---------- Gainesboro-Lehew	IIIe	81	400	---	---	2.8	6.0
18D---------- Gainesboro-Lehew	IVe	73	400	---	---	2.2	5.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Capability class and subclass	Corn	Apples	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Bu	Bu	Tons	Tons	AUM*
18E---------- Gainesboro-Lehew	VIe	---	---	---	---	---	---
19C---------- Gilpin	IIIe	85	---	35	---	3.0	5.0
20B---------- Guernsey	IIe	100	---	---	---	4.0	5.0
20C---------- Guernsey	IIIe	90	---	---	---	4.0	5.0
21C---------- Hayter	IIIe	120	450	40	---	3.0	5.0
21D---------- Hayter	IVe	110	450	35	---	2.5	4.0
22C---------- Hayter	IVs	90	---	35	---	2.5	4.0
22D---------- Hayter	VIs	---	---	---	---	---	---
22E---------- Hayter	VIIe	---	---	---	---	---	---
23C, 23D-------- Hazleton	VIs	---	---	---	---	---	3.5
23E, 24E-------- Hazleton	VIIs	---	---	---	---	---	---
25C---------- Laidig	VIs	---	---	---	---	---	---
25D---------- Laidig	VIs	---	---	---	---	---	---
25E---------- Laidig	VIIs	---	---	---	---	---	---
26C---------- Lehew	IIIe	75	400	35	3.0	2.5	4.5
26D---------- Lehew	IVe	70	400	30	3.0	2.0	4.5
26E---------- Lehew	VIIe	---	---	---	---	---	---
27---------- Library	IIIw	95	---	35	---	3.0	6.0
28---------- Lobdell	IIw	120	---	---	---	4.5	6.0
29---------- Massanetta	IIw	100	---	---	---	3.0	5.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Capability class and subclass	Corn	Apples	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Bu	Bu	Tons	Tons	AUM*
30B---------- Monongahela	IIe	110	---	40	3.5	3.0	4.5
31B---------- Nicholson	IIe	130	500	40	4.5	3.5	6.5
32B---------- Oaklet	IIe	115	500	45	4.0	3.0	7.0
32C---------- Oaklet	IIIe	95	500	35	3.5	2.5	7.0
33C---------- Opequon-Chilhowie	VIs	---	---	---	---	2.5	---
33E---------- Opequon-Chilhowie	VIIs	---	---	---	---	---	---
34, 35---------- Pagebrook	IIIs	85	---	55	4.0	3.5	---
36**. Pits							
37D, 37E-------- Schaffenaker	VIIs	---	---	---	---	---	---
38B---------- Sequoia	IIIe	65	---	45	2.7	2.5	5.5
38C---------- Sequoia	IVe	55	---	40	2.5	2.0	5.0
38D---------- Sequoia	VIe	---	---	---	---	---	4.5
39B---------- Swimley	IIe	125	550	45	4.5	3.5	7.0
39C---------- Swimley	IIIe	120	550	40	4.0	3.0	7.0
40B---------- Timberville	IIw	100	---	55	---	2.5	6.0
41B---------- Weikert-Berks	IIIe	---	---	---	---	2.0	4.0
41C---------- Weikert-Berks	IVe	---	---	---	---	1.5	3.5
41D---------- Weikert-Berks	VIe	---	---	---	---	---	---
41E---------- Weikert-Berks	VIIe	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Capability class and subclass	Corn	Apples	Wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Bu	Bu	Tons	Tons	AUM*
42C, 42D-------- Weikert-Berks	VIs	---	---	---	---	---	---
42E---------- Weikert-Berks	VIIs	---	---	---	---	---	---
43---------- Wheeling	I	125	---	45	---	4.5	6.0
44B---------- Zoar	IIe	90	---	40	3.5	3.0	5.5
44C---------- Zoar	IIIe	80	---	35	3.5	3.0	5.5

* 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 7.--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	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
1B, 1C---------- Berks	4F	Slight	Slight	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, Virginia pine.
						Black oak----------	70	4	
						Virginia pine-------	70	8	
2---------- Birdsboro	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow-poplar, Virginia pine.
						Yellow-poplar-------	90	6	
						Virginia pine-------	80	8	
						Shortleaf pine------	80	9	
3B, 3C---------- Blairton	4W	Slight	Moderate	Slight	Slight	Northern red oak----	70	4	Yellow-poplar, eastern white pine.
						White ash----------	70	3	
						Sugar maple---------	70	3	
						Yellow-poplar-------	80	5	
4B, 4C---------- Buchanan	3A	Slight	Slight	Slight	Slight	Northern red oak----	66	3	Eastern white pine, yellow-poplar, sugar maple.
						Yellow-poplar-------	91	6	
5B, 5C---------- Carbo	4C	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	80	5	
						Eastern white pine--	80	10	
6C**:									
Carbo----------	4C	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	80	5	
						Eastern white pine--	80	10	
Oaklet---------	4C	Slight	Moderate	Slight	Slight	Northern red oak----	75	4	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	85	6	
7C**:									
Carbo----------	4C	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	80	5	
						Eastern white pine--	80	10	
7C**:									
Oaklet---------	4C	Slight	Moderate	Slight	Slight	Northern red oak----	75	4	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	85	6	
Rock outcrop.									

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
8B, 8C---------- Chilhowie	3C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	
9B, 9C---------- Clearbrook	4W	Moderate	Severe	Moderate	Moderate	Northern red oak----	70	4	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	80	5	
10---------- Craigsville	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Loblolly pine, eastern white pine, yellow-poplar.
						Yellow-poplar-------	95	7	
						Eastern white pine--	90	12	
						Virginia pine-------	80	8	
11C---------- Dekalb	3F	Slight	Slight	Moderate	Slight	Northern red oak----	57	3	Eastern white pine, Virginia pine.
12E---------- Dekalb (North aspect)	3R	Moderate	Severe	Severe	Slight	Northern red oak----	57	3	Eastern white pine, Virginia pine.
12E---------- Dekalb (South aspect)	2R	Moderate	Severe	Moderate	Slight	Northern red oak----	57	3	Eastern white pine, Virginia pine.
13B, 13C-------- Frankstown	4A	Slight	Slight	Slight	Slight	Northern red oak----	79	4	Eastern white pine, yellow-poplar, black walnut, Virginia pine.
						Yellow-poplar-------	85	6	
						Shortleaf pine------	80	9	
						Virginia pine-------	80	8	
						White oak-----------	80	4	
13D, 13E-------- Frankstown (North aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	79	4	Eastern white pine, yellow-poplar, black walnut, Virginia pine.
						Yellow-poplar-------	85	6	
						Shortleaf pine------	80	9	
						Virginia pine-------	80	8	
						White oak-----------	80	4	
13D, 13E-------- Frankstown (South aspect)	3R	Moderate	Moderate	Moderate	Slight	Northern red oak----	65	3	Eastern white pine, Virginia pine.
14B**, 14C**: Frederick------	4C	Slight	Moderate	Slight	Slight	Northern red oak----	76	4	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	86	6	
14B**, 14C**: Poplimento-----	4C	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	90	6	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
14D**:									
Frederick------	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 86	4 6	Eastern white pine, yellow-poplar.
Poplimento-----	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	4 6	Eastern white pine, yellow-poplar, black walnut.
15C**:									
Frederick------	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 86	4 6	Eastern white pine, yellow-poplar, black walnut.
Poplimento-----	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	4 6	Eastern white pine, yellow-poplar, black walnut.
15D**:									
Frederick------	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 86	4 6	Eastern white pine, yellow-poplar, black walnut.
Poplimento-----	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	4 6	Eastern white pine, yellow-poplar, black walnut.
15E**:									
Frederick------ (North aspect)	4R	Severe	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 86	4 6	Eastern white pine, yellow-poplar, black walnut.
Poplimento----- (North aspect)	4R	Severe	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	4 6	Eastern white pine, yellow-poplar, black walnut.
15E**:									
Frederick------ (South aspect)	3R	Severe	Severe	Moderate	Slight	Northern red oak----	66	3	Eastern white pine, Virginia pine.
Poplimento (South aspect)	3R	Severe	Severe	Moderate	Slight	Northern red oak----	67	3	Eastern white pine, Virginia pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
16B**, 16C**:									
Frederick------	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 86	4 6	Eastern white pine, yellow-poplar, black walnut.
Poplimento-----	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	4 6	Eastern white pine, yellow-poplar, black walnut.
16D**:									
Frederick------	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 86	4 6	Eastern white pine, yellow-poplar, black walnut.
Poplimento-----	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	4 6	Eastern white pine, yellow-poplar, black walnut.
17C**:									
Frederick------	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 86	4 6	Eastern white pine, yellow-poplar, black walnut.
Poplimento-----	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	4 6	Eastern white pine, yellow-poplar, black walnut.
Rock outcrop.									
17E**:									
Frederick------ (North aspect)	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 86	4 6	Eastern white pine, yellow-poplar, black walnut.
Poplimento----- (North aspect)	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	4 6	Eastern white pine, yellow-poplar, black walnut.
Rock outcrop.									
17E**:									
Frederick------ (South aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak----	66	3	Eastern white pine, Virginia pine.
Poplimento----- (South aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak----	67	3	Eastern white pine, Virginia pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
18B**, 18C**:									
Gainesboro-----	4A	Slight	Slight	Slight	Slight	Northern red oak---- Virginia pine------- Yellow-poplar-------	70 70 80	4 8 5	Eastern white pine, Virginia pine.
Lehew----------	3A	Slight	Slight	Slight	Slight	Northern red oak---- Virginia pine-------	62 57	3 6	Eastern white pine, Virginia pine.
18D**:									
Gainesboro-----	4R	Slight	Moderate	Moderate	Slight	Northern red oak---- Virginia pine------- Yellow-poplar-------	70 70 80	4 8 5	Eastern white pine, Virginia pine.
Lehew----------	3R	Slight	Moderate	Slight	Slight	Northern red oak---- Virginia pine-------	67 70	3 8	Eastern white pine, Virginia pine.
18E**:									
Gainesboro----- (North aspect)	4R	Moderate	Severe	Moderate	Slight	Northern red oak---- Virginia pine------- Yellow-poplar-------	70 80 80	4 8 5	Eastern white pine, Virginia pine.
Lehew---------- (North aspect)	3R	Moderate	Severe	Slight	Slight	Northern red oak---- Virginia pine-------	67 70	3 8	Eastern white pine, Virginia pine.
18E**:									
Gainesboro----- (South aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak----	60	3	Eastern white pine, Virginia pine.
Lehew---------- (South aspect)	2R	Moderate	Severe	Slight	Slight	Northern red oak---- Virginia pine-------	52 50	2 5	Eastern white pine, Virginia pine.
19C---------- Gilpin	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 95	4 7	Virginia pine, eastern white pine, black cherry, yellow-poplar.
20B, 20C-------- Guernsey	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	78 95	4 7	Eastern white pine, yellow-poplar, black cherry, black locust, northern red oak.
21C---------- Hayter	4A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 96	4 7	Yellow-poplar, eastern white pine.
21D---------- Hayter	4R	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 96	4 7	Yellow-poplar, eastern white pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
22C---------- Hayter	4A	Slight	Moderate	Slight	Slight	Northern red oak----	76	4	Yellow-poplar, eastern white pine.
						Yellow-poplar-------	96	7	
22D, 22E-------- Hayter (North aspect)	4R	Slight	Moderate	Slight	Slight	Northern red oak----	76	4	Yellow-poplar, eastern white pine.
						Yellow-poplar-------	96	7	
22D, 22E-------- Hayter (South aspect)	3R	Slight	Moderate	Slight	Slight	Northern red oak----	67	3	Eastern white, pine.
						Yellow-poplar-------	90	6	
23C---------- Hazleton	4F	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	80	5	
23D---------- Hazleton	4R	Slight	Moderate	Slight	Slight	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	80	5	
23E---------- Hazleton (North aspect)	4R	Moderate	Severe	Slight	Slight	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	80	5	
23E---------- Hazleton (South aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak----	65	3	Eastern white pine.
24E---------- Hazleton (North aspect)	4R	Moderate	Severe	Slight	Slight	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	80	5	
24E---------- Hazleton (South aspect)	3X	Moderate	Severe	Moderate	Slight	Northern red oak----	60	3	Eastern white pine.
25C---------- Laidig	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow-poplar, black walnut, black cherry.
						White oak----------	80	4	
						Yellow-poplar-------	90	6	
						White ash----------	80	4	
						Sugar maple---------	80	4	
25D---------- Laidig	4R	Slight	Moderate	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow-poplar, black walnut, black cherry.
						White oak----------	80	4	
						Yellow-poplar-------	90	6	
						White ash----------	80	4	
						Sugar maple---------	80	4	
25E---------- Laidig (North aspect)	4R	Moderate	Severe	Slight	Slight	Northern red oak----	80	4	Eastern white pine, yellow-poplar, black walnut, black cherry.
						White oak----------	80	4	
						Yellow-poplar-------	90	6	
						White ash----------	80	4	
						Sugar maple---------	80	4	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
25E---------- Laidig (South aspect)	3R	Moderate	Severe	Slight	Slight	Northern red oak----	68	3	Eastern white pine, yellow-poplar, black walnut, Virginia pine.
						Yellow-poplar-------	83	5	
						Eastern white pine--	80	10	
						Virginia pine-------	60	6	
26C---------- Lehew	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Eastern white pine, Virginia pine.
						Virginia pine-------	57	6	
26D---------- Lehew	4R	Slight	Moderate	Slight	Slight	Northern red oak----	70	4	Eastern white pine, Virginia pine.
						Virginia pine-------	60	6	
26E---------- Lehew (North aspect)	4R	Moderate	Severe	Slight	Slight	Northern red oak----	70	4	Eastern white pine, Virginia pine.
						Virginia pine-------	60	6	
26E---------- Lehew (South aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak----	58	3	Eastern white pine, Virginia pine.
						Virginia pine-------	50	5	
27---------- Library	4W	Slight	Moderate	Moderate	Moderate	Northern red oak----	80	4	Yellow-poplar, eastern white pine.
						White ash----------	80	4	
						Sugar maple---------	80	4	
						Red maple----------	80	4	
						Yellow-poplar-------	90	6	
28---------- Lobdell	4A	Slight	Slight	Slight	Slight	Northern red oak----	87	4	Eastern white pine, yellow-poplar, northern red oak.
						Yellow-poplar-------	96	7	
29---------- Massanetta	4W	Slight	Moderate	Slight	Slight	Northern red oak----	85	4	Black walnut, eastern white pine, yellow-poplar.
						Virginia pine-------	85	8	
						Sweetgum-----------	95	8	
30B---------- Monongahela	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Eastern white pine.
						Yellow-poplar-------	85	6	
						Eastern white pine--	72	9	
						Virginia pine-------	66	7	
31B---------- Nicholson	4A	Slight	Slight	Slight	Slight	Northern red oak----	78	4	Black oak, yellow-poplar.
						White oak----------	74	4	
						Yellow-poplar-------	84	6	
32B, 32C-------- Oaklet	4C	Slight	Moderate	Slight	Slight	Northern red oak----	75	4	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	85	6	
33C**:									
Opequon--------	3D	Moderate	Moderate	Severe	Severe	Northern red oak----	65	3	Virginia pine, eastern white pine.
						White oak----------	60	3	
Chilhowie------	3C	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	3	Eastern white pine.
						Virginia pine-------	60	6	
						Shortleaf pine------	60	6	

See footnote and end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
33E**:									
Opequon (North aspect)	3R	Severe	Severe	Severe	Severe	Northern red oak Yellow-poplar	65 80	3 5	Virginia pine, eastern white pine.
Chilhowie (North aspect)	3R	Severe	Severe	Moderate	Moderate	Northern red oak Virginia pine Shortleaf pine	60 60 60	3 6 6	Virginia pine, eastern white pine, black walnut.
33E Opequon (South aspect)	2R	Severe	Severe	Severe	Severe	Northern red oak	50	--	Virginia pine.
Chilhowie (South aspect)	2R	Severe	Severe	Moderate	Moderate	Northern red oak	50	--	Virginia pine.
34, 35 Pagebrook	4C	Slight	Moderate	Moderate	Slight	Northern red oak Yellow-poplar	70 75	4 4	Eastern white pine, yellow-poplar, black walnut.
37D**: Schaffenacker	3S	Slight	Moderate	Moderate	Slight	Northern red oak Chestnut oak Virginia pine	60 60 60	3 3 6	Eastern white pine.
37E**:									
Schaffenacker (North aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak Chestnut oak Virginia pine	60 60 60	3 3 6	Eastern white pine.
Schaffenacker (South aspect)	2R	Moderate	Severe	Severe	Slight	Northern red oak Chestnut oak Virginia pine	50 50 50	2 2 5	Eastern white pine.
38B, 38C Sequoia	4A	Slight	Slight	Slight	Slight	Northern red oak Shortleaf pine Virginia pine	70 63 71	4 7 8	Loblolly pine, shortleaf pine, Virginia pine.
38D Sequoia	4R	Moderate	Moderate	Slight	Slight	Northern red oak Shortleaf pine Virginia pine	70 63 71	4 7 8	Loblolly pine, shortleaf pine, Virginia pine.
39B, 39C Swimley	4C	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar	80 90	4 6	Eastern white pine, yellow-poplar.
40B Timberville	4A	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Shortleaf pine Virginia pine	80 90 80 70	4 6 9 8	Yellow-poplar, black walnut, eastern white pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
41B**, 41C**:									
Weikert--------	3D	Slight	Slight	Severe	Moderate	Northern red oak---- Virginia pine-------	65 56	3 6	Virginia pine, shortleaf pine, eastern white pine.
Berks----------	4F	Slight	Slight	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine.
41D**:									
Weikert--------	3D	Slight	Moderate	Severe	Moderate	Northern red oak---- Virginia pine-------	64 60	3 6	Eastern white pine, shortleaf pine, Virginia pine.
Berks----------	4F	Slight	Moderate	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine.
41E**:									
Weikert-------- (North aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak---- Virginia pine-------	60 60	3 6	Eastern white pine, shortleaf pine, Virginia pine.
Berks---------- (North aspect)	4R	Moderate	Severe	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine.
41E**:									
Weikert-------- (South aspect)	2D	Moderate	Severe	Severe	Moderate	Northern red oak---- Virginia pine-------	50 52	2 --	Virginia pine, shortleaf pine.
Berks---------- (South aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	60 60 60	3 3 6	Virginia pine, eastern white pine.
42C**:									
Weikert--------	3D	Slight	Slight	Severe	Moderate	Northern red oak----	59	3	Virginia pine, shortleaf pine, eastern white pine.
Berks----------	4F	Slight	Slight	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	4 4 8	Virginia pine, eastern white pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
42D**:									
Weikert	3D	Slight	Slight	Severe	Moderate	Northern red oak	64	3	Virginia pine, shortleaf pine, eastern white pine.
						Virginia pine	60	6	
Berks	4F	Slight	Moderate	Moderate	Slight	Northern red oak	70	4	Virginia pine, eastern white pine.
						Black oak	70	4	
						Virginia pine	70	8	
42E**:									
Weikert (North aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak	64	3	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine	60	6	
Berks (North aspect)	4R	Moderate	Severe	Moderate	Slight	Northern red oak	70	4	Virginia pine, eastern white pine.
						Black oak	70	4	
42E**:									
Weikert (South aspect)	2D	Moderate	Severe	Severe	Moderate	Northern red oak	50	2	Eastern white pine.
						Virginia pine	52	6	
Berks (South aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak	60	3	Virginia pine, eastern white pine.
						Black oak	60	4	
						Virginia pine	60	8	
43--- Wheeling	4A	Slight	Slight	Slight	Slight	Northern red oak	80	4	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	90	6	
44B--- Zoar	4W	Slight	Moderate	Slight	Slight	Northern red oak	70	4	Eastern white pine, shortleaf pine, Virginia pine, yellow-poplar.
						Yellow-poplar	80	5	
						Virginia pine	70	8	
						Eastern white pine	80	10	
						Black oak	70	4	
						White oak	70	4	
44C--- Zoar	4W	Moderate	Moderate	Slight	Slight	Northern red oak	70	4	Eastern white pine, shortleaf pine, Virginia pine, yellow-poplar.
						Yellow-poplar	80	5	
						Virginia pine	70	8	
						Eastern white pine	80	10	
						Black oak	70	4	
						White oak	70	4	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--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
1B Berks	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: small stones.
1C Berks	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Slight	Severe: small stones.
2 Birdsboro	Severe: flooding.	Moderate: wetness.	Moderate: small stones.	Slight	Slight.
3B Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
3C Blairton	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.
4B Buchanan	Severe: wetness.	Severe: wetness.	Severe: large stones, small stones.	Severe: wetness.	Severe: small stones, wetness.
4C Buchanan	Severe: wetness.	Severe: wetness.	Severe: large stones, slope, small stones.	Severe: wetness.	Severe: small stones, wetness.
5B Carbo	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: depth to rock.
5C Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
6C*: Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
Oaklet	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
7C*: Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
Oaklet	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Rock outcrop.					
8B Chilhowie	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Slight	Moderate: large stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
8C---------- Chilhowie	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: large stones, slope.
9B---------- Clearbrook	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.	Severe: wetness.	Severe: large stones, wetness.
9C---------- Clearbrook	Severe: wetness.	Severe: wetness.	Severe: small stones, slope, wetness.	Severe: wetness, erodes easily.	Severe: large stones, wetness.
10---------- Craigsville	Severe: flooding.	Moderate: flooding, large stones.	Severe: small stones, flooding.	Moderate: large stones, flooding.	Severe: large stones, flooding.
11C---------- Dekalb	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Severe: small stones.
12E---------- Dekalb	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, small stones.
13B---------- Frankstown	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Moderate: small stones.
13C---------- Frankstown	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones.	Moderate: small stones.	Moderate: slope, small stones.
13D, 13E---------- Frankstown	Severe: slope.	Severe: slope.	Severe: small stones.	Severe: slope.	Severe: slope.
14B*: Frederick----------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
Poplimento----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Slight.
14C*: Frederick----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Poplimento----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.
14D*: Frederick----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Poplimento----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
15C*:					
Frederick	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
Poplimento	Severe: small stones.	Severe: small stones.	Severe: small stones, slope.	Slight	Severe: small stones.
15D*:					
Frederick	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: slope, small stones.
Poplimento	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Moderate: slope.	Severe: small stones, slope.
15E*:					
Frederick	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Poplimento	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope.	Severe: small stones, slope.
16B*:					
Frederick	Slight	Slight	Severe: small stones.	Slight	Slight.
Poplimento	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
16C*:					
Frederick	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Slight	Moderate: slope.
Poplimento	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
16D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, small stones.
Poplimento	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
17C*:					
Frederick	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Slight	Moderate: slope.
Poplimento	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Rock outcrop.					

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
17E*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
Poplimento	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
18B*:					
Gainesboro	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
Lehew	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.	Moderate: small stones, large stones, droughty.
18C*:					
Gainesboro	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty, slope.
Lehew	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Moderate: small stones, large stones, droughty.
18D*:					
Gainesboro	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Lehew	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.	Severe: slope.
18E*:					
Gainesboro	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Lehew	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
19C Gilpin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Moderate: large stones.	Moderate: slope, small stones.
20B Guernsey	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
20C---------- Guernsey	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
21C---------- Hayter	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.	Moderate: large stones, slope.
21D---------- Hayter	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.	Severe: slope.
22C---------- Hayter	Severe: large stones.	Severe: large stones.	Severe: large stones, slope.	Moderate: large stones.	Severe: large stones.
22D---------- Hayter	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope.
22E---------- Hayter	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: large stones, slope.
23C---------- Hazleton	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope, small stones, large stones.	Slight----------	Moderate: slope, large stones.
23D---------- Hazleton	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Moderate: slope.	Severe: slope.
23E---------- Hazleton	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
24E---------- Hazleton	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, large stones.
25C---------- Laidig	Moderate: slope, large stones, small stones.	Moderate: slope, small stones, large stones.	Severe: slope, large stones, small stones.	Slight----------	Moderate: slope, large stones, small stones.
25D---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Moderate: slope.	Severe: slope.
25E---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
26C---------- Lehew	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Moderate: small stones, large stones, droughty.
26D---------- Lehew	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.	Severe: slope.
26E---------- Lehew	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
27---------- Library	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
28---------- Lobdell	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight----------	Moderate: flooding.
29---------- Massanetta	Severe: flooding.	Moderate: wetness.	Moderate: slope, small stones, wetness.	Slight----------	Moderate: flooding.
30B---------- Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: large stones.
31B---------- Nicholson	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
32B---------- Oaklet	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Slight.
32C---------- Oaklet	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
33C*:					
Opequon----------	Severe: too clayey, depth to rock.	Severe: too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: too clayey, erodes easily.	Severe: thin layer, too clayey.
Chilhowie----------	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: too clayey.
33E*:					
Opequon----------	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: too clayey, slope, erodes easily.	Severe: slope, thin layer, too clayey.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
33E*: Chilhowie	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey, slope.	Severe: slope, too clayey.
34, 35--- Pagebrook	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
36*. Pits					
37D--- Schaffenaker	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.
37E--- Schaffenaker	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
38B--- Sequoia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock.	Slight---	Moderate: droughty.
38C--- Sequoia	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight---	Moderate: droughty, slope.
38D--- Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
39B--- Swimley	Slight---	Slight---	Moderate: slope, small stones.	Slight---	Slight.
39C--- Swimley	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
40B--- Timberville	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
41B*: Weikert	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: depth to rock, small stones.	Slight---	Severe: thin layer, small stones.
Berks	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight---	Severe: small stones.
41C*: Weikert	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Slight---	Severe: thin layer, small stones.
Berks	Severe: small stones.	Severe: small stones.	Severe: small stones, slope.	Slight---	Severe: small stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
41D*:					
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Moderate: slope.	Severe: slope, thin layer, small stones.
Berks	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Moderate: slope.	Severe: slope, small stones.
41E*:					
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, thin layer, small stones.
Berks	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
42C*:					
Weikert	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Slight	Severe: small stones, thin layer.
Berks	Severe: small stones.	Severe: small stones.	Severe: small stones, slope.	Slight	Severe: small stones.
42D*:					
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Moderate: slope.	Severe: slope, small stones, thin layer.
Berks	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Moderate: slope.	Severe: slope, small stones.
42E*:					
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, small stones, thin layer.
Berks	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
43--- Wheeling	Slight	Slight	Slight	Slight	Slight.
44B--- Zoar	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
44C---------- Zoar	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--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
1B---------- Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
1C---------- Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
2---------- Birdsboro	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
3B---------- Blairton	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
3C---------- Blairton	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
4B---------- Buchanan	Very poor.	Poor	Good	Good	---	Fair	Very poor.	Poor	Good	Poor.
4C---------- Buchanan	Very poor.	Poor	Good	Good	---	Poor	Very poor.	Poor	Good	Very poor.
5B---------- Carbo	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
5C---------- Carbo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
6C*:										
Carbo----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Oaklet----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
7C*:										
Carbo----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Oaklet----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
8B---------- Chilhowie	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
8C---------- Chilhowie	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
9B---------- Clearbrook	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
9C---------- Clearbrook	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.

See footnote at end of table.

TABLE 9.--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
10---------- Craigsville	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
11C---------- Dekalb	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
12E---------- Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
13B---------- Frankstown	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
13C---------- Frankstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
13D---------- Frankstown	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
13E---------- Frankstown	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
14B*: Frederick---------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Poplimento--------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
14C*: Frederick---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Poplimento--------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
14D*: Frederick---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento--------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
15C*: Frederick---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Poplimento--------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
15D*: Frederick---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento--------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
15E*: Frederick---------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 9.--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
15E*:										
Poplimento	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
16B*:										
Frederick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Poplimento	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
16C*:										
Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Poplimento	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
16D*:										
Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
17C*:										
Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Poplimento	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
17E*:										
Frederick	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Poplimento	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
18B*:										
Gainesboro	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Lehew	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
18C*:										
Gainesboro	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Lehew	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
18D*:										
Gainesboro	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 9.--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
18D*: Lehew	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
18E*: Gainesboro	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Lehew	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
19C Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
20B Guernsey	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
20C Guernsey	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
21C Hayter	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
21D Hayter	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
22C Hayter	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
22D Hayter	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
22E Hayter	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
23C, 23D, 23E Hazleton	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
24E Hazleton	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
25C, 25D Laidig	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
25E Laidig	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
26C Lehew	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
26D Lehew	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
26E Lehew	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
27 Library	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.

See footnote at end of table.

TABLE 9.--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
28---------- Lobdell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
29---------- Massanetta	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
30B---------- Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
31B---------- Nicholson	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
32B---------- Oaklet	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
32C---------- Oaklet	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
33C*:										
Opequon----------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
Chilhowie---------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
33E*:										
Opequon----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Chilhowie---------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
34, 35---------- Pagebrook	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
36*. Pits										
37D---------- Schaffenaker	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
37E---------- Schaffenaker	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
38B---------- Sequoia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
38C---------- Sequoia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
38D---------- Sequoia	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
39B---------- Swimley	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
39C---------- Swimley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--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
40B---------- Timberville	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
41B*:										
Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
41C*:										
Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
41D*:										
Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
41E*, 42C*, 42D*, 42E*:										
Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
43---------- Wheeling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
44B---------- Zoar	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
44C---------- Zoar	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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
1B---------- Berks	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Slight---------	Severe: small stones.
1C---------- Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
2---------- Birdsboro	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Slight.
3B---------- Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
3C---------- Blairton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.	Severe: wetness.
4B---------- Buchanan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.
4C---------- Buchanan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness.	Severe: small stones, wetness.
5B---------- Carbo	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: depth to rock.
5C---------- Carbo	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, depth to rock.
6C*:						
Carbo----------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, depth to rock.
Oaklet----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
7C*:						
Carbo----------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, depth to rock.
Oaklet----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Rock outcrop.						

See footnote at end of table.

TABLE 10.--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
8B---------- Chilhowie	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Moderate: large stones.
8C---------- Chilhowie	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.	Moderate: large stones, slope.
9B---------- Clearbrook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: large stones, wetness.
9C---------- Clearbrook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness.	Severe: large stones, wetness.
10---------- Craigsville	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones, flooding.
11C---------- Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
12E---------- Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
13B---------- Frankstown	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
13C---------- Frankstown	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
13D, 13E---------- Frankstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
14B*: Frederick--------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
Poplimento-------	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
14C*: Frederick--------	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Poplimento-------	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.

See footnote at end of table.

TABLE 10.--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
14D*:						
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
15C*:						
Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Severe: small stones.
Poplimento	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: small stones.
15D*, 15E*:						
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, small stones.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: small stones, slope.
16B*:						
Frederick	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
Poplimento	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
16C*:						
Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Poplimento	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
16D*:						
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, small stones.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.

See footnote at end of table.

TABLE 10.--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
17C*:						
Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Poplimento	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Rock outcrop.						
17E*:						
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, small stones.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Rock outcrop.						
18B*:						
Gainesboro	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, low strength.	Moderate: small stones, droughty.
Lehew	Severe: depth to rock.	Moderate: depth to rock, large stones.	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Moderate: depth to rock, large stones.	Moderate: small stones, large stones, droughty.
18C*:						
Gainesboro	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.	Moderate: small stones, droughty, slope.
Lehew	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Moderate: small stones, large stones, droughty.
18D*, 18E*:						
Gainesboro	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lehew	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
19C	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
20B	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 10.--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
20C---------- Guernsey	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, frost action.	Moderate: slope.
21C---------- Hayter	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope, depth to rock.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: large stones, slope.
21D---------- Hayter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
22C---------- Hayter	Moderate: depth to rock, large stones, slope.	Moderate: shrink-swell, slope, large stones.	Moderate: shrink-swell, slope, depth to rock.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Severe: large stones.
22D, 22E---------- Hayter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
23C---------- Hazleton	Moderate: depth to rock, slope, large stones.	Moderate: slope, large stones.	Moderate: slope, large stones, depth to rock.	Severe: slope.	Moderate: slope, frost action, large stones.	Moderate: slope, large stones.
23D, 23E---------- Hazleton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
24E---------- Hazleton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, large stones.
25C---------- Laidig	Moderate: slope, wetness.	Moderate: slope.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, low strength, frost action.	Moderate: slope, large stones, small stones.
25D, 25E---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
26C---------- Lehew	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Moderate: small stones, large stones, droughty.
26D, 26E---------- Lehew	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
27---------- Library	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, frost action.	Severe: wetness.
28---------- Lobdell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.

See footnote at end of table.

TABLE 10.--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
29---------- Massanetta	Severe: wetness.	Severe: flooding.	Severe: wetness, flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
30B---------- Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Moderate: large stones.
31B---------- Nicholson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
32B---------- Oaklet	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
32C---------- Oaklet	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
33C*: Opequon----------	Severe: depth to rock.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: depth to rock, low strength, shrink-swell.	Severe: thin layer, too clayey.
Chilhowie---------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.	Severe: too clayey.
33E*: Opequon----------	Severe: slope, depth to rock.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, low strength.	Severe: slope, thin layer, too clayey.
Chilhowie---------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, too clayey.
34, 35---------- Pagebrook	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, flooding, shrink-swell.	Severe: flooding.
36*. Pits						
37D, 37E---------- Schaffenaker	Severe: slope, depth to rock, cutbanks cave.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
38B---------- Sequoia	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: droughty.

See footnote at end of table.

TABLE 10.--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
38C---------- Sequoia	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: droughty, slope.
38D---------- Sequoia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
39B---------- Swimley	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
39C---------- Swimley	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
40B---------- Timberville	Moderate: too clayey, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
41B*: Weikert----------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: thin layer, small stones.
Berks----------	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Slight---------	Severe: small stones.
41C*: Weikert----------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Severe: thin layer, small stones.
Berks----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
41D*, 41E*: Weikert----------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, thin layer, small stones.
Berks----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
42C*: Weikert----------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Severe: small stones, thin layer.
Berks----------	Moderate: slope, depth to rock, large stones.	Moderate: large stones, slope.	Moderate: depth to rock, large stones, slope.	Severe: slope.	Moderate: slope, large stones.	Severe: small stones.

See footnote at end of table.

TABLE 10.--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
42D*, 42E*: Weikert	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones, thin layer.
Berks	Severe: slope.	Severe: slope.	Severe	Severe: slope.	Severe: slope.	Severe: slope, small stones.
43 Wheeling	Slight	Slight	Slight	Slight	Moderate: frost action, low strength.	Slight.
44B Zoar	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.
44C Zoar	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope, slippage.	Severe: low strength.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," 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
1B Berks	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
1C Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
2 Birdsboro	Severe: wetness.	Severe: seepage, flooding.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, small stones.
3B Blairton	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, small stones.
3C Blairton	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, small stones.
4B Buchanan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
4C Buchanan	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
5B Carbo	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
5C Carbo	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
6C*: Carbo	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Oaklet	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--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
7C*:					
Carbo	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Oaklet	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Rock outcrop.					
8B Chilhowie	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
8C Chilhowie	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
9B Clearbrook	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim.
9C Clearbrook	Severe: depth to rock, wetness.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim.
10 Craigsville	Severe: flooding, poor filter, large stones.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage, large stones.	Severe: flooding, seepage.	Poor: large stones, seepage.
11C Dekalb	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
12E Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
13B Frankstown	Moderate: depth to rock.	Moderate: depth to rock, seepage, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: hard to pack, small stones.
13C Frankstown	Moderate: depth to rock, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: hard to pack, small stones.
13D, 13E Frankstown	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: hard to pack, small stones.

See footnote at end of table.

TABLE 11.--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
14B*:					
Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
14C*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
14D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
15C*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
15D*, 15E*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
16B*:					
Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--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
16C*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
16D*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
17C*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Rock outcrop.					
17E*:					
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Rock outcrop.					
18B*:					
Gainesboro	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
Lehew	Severe: depth to rock, poor filter.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
18C*:					
Gainesboro	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 11.--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
18C*: Lehew	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
18D*, 18E*: Gainesboro	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Lehew	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
19C---- Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
20B---- Guernsey	Severe: wetness, percs slowly.	Moderate: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
20C---- Guernsey	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness, slope.	Poor: too clayey, hard to pack.
21C---- Hayter	Moderate: depth to rock, slope, large stones.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: large stones.
21D---- Hayter	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope, seepage.	Severe: slope, seepage.	Poor: slope.
22C---- Hayter	Moderate: depth to rock, slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: large stones.
22D, 22E---- Hayter	Severe: slope.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope, large stones.
23C---- Hazleton	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
23D, 23E---- Hazleton	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.

See footnote at end of table.

TABLE 11.--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
24E---------- Hazleton	Severe: poor filter, slope.	Severe: slope, seepage, large stones.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.
25C---------- Laidig	Severe: percs slowly, wetness.	Severe: seepage, slope, wetness.	Moderate: slope, wetness.	Severe: seepage.	Fair: slope, small stones, wetness.
25D, 25E---------- Laidig	Severe: slope, percs slowly, wetness.	Severe: seepage, slope, wetness.	Severe: slope.	Severe: slope, seepage.	Poor: slope.
26C---------- Lehew	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
26D, 26E---------- Lehew	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
27---------- Library	Severe: percs slowly, wetness.	Moderate: slope, depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
28---------- Lobdell	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
29---------- Massanetta	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: flooding, wetness.	Severe: wetness, flooding.	Fair: too clayey, small stones, wetness.
30B---------- Monongahela	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
31B---------- Nicholson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
32B---------- Oaklet	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
32C---------- Oaklet	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
33C*: Opequon----------	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--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
33C*: Chilhowie	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
33E*: Opequon	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, slope.
Chilhowie	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
34, 35--- Pagebrook	Severe: flooding, wetness, percs slowly.	Slight	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, small stones.
36*. Pits					
37D, 37E--- Schaffenaker	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, seepage.
38B--- Sequoia	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
38C--- Sequoia	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
38D--- Sequoia	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
39B--- Swimley	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
39C--- Swimley	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
40B--- Timberville	Severe: flooding.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack, small stones.

See footnote at end of table.

TABLE 11.--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
41B*:					
Weikert	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.
Berks	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
41C*:					
Weikert	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.
Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
41D*, 41E*:					
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, seepage.
Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
42C*:					
Weikert	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.
Berks	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
42D*, 42E*:					
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, seepage.
Berks	Severe: depth to rock, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
43 Wheeling	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
44B Zoar	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 11.--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
44C---------- Zoar	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey.	Moderate: slope, wetness.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--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
1B, 1C---------- Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
2---------- Birdsboro	Fair: wetness.	Probable----------	Probable----------	Poor: small stones, area reclaim.
3B, 3C---------- Blairton	Poor: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
4B, 4C---------- Buchanan	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
5B, 5C---------- Carbo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
6C*: Carbo----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Oaklet----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
7C*: Carbo----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Oaklet----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Rock outcrop.				
8B, 8C---------- Chilhowie	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
9B, 9C---------- Clearbrook	Poor: area reclaim, wetness.	Improbable: excess fines, small stones.	Improbable: excess fines.	Poor: large stones, wetness.
10---------- Craigsville	Poor: large stones, area reclaim.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
11C---------- Dekalb	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
12E---------- Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
13B, 13C---------- Frankstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
13D---------- Frankstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
13E---------- Frankstown	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
14B*, 14C*: Frederick----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Poplimento----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
14D*: Frederick----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, thin layer.
Poplimento----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
15C*: Frederick----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Poplimento----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
15D*: Frederick----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Poplimento----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
15E*: Frederick----------	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Poplimento----------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
16B*, 16C*:				
Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Poplimento	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
16D*:				
Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Poplimento	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
17C*:				
Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Poplimento	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rock outcrop.				
17E*:				
Frederick	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Poplimento	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
18B*, 18C*:				
Gainesboro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Lehew	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
18D*:				
Gainesboro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Lehew	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
18E*:				
Gainesboro	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
18E*: Lehew	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
19C---------- Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
20B, 20C---------- Guernsey	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
21C---------- Hayter	Fair: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim.
21D---------- Hayter	Fair: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
22C---------- Hayter	Fair: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
22D---------- Hayter	Fair: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
22E---------- Hayter	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
23C---------- Hazleton	Fair: area reclaim, thin layer, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
23D---------- Hazleton	Fair: slope, area reclaim, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
23E---------- Hazleton	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
24E---------- Hazleton	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
25C---------- Laidig	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
25D---------- Laidig	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
25E---------- Laidig	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
26C---------- Lehew	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
26D---------- Lehew	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
26E---------- Lehew	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
27---------- Library	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim, wetness.
28---------- Lobdell	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
29---------- Massanetta	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
30B---------- Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
31B---------- Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
32B, 32C---------- Oaklet	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
33C*:				
Opequon----------	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, small stones.
Chilhowie----------	Poor: depth to rock, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
33E*:				
Opequon----------	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, small stones.
Chilhowie----------	Poor: depth to rock, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
34, 35---------- Pagebrook	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
36*. Pits				
37D---------- Schaffenaker	Poor: area reclaim, thin layer.	Improbable: thin layer.	Improbable: too sandy, thin layer.	Poor: small stones, slope.
37E---------- Schaffenaker	Poor: slope, area reclaim, thin layer.	Improbable: thin layer.	Improbable: too sandy, thin layer.	Poor: small stones, slope.
38B, 38C, 38D--------- Sequoia	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
39B---------- Swimley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
39C---------- Swimley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
40B---------- Timberville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
41B*, 41C*: Weikert----------	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim.
Berks----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
41D*: Weikert----------	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
Berks----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
41E*: Weikert----------	Poor: slope, area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
Berks----------	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
42C*:				
Weikert	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: area reclaim, small stones.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
42D*:				
Weikert	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
42E*:				
Weikert	Poor: slope, area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
43 Wheeling	Fair: low strength.	Probable	Probable	Fair: small stones.
44B, 44C Zoar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--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	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1B---------- Berks	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, large stones.	Droughty, depth to rock, large stones.
1C---------- Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
2---------- Birdsboro	Moderate: seepage.	Severe: piping.	Severe: cutbanks cave.	Favorable------	Wetness--------	Wetness--------	Favorable.
3B---------- Blairton	Moderate: seepage, depth to rock, slope.	Severe: piping, wetness.	Severe: no water.	Depth to rock, frost action, slope.	Slope, wetness, depth to rock.	Depth to rock, wetness.	Wetness, droughty.
3C---------- Blairton	Severe: slope.	Severe: piping, wetness.	Severe: no water.	Depth to rock, frost action, slope.	Slope, wetness, depth to rock.	Slope, depth to rock, wetness.	Wetness, slope, droughty.
4B---------- Buchanan	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, slope.	Slope, wetness, droughty.	Large stones, wetness.	Large stones, wetness.
4C---------- Buchanan	Severe: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, slope.	Slope, wetness, droughty.	Slope, large stones, wetness.	Large stones, wetness, slope.
5B---------- Carbo	Moderate: depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
5C---------- Carbo	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
6C*:							
Carbo	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Oaklet	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
7C*:							
Carbo	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Oaklet	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Rock outcrop.							
8B Chilhowie	Moderate: depth to rock, slope.	Severe: seepage, hard to pack.	Severe: no water.	Deep to water	Slope, droughty, percs slowly.	Large stones, depth to rock.	Large stones, droughty.
8C Chilhowie	Severe: slope.	Severe: seepage, hard to pack.	Severe: no water.	Deep to water	Slope, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
9B Clearbrook	Moderate: depth to rock, slope.	Severe: large stones, wetness.	Severe: slow refill, depth to rock.	Depth to rock, large stones, slope.	Large stones, wetness, droughty.	Large stones, depth to rock.	Large stones, wetness.
9C Clearbrook	Severe: slope.	Severe: large stones, wetness.	Severe: slow refill, depth to rock.	Depth to rock, large stones, slope.	Large stones, wetness, droughty.	Slope, large stones, depth to rock.	Large stones, wetness, slope.
10 Craigsville	Severe: seepage.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Large stones, droughty.	Large stones, too sandy.	Large stones, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
11C---------- Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.	Slope, large stones, droughty.
12E---------- Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock, large stones.	Slope, large stones, droughty.
13B---------- Frankstown	Moderate: seepage, depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Favorable------	Favorable.
13C, 13D, 13E----- Frankstown	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
14B*: Frederick--------	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Favorable------	Favorable.
Poplimento-------	Moderate: depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Favorable------	Favorable.
14C*, 14D*: Frederick--------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
Poplimento-------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
15C*, 15D*, 15E*: Frederick--------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
Poplimento-------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Droughty, slope.	Slope----------	Slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
16B*:							
Frederick	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
Poplimento	Moderate: depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
16C*, 16D*:							
Frederick	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Poplimento	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
17C*, 17E*:							
Frederick	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Poplimento	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Rock outcrop.							
18B*:							
Gainesboro	Severe: seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
Lehew	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
18C*, 18D*, 18E*:							
Gainesboro	Severe: seepage, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
18C*, 18D*, 18E*: Lehew	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
19C--- Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
20B--- Guernsey	Moderate: seepage, depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Wetness, percs slowly, slope.	Erodes easily	Erodes easily, percs slowly.
20C--- Guernsey	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Wetness, percs slowly, slope.	Slope, erodes easily.	Slope, erodes easily, percs slowly.
21C, 21D--- Hayter	Severe: seepage, slope.	Moderate: thin layer, piping, large stones.	Severe: no water.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
22C, 22D, 22E--- Hayter	Severe: seepage, slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
23C, 23D, 23E, 24E--- Hazleton	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Large stones, droughty, slope.	Large stones, slope, too sandy.	Large stones, slope, droughty.
25C, 25D, 25E--- Laidig	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Droughty, rooting depth, slope.	Slope, large stones, rooting depth.	Slope, large stones, droughty.
26C, 26D, 26E--- Lehew	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
27---------- Library	Moderate: depth to rock, slope.	Severe: hard to pack, wetness.	Severe: slow refill.	Slope, percs slowly, frost action.	Slope, percs slowly, wetness.	Wetness, large stones.	Wetness, large stones, percs slowly.
28---------- Lobdell	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Erodes easily.
29---------- Massanetta	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Flooding-------	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
30B---------- Monongahela	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
31B---------- Nicholson	Slight---------	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Erodes easily, rooting depth.
32B---------- Oaklet	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
32C---------- Oaklet	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
33C*, 33E*: Opequon----------	Severe: depth to rock, slope.	Severe: hard to pack, thin layer.	Severe: no water.	Deep to water	Slow intake, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Chilhowie--------	Severe: slope.	Severe: seepage, hard to pack.	Severe: no water.	Deep to water	Slope, droughty, percs slowly.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
34, 35---------- Pagebrook	Slight---------	Severe: hard to pack.	Severe: slow refill.	Percs slowly, flooding.	Wetness, percs slowly, flooding.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
36*. Pits							
37D, 37E---------- Schaffenaker	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, depth to rock.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
38B---------- Sequoia	Moderate: depth to rock, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Droughty, depth to rock.	Depth to rock, erodes easily.	Erodes easily, droughty.
38C, 38D---------- Sequoia	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Droughty, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, droughty.
39B---------- Swimley	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
39C---------- Swimley	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
40B---------- Timberville	Moderate: seepage, slope.	Moderate: piping, hard to pack.	Severe: no water.	Deep to water	Slope, flooding.	Favorable------	Favorable.
41B*: Weikert----------	Severe: depth to rock, seepage.	Severe: seepage, thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Depth to rock	Droughty, depth to rock.
Berks----------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, large stones.	Droughty, depth to rock, large stones.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
41C*, 41D*, 41E*: Weikert	Severe: depth to rock, slope, seepage.	Severe: seepage, thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty.
Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
42C*, 42D*, 42E*: Weikert	Severe: depth to rock, slope, seepage.	Severe: seepage, thin layer.	Severe: no water.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Slope, droughty, depth to rock.
Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Droughty, slope, depth to rock.	Slope, depth to rock, large stones.	Depth to rock, large stones, slope.
43 Wheeling	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable	Favorable.
44B Zoar	Moderate: slope.	Severe: hard to pack, thin layer.	Severe: no water.	Slope, percs slowly.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
44C Zoar	Severe: slope, slippage.	Severe: hard to pack, thin layer.	Severe: no water.	Slope, percs slowly.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--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 > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1B, 1C---------- Berks	0-8	Channery silt loam	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	8-22	Channery loam, very channery loam, channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	22-30	Channery loam, very channery loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
2---------- Birdsboro	0-13	Loam----------	ML, CL-ML	A-4	0	95-100	85-100	80-100	65-90	20-35	2-10
	13-62	Silt loam, sandy clay loam, gravelly clay loam.	ML, CL, SM, GM	A-4, A-6	0-5	70-100	65-100	60-100	45-95	25-40	3-18
3B, 3C---------- Blairton	0-9	Silt loam--------	ML, CL-ML	A-4	0	80-100	75-100	65-90	50-80	20-35	2-10
	9-30	Silt loam, channery silty clay loam, very channery loam.	ML, CL, GM	A-4, A-6, A-7, A-2	0-5	50-90	35-90	30-85	25-70	25-42	2-20
	30-36	Very channery loam, channery loam, very channery silt loam.	GM, SM, ML, CL	A-4, A-2, A-6, A-1	0-10	15-65	15-65	15-65	10-60	25-40	2-12
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
4B, 4C---------- Buchanan	0-5	Very stony sandy loam.	GM, ML, CL, CL-ML	A-1, A-2	3-20	50-80	45-70	30-60	15-35	15-30	NP-10
	5-26	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	26-60	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
5B, 5C---------- Carbo	0-9	Silt loam--------	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	9-26	Clay----------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
6C*: Carbo----------	0-9	Silt loam--------	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	9-26	Clay----------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oaklet----------	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	70-100	55-95	25-38	5-16
	11-31	Clay----------	CH	A-7	0-10	80-100	75-100	70-100	65-95	60-90	35-65
	31-63	Clay, silty clay	CH	A-7	0-10	80-100	75-100	70-100	65-95	60-85	35-60

See footnote at end of table.

TABLE 14.--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	
7C*:											
Carbo----------	0-9	Silt loam--------	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	9-26	Clay------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oaklet----------	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	70-100	55-95	25-38	5-16
	11-31	Clay------------	CH	A-7	0-10	80-100	75-100	70-100	65-95	60-90	35-65
	31-63	Clay, silty clay	CH	A-7	0-10	80-100	75-100	70-100	65-95	60-85	35-60
Rock outcrop.											
8B, 8C----------	0-7	Silty clay loam	CL	A-6, A-7	0-10	90-100	85-100	80-100	75-95	30-50	10-25
Chilhowie	7-17	Clay, silty clay	CH	A-7	0-10	90-100	85-100	80-100	75-95	50-65	30-45
	17-27	Extremely channery clay, very channery silty clay, flaggy clay.	CH, GC, MH, GM	A-7, A-2	10-30	25-80	15-65	15-65	15-60	50-65	20-35
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9B, 9C----------	0-7	Channery silt loam.	CL-ML, CL	A-4, A-6	5-25	75-90	60-85	55-75	50-70	20-30	6-15
Clearbrook	7-14	Channery silt loam, very channery silt loam, very channery silty clay loam.	CL	A-6	10-50	75-90	60-85	55-75	50-70	25-40	10-20
	14-23	Very channery silty clay loam, very channery silty clay, channery clay loam.	CL, GC, SC	A-6, A-7	10-50	60-85	50-75	50-65	45-60	35-45	15-25
	23-27	Very channery silt loam, very channery clay loam, extremely channery silty clay loam.	CL, GC, SC	A-6	10-50	50-75	45-70	40-65	35-60	30-45	10-20
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
10----------	0-13	Cobbly sandy loam	ML, SM, CL-ML, SC	A-2, A-4	25-50	80-95	75-95	50-80	25-60	<25	NP-10
Craigsville	13-37	Gravelly sandy loam, cobbly loam, very gravelly sandy loam.	SM, GM, GC, SC	A-1, A-2, A-4	25-60	50-80	30-65	25-60	15-40	<25	NP-10
	37-60	Very gravelly loamy sand, very gravelly sandy loam, very cobbly sandy loam.	GC, GM, GP-GM, GM-GC	A-1, A-2	35-75	35-55	30-50	20-45	10-25	<25	NP-8

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
11C---------- Dekalb	0-4	Channery loam----	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	4-29	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	29-35	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
12E---------- Dekalb	0-4	Very stony loam	SM, GM, ML, CL-ML	A-2, A-4, A-1	10-30	50-90	45-80	40-75	20-55	10-32	NP-10
	4-29	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-9
	29-35	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13B, 13C, 13D, 13E---------- Frankstown	0-8	Channery silt loam.	ML, CL-ML	A-4, A-6	0	85-100	80-100	75-100	70-90	25-40	4-12
	8-15	Channery silty clay loam, gravelly silty clay loam, silt loam.	ML, CL, CH, GC	A-6, A-7	0	60-100	55-100	50-100	45-95	25-50	11-23
	15-62	Channery silty clay loam, channery silt loam, gravelly clay.	MH, CL, CH, GC	A-6, A-7	0-5	45-100	40-95	40-95	35-95	30-65	11-35
14B*, 14C*, 14D*: Frederick-------	0-7	Loam----------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	7-12	Silt loam, silty clay loam, gravelly silty clay loam.	CL, CL-ML	A-6, A-7, A-4	0-5	80-100	60-100	55-100	50-95	20-45	5-25
	12-25	Silty clay, clay, gravelly clay.	CH, MH	A-7	0-5	80-100	65-100	65-100	65-100	50-70	20-40
	25-64	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	64-72	Clay, silty clay	CH	A-7	0-5	90-100	85-100	75-100	65-95	50-75	24-45

See footnote at end of table.

TABLE 14.--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	
14B*, 14C*, 14D*:											
Poplimento------	0-9	Loam----------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	65-100	50-90	25-40	5-15
	9-39	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	45-65	30-50
	39-60	Channery silty clay, very channery silty clay loam.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	30-80	20-70	20-65	15-60	35-55	15-30
15C*:											
Frederick-------	0-7	Very gravelly loam.	GC, GM-GC	A-2, A-1	0-15	40-60	25-35	20-35	15-25	20-45	5-25
	7-12	Silt loam, silty clay loam, gravelly silty clay loam.	CL, GC, SC, GM-GC	A-6, A-7, A-4	0-5	70-100	60-100	55-100	45-95	20-45	5-25
	12-25	Silty clay, clay, gravelly clay.	CH, MH	A-7	0-5	80-100	65-100	65-100	65-100	50-70	20-40
	25-64	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	64-72	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	50-75	25-45
Poplimento------	0-9	Very gravelly loam.	GM, GC, SM, SC	A-2, A-4, A-6	0-10	50-85	40-75	35-60	30-50	<30	NP-15
	9-39	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	45-65	30-50
	39-60	Channery silty clay, very channery silty clay loam.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	30-80	20-70	20-65	15-60	35-55	15-30
15D*, 15E*:											
Frederick-------	0-6	Very gravelly loam.	GC, GM-GC	A-2, A-1	0-15	40-60	25-35	20-35	15-25	20-45	5-25
	6-12	Silt loam, silty clay loam, gravelly silty clay loam.	CL, GC, SC, GM-GC	A-6, A-7, A-4	0-5	70-100	60-100	55-100	45-95	20-45	5-25
	12-25	Silty clay, clay, gravelly clay.	CH, MH	A-7	0-5	80-100	65-100	65-100	65-100	50-70	20-40
	25-64	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	64-72	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	50-75	25-45
Poplimento------	0-9	Very gravelly loam.	GM, GC, SM, SC	A-2, A-4, A-6	0-10	50-85	40-75	35-60	30-50	<30	NP-15
	9-39	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	45-65	30-50
	39-60	Channery silty clay, very channery silty clay loam.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	30-80	20-70	20-65	15-60	35-55	15-30

See footnote at end of table.

TABLE 14.--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	
16B*:											
Frederick-------	0-6	Loam----------	GM, GC, ML, CL	A-4, A-6	0-10	60-80	55-75	40-75	35-70	<35	NP-15
	6-12	Silt loam, silty clay loam, gravelly silty clay loam.	CL, GC, SC, GM-GC	A-6, A-7, A-4	0-5	70-100	60-100	55-100	45-95	20-45	5-25
	12-25	Silty clay, clay, gravelly clay.	CH, MH	A-7	0-5	80-100	65-100	65-100	65-100	50-70	20-40
	25-64	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	64-72	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	50-75	25-45
Poplimento------	0-9	Loam----------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	65-100	50-90	25-40	5-15
	9-39	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	45-65	30-50
	39-60	Channery silty clay, very channery silty clay loam.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	30-80	20-70	20-65	15-60	35-55	15-30
16C*, 16D*:											
Frederick-------	0-7	Loam----------	GM, GC, ML, CL	A-4, A-6	0-10	60-80	55-75	40-75	35-70	<35	NP-15
	7-12	Silt loam, silty clay loam, gravelly silty clay loam.	CL, GC, SC, GM-GC	A-6, A-7, A-4	0-5	70-100	60-100	55-100	45-95	20-45	5-25
	12-25	Silty clay, clay, gravelly clay.	CH, MH	A-7	0-5	80-100	65-100	65-100	65-100	50-70	20-40
	25-64	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	64-72	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	50-75	25-45
Poplimento------	0-9	Loam----------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	65-100	50-90	25-40	5-15
	9-39	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	45-65	30-50
	39-60	Channery silty clay, very channery silty clay loam.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	30-80	20-70	20-65	15-60	35-55	15-30
17C*, 17E*:											
Frederick-------	0-7	Loam----------	GM, GC, ML, CL	A-4, A-6	0-10	60-80	55-75	40-75	35-70	<35	NP-15
	7-12	Silt loam, silty clay loam, gravelly silty clay loam.	CL, GC, SC, GM-GC	A-6, A-7, A-4	0-5	70-100	60-100	55-100	45-95	20-45	5-25
	12-25	Silty clay, clay, gravelly clay.	CH, MH	A-7	0-5	80-100	65-100	65-100	65-100	50-70	20-40
	25-64	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	64-72	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	50-75	25-45

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
17C*, 17E*:											
Poplimento------	0-9	Loam----------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	65-100	50-90	25-40	5-15
	9-39	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	45-65	30-50
	39-60	Channery silty clay, very channery silty clay loam.	CL, CH, GC, SC	A-2, A-6, A-7	0-15	30-80	20-70	20-65	15-60	35-55	15-30
Rock outcrop.											
18B*, 18C*, 18D*, 18E*:											
Gainesboro-----	0-8	Channery silt loam.	ML, CL-ML, CL, GM	A-4, A-6	1-5	70-90	65-85	60-85	45-80	<35	NP-15
	8-17	Channery silt loam, channery loam, very channery silt loam.	CL-ML, CL, SC, GC	A-4, A-6	5-15	70-90	65-85	60-85	45-80	25-35	6-15
	17-26	Very channery clay loam, very channery silty clay loam.	CL, SC, GC	A-6, A-2	5-20	50-85	45-80	40-80	25-75	25-45	10-25
	26-32	Very channery clay loam, extremely channery silt loam.	GC, CL, SC	A-2, A-4, A-6	10-35	35-75	30-70	25-70	20-65	20-40	6-15
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lehew----------	0-9	Channery fine sandy loam.	GM, ML, CL-ML, SM	A-2, A-4	5-30	50-80	45-70	40-65	25-60	15-30	NP-7
	9-15	Very channery sandy loam, channery fine sandy loam, channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	5-40	45-75	30-65	20-55	10-40	15-30	NP-7
	15-35	Very channery sandy loam, very channery fine sandy loam, channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	10-50	45-75	30-65	20-55	10-40	15-30	NP-7
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
19C---------- Gilpin	0-3	Channery loam----	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-90	45-85	35-75	30-70	20-40	4-15
	3-8	Channery loam, channery silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	8-14	Channery loam, very channery silt loam, very channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--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	
20B, 20C--------- Guernsey	0-12	Silt loam---------	ML, CL-ML, CL	A-4, A-6	0-2	90-100	80-100	75-95	70-90	25-40	4-14
	12-20	Silt loam, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0-2	80-100	70-100	65-100	60-100	30-55	11-26
	20-54	Silty clay, clay, silty clay loam.	CH, CL, ML, MH	A-7	0-10	75-100	65-100	60-100	55-100	45-65	15-35
	54-72	Clay, silty clay, channery silty clay loam.	CH, MH, ML, CL	A-7	2-20	70-100	60-90	55-85	55-80	40-70	15-40
	72	Weathered bedrock	---	---	---	---	---	---	---	---	---
21C, 21D--------- Hayter	0-9	Cobbly loam------	SM, SC, ML, CL	A-4, A-6	15-25	85-100	80-95	55-85	36-70	<40	NP-15
	9-60	Clay loam, sandy clay loam, cobbly clay loam.	CL, SC	A-6, A-7, A-2	0-25	85-100	80-100	60-95	30-70	30-45	11-20
22C, 22D, 22E---- Hayter	0-9	Very cobbly loam	SM, SC, ML, CL	A-4, A-6	15-35	90-100	75-100	55-85	36-70	<40	NP-15
	9-60	Clay loam, cobbly clay loam, very cobbly sandy clay loam.	CL, SC	A-6, A-7, A-2	10-50	85-100	70-100	60-95	30-70	30-45	11-20
23C, 23D, 23E---- Hazleton	0-4	Very stony sandy loam.	ML, GM, SM	A-4, A-2	5-15	60-85	50-80	50-70	35-55	---	---
	4-60	Channery loam, very channery sandy loam, very channery loamy sand.	GM, SM, SC, GC	A-2, A-1, A-4	5-60	50-80	35-75	25-65	15-50	<30	NP-8
24E--------- Hazleton	0-4	Extremely stony sandy loam.	GM, SM, ML	A-4, A-2	15-50	60-85	50-80	50-70	35-55	---	---
	4-60	Channery loam, very channery sandy loam, very channery loamy sand.	GM, SM, SC, GC	A-2, A-1, A-4	5-60	50-80	35-75	25-65	15-50	<30	NP-8
25C, 25D, 25E---- Laidig	0-13	Very stony fine sandy loam.	GM-GC, SM, CL-ML, SM-SC	A-4	3-15	65-90	50-80	45-80	35-70	15-30	NP-10
	13-36	Channery loam, channery sandy clay loam, channery sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6	5-20	70-95	55-90	40-80	20-70	15-40	2-18
	36-60	Channery sandy clay loam, channery loam, channery sandy loam.	SC, GM-GC, CL-ML, GC	A-2, A-4, A-6	5-20	50-90	40-85	30-80	15-70	15-35	2-16

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
26C, 26D, 26E---- Lehew	0-9	Channery fine sandy loam.	GM, ML, CL-ML, SM	A-2, A-4	5-30	50-80	45-70	40-65	25-60	15-30	NP-7
	9-15	Very channery sandy loam, channery fine sandy loam, channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	5-40	45-75	30-65	20-55	10-40	15-30	NP-7
	15-35	Very channery sandy loam, very channery fine sandy loam, channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4	10-50	45-75	30-65	20-55	10-40	15-30	NP-7
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
27---------- Library	0-14	Silt loam--------	ML, CL	A-6, A-7	0-5	90-100	85-100	80-100	75-100	---	---
	14-36	Silty clay, clay	MH, CH, CL, ML	A-7	0-15	90-100	80-100	75-100	70-100	40-65	15-30
	36-60	Channery silty clay loam, channery loam, silty clay.	CL, SC, CH	A-7	0-35	75-100	50-100	45-90	40-90	40-55	15-30
28---------- Lobdell	0-9	Silt loam--------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-100	65-90	20-30	NP-8
	9-44	Loam, silt loam	ML	A-4	0	90-100	80-100	70-95	55-85	20-35	NP-10
	44-64	Stratified sandy loam to silt loam.	ML, SM, CL-ML, CL	A-4	0	90-100	80-100	65-85	40-80	15-35	NP-10
29---------- Massanetta	0-16	Loam----------	ML, CL, CL-ML	A-4, A-6	0-5	90-100	85-100	75-95	55-80	20-35	2-12
	16-54	Clay loam, silty clay loam, silt loam.	CL	A-6	0-5	90-100	85-100	75-95	55-85	25-45	10-25
	54-62	Loam, silty clay loam, gravelly clay loam.	CL, CL-ML, SM-SC, SC	A-4, A-6	0-10	75-100	60-100	50-95	40-90	20-45	5-20
30B---------- Monongahela	0-7	Gravelly loam----	ML, SM, CL-ML, SM-SC	A-4	0-15	80-90	75-85	70-80	45-75	20-35	1-10
	7-20	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	20-31	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	31-43	Silt loam, clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
31B---------- Nicholson	0-11	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	11-18	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	85-100	85-100	80-100	25-45	5-20
	18-26	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	90-100	80-100	75-95	25-45	5-20
	26-74	Silty clay, clay, channery clay.	CH, CL	A-6, A-7	0-10	80-100	70-100	60-100	55-95	34-70	16-40

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
32B, 32C---------	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	70-100	55-95	25-38	5-16
Oaklet	11-51	Clay-------------	CH	A-7	0-10	80-100	75-100	70-100	65-95	60-90	35-65
	51-63	Clay, silty clay	CH	A-7	0-10	80-100	75-100	70-100	65-95	60-85	35-60
33C*, 33E*:											
Opequon---------	0-7	Silty clay-------	CL, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	7-15	Silty clay loam, clay, silty clay.	CH, CL	A-6, A-7	0-10	80-100	60-100	60-100	55-95	35-65	15-40
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Chilhowie-------	0-7	Silty clay-------	CL, CH	A-7	0-10	90-100	85-100	80-100	70-95	40-60	20-40
	7-17	Clay, silty clay	CH	A-7	0-10	90-100	85-100	80-100	75-95	50-65	30-45
	17-27	Extremely channery clay, very channery silty clay, flaggy clay.	CH, GC, MH, GM	A-7, A-2	10-30	25-80	15-65	15-65	15-60	50-65	20-35
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
34---------------	0-21	Silt loam--------	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	65-90	24-38	5-16
Pagebrook	21-42	Clay, silty clay, gravelly clay loam.	CH	A-7	0	60-100	50-100	45-100	40-95	50-90	30-65
	42-62	Silty clay, gravelly clay loam, channery clay.	CH	A-7	0-5	55-100	50-95	35-95	30-90	50-80	30-50
35---------------	0-9	Silty clay loam	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	65-90	24-38	5-16
Pagebrook	9-30	Clay, silty clay, gravelly clay loam.	CH	A-7	0	60-100	50-100	45-100	40-95	50-90	30-65
	30-60	Silty clay, gravelly clay loam, channery clay.	CH	A-7	0-5	55-100	50-95	35-95	30-90	50-80	30-50
36*. Pits											
37D, 37E---------	0-4	Very stony loamy sand.	SP-SM, SW-SM, SM	A-1, A-2, A-3	3-15	60-100	55-100	30-75	5-30	---	NP
Schaffenaker	4-14	Loamy sand, loamy fine sand, sand.	SP-SM, SW-SM, SM	A-1, A-2, A-3	0-5	85-100	75-100	35-80	4-35	---	NP
	14-23	Loamy sand, channery loamy fine sand, channery sand.	SP-SM, SW-SM, SM	A-1, A-2, A-3	0-10	60-100	55-100	30-60	5-25	---	NP
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
38B, 38C, 38D---- Sequoia	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	80-95	23-35	5-15
	8-52	Silty clay, clay, channery silty clay.	CL, MH, CH	A-7	0	70-100	65-100	60-100	55-95	43-74	20-40
	52	Weathered bedrock	---	---	---	---	---	---	---	---	---
39B, 39C--------- Swimley	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0	85-100	80-100	75-100	60-95	24-38	5-16
	11-43	Silt loam, silty clay loam, silty clay.	CL	A-6, A-7	0	85-100	80-100	70-100	55-95	28-48	10-24
	43-67	Clay-------------	CH	A-7	0	85-100	80-100	80-100	75-95	50-70	30-45
40B---------- Timberville	0-10	Silt loam--------	ML, CL-ML, SM-SC, SM	A-4	0-3	75-100	75-100	55-95	35-85	<25	NP-7
	10-22	Silt loam, silty clay loam, gravelly loam.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	55-100	50-100	40-90	35-85	15-40	5-20
	22-66	Clay, silty clay loam, gravelly clay loam.	CL, CH, SC, GC	A-6, A-7	0-10	55-95	50-95	45-90	40-85	35-60	14-32
41B*, 41C*, 41D*, 41E*:											
Weikert--------	0-3	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	3-15	Shaly loam, very shaly silt loam, cherty loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks----------	0-8	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	8-22	Channery loam, very channery loam, channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	22-30	Channery loam, very channery loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
42C*, 42D*, 42E*:											
Weikert--------	0-3	Very stony silt loam.	GM, ML, SM	A-1, A-2, A-4	3-15	35-70	35-70	25-65	20-55	30-40	4-10
	3-13	Channery loam, very channery silt loam, gravelly loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--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	
42C*, 42D*, 42E*: Berks	0-8	Very stony silt loam.	GM, SM, GC, SC	A-2, A-4	15-30	40-80	35-70	30-60	25-45	25-36	5-10
	8-22	Channery loam, very channery loam, channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	22-30	Channery loam, very channery loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
43---------- Wheeling	0-14	Loam----------	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	14-50	Silty clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	50-60	Stratified very fine sand to very gravelly sand.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	4-45	<20	NP-10
44B, 44C--------- Zoar	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-40	3-15
	9-42	Silty clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	85-100	30-55	11-32
	42-60	Clay loam, silty clay loam, clay.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	75-95	30-60	11-35

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--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 "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	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
1B, 1C----------	0-8	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	<2	Low----------	0.17	3	.5-3
Berks	8-22	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	<2	Low----------	0.17		
	22-30	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	<2	Low----------	0.17		
	30	---	---	---	---	---	---	----------	----		
2----------	0-13	10-27	1.20-1.50	0.6-2.0	0.16-0.20	3.6-5.5	<2	Low----------	0.37	4	1-3
Birdsboro	13-62	20-35	1.30-1.60	0.6-2.0	0.14-0.18	3.6-5.5	<2	Low----------	0.28		
3B, 3C----------	0-9	10-27	1.40-1.60	0.6-2.0	0.14-0.18	3.6-5.5	<2	Low----------	0.43	3-2	1-4
Blairton	9-30	18-35	1.50-1.70	0.2-0.6	0.08-0.14	3.6-5.5	<2	Low----------	0.32		
	30-36	10-27	1.40-1.60	0.2-2.0	0.04-0.10	3.6-5.5	<2	Low----------	0.32		
	36	---	---	---	---	---	---	----------	----		
4B, 4C----------	0-5	10-20	1.25-1.50	0.6-2.0	0.10-0.16	3.6-5.5	---	Low----------	0.20	3-2	.5-2
Buchanan	5-26	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.6-5.5	<2	Low----------	0.24		
	26-60	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	<2	Low----------	0.17		
5B, 5C----------	0-9	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	<2	Moderate----	0.37	2	.5-3
Carbo	9-26	60-80	1.30-1.50	0.06-0.2	0.10-0.14	5.6-7.8	<2	High--------	0.24		
	26	---	---	---	---	---	---	----------	----		
6C*:											
Carbo----------	0-9	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	<2	Moderate----	0.37	2	.5-3
	9-26	60-80	1.30-1.50	0.06-0.2	0.10-0.14	5.6-7.8	<2	High--------	0.24		
	26	---	---	---	---	---	---	----------	----		
Oaklet----------	0-11	20-40	1.20-1.40	0.6-2.0	0.10-0.19	4.5-6.5	<2	Low----------	0.37	4	1-2
	11-31	60-80	1.30-1.60	0.06-0.2	0.08-0.16	4.5-6.5	<2	High--------	0.28		
	31-63	55-80	1.30-1.60	0.06-0.2	0.08-0.16	4.5-8.4	<2	High--------	0.28		
7C*:											
Carbo----------	0-9	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	<2	Moderate----	0.37	2	.5-3
	9-26	60-80	1.30-1.50	0.06-0.2	0.10-0.14	5.6-7.8	<2	High--------	0.24		
	26	---	---	---	---	---	---	----------	----		
Oaklet----------	0-11	20-40	1.20-1.40	0.6-2.0	0.10-0.19	4.5-6.5	<2	Low----------	0.37	4	1-2
	11-31	60-80	1.30-1.60	0.06-0.2	0.08-0.16	4.5-6.5	<2	High--------	0.28		
	31-63	55-80	1.30-1.60	0.06-0.2	0.08-0.16	4.5-8.4	<2	High--------	0.28		
Rock outcrop.											
8B, 8C----------	0-7	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-7.8	<2	Moderate----	0.37	2	.5-2
Chilhowie	7-17	60-80	1.30-1.50	0.06-0.2	0.10-0.15	6.1-7.8	<2	High--------	0.24		
	17-27	55-80	1.20-1.50	0.06-0.2	0.02-0.05	6.6-8.4	<2	High--------	0.24		
	27	---	---	---	---	---	---	----------	----		
9B, 9C----------	0-7	15-27	1.25-1.55	0.6-2.0	0.08-0.12	4.5-5.5	<2	Low----------	0.32	2	.1-2
Clearbrook	7-14	20-35	1.35-1.55	0.2-0.6	0.08-0.12	4.5-5.5	<2	Moderate----	0.28		
	14-23	30-50	1.35-1.55	0.2-0.6	0.06-0.10	4.5-5.5	<2	Moderate----	0.28		
	23-27	20-35	1.35-1.55	0.2-0.6	0.04-0.08	4.5-5.5	---	Low----------	0.24		
	27	---	---	---	---	---	---	----------	-----		
10----------	0-13	5-15	1.20-1.40	2.0-20	0.07-0.15	4.5-5.5	<2	Low----------	0.17	3	1-5
Craigsville	13-37	5-15	1.30-1.60	2.0-20	0.06-0.15	4.5-5.5	<2	Low----------	0.17		
	37-60	5-10	1.35-1.55	>6.0	0.04-0.09	4.5-5.5	<2	Low----------	0.17		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
11C, 12E---------	0-4	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	<2	Low---------	0.17	2	2-4
Dekalb	4-29	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	<2	Low---------	0.17		
	29-35	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	<2	Low---------	0.17		
	35	---	---	---	---	---	---	----------	----		
13B, 13C, 13D, 13E----------	0-8	18-27	1.20-1.40	0.6-2.0	0.18-0.22	5.1-6.0	<2	Low---------	0.37	3	1-4
Frankstown	8-15	25-35	1.30-1.50	0.6-2.0	0.14-0.20	4.5-6.0	<2	Moderate----	0.28		
	15-62	25-45	1.30-1.50	0.6-2.0	0.12-0.16	4.5-6.0	<2	Moderate----	0.28		
14B*, 14C*, 14D*:											
Frederick-------	0-7	13-23	1.25-1.50	2.0-6.0	0.15-0.24	4.5-6.0	<2	Low---------	0.32	4	1-3
	7-12	20-40	1.25-1.60	0.6-2.0	0.12-0.18	4.5-6.0	<2	Moderate----	0.24		
	12-25	40-75	1.20-1.50	0.6-2.0	0.09-0.18	4.5-5.5	<2	Moderate----	0.24		
	25-64	50-85	1.20-1.50	0.6-2.0	0.09-0.18	4.5-5.5	<2	High--------	0.24		
	64-72	40-70	1.20-1.50	0.6-2.0	0.09-0.20	4.5-5.5	<2	High--------	0.24		
Poplimento------	0-9	17-27	1.20-1.35	0.6-2.0	0.15-0.22	4.5-6.0	<2	Low---------	0.32	4	.5-2
	9-39	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.0	<2	High--------	0.24		
	39-60	27-50	1.25-1.50	0.2-0.6	0.05-0.12	5.1-6.5	<2	Moderate----	0.24		
15C*:											
Frederick-------	0-7	13-35	1.30-1.65	2.0-6.0	0.10-0.16	4.5-6.0	<2	Low---------	0.28	4	1-3
	7-12	20-40	1.25-1.50	0.6-2.0	0.12-0.18	4.5-6.0	<2	Moderate----	0.24		
	12-25	40-75	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	Moderate----	0.24		
	25-64	50-85	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	High--------	0.24		
	64-72	40-70	1.20-1.50	0.6-2.0	0.09-0.20	4.5-5.5	<2	High--------	0.24		
Poplimento------	0-9	10-27	1.20-1.35	0.6-2.0	0.08-0.14	4.5-6.0	<2	Low---------	0.24	4	.5-2
	9-39	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.0	<2	High--------	0.24		
	39-60	27-50	1.25-1.50	0.2-0.6	0.05-0.12	5.1-6.5	<2	Moderate----	0.24		
15D*, 15E*:											
Frederick-------	0-6	13-35	1.30-1.65	2.0-6.0	0.10-0.16	4.5-6.0	<2	Low---------	0.28	4	1-3
	6-12	20-40	1.25-1.50	0.6-2.0	0.12-0.18	4.5-6.0	<2	Moderate----	0.24		
	12-25	40-75	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	Moderate----	0.24		
	25-64	50-85	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	High--------	0.24		
	64-72	40-70	1.20-1.50	0.6-2.0	0.09-0.20	4.5-5.5	<2	High--------	0.24		
Poplimento------	0-9	10-27	1.20-1.35	0.6-2.0	0.08-0.14	4.5-6.0	<2	Low---------	0.24	4	.5-2
	9-39	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.0	<2	High--------	0.24		
	39-60	27-50	1.25-1.50	0.2-0.6	0.05-0.12	5.1-6.5	<2	Moderate----	0.24		
16B*:											
Frederick-------	0-6	13-35	1.25-1.55	2.0-6.0	0.12-0.20	4.5-6.0	<2	Low---------	0.28	4	1-3
	6-12	20-40	1.25-1.50	0.6-2.0	0.12-0.18	4.5-6.0	<2	Moderate----	0.24		
	12-25	40-75	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	Moderate----	0.24		
	25-64	50-85	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	High--------	0.24		
	64-72	40-70	1.20-1.50	0.6-2.0	0.09-0.20	4.5-5.5	<2	High--------	0.24		
Poplimento------	0-9	17-27	1.20-1.35	0.6-2.0	0.15-0.22	4.5-6.0	<2	Low---------	0.32	4	.5-2
	9-39	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.0	<2	High--------	0.24		
	39-60	27-50	1.25-1.50	0.2-0.6	0.05-0.12	5.1-6.5	<2	Moderate----	0.24		
16C*, 16D*:											
Frederick-------	0-7	13-35	1.25-1.55	2.0-6.0	0.12-0.20	4.5-6.0	<2	Low---------	0.28	4	1-3
	7-12	20-40	1.25-1.50	0.6-2.0	0.12-0.18	4.5-6.0	<2	Moderate----	0.24		
	12-25	40-75	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	Moderate----	0.24		
	25-64	50-85	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	High--------	0.24		
	64-72	40-70	1.20-1.50	0.6-2.0	0.09-0.20	4.5-5.5	<2	High--------	0.24		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
16C*, 16D*:											
Poplimento------	0-9	17-27	1.20-1.35	0.6-2.0	0.15-0.22	4.5-6.0	<2	Low---------	0.32	4	.5-2
	9-39	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.0	<2	High--------	0.24		
	39-60	27-50	1.25-1.50	0.2-0.6	0.05-0.12	5.1-6.5	<2	Moderate----	0.24		
17C*, 17E*:											
Frederick-------	0-7	13-35	1.25-1.55	2.0-6.0	0.12-0.20	4.5-6.0	<2	Low---------	0.28	4	1-3
	7-12	20-40	1.25-1.50	0.6-2.0	0.12-0.18	4.5-6.0	<2	Moderate----	0.24		
	12-25	40-75	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	Moderate----	0.24		
	25-64	50-85	1.20-1.50	0.6-2.0	0.10-0.18	4.5-5.5	<2	High--------	0.24		
	64-72	40-70	1.20-1.50	0.6-2.0	0.09-0.20	4.5-5.5	<2	High--------	0.24		
Poplimento------	0-9	17-27	1.20-1.35	0.6-2.0	0.15-0.22	4.5-6.0	<2	Low---------	0.32	4	.5-2
	9-39	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.0	<2	High--------	0.24		
	39-60	27-50	1.25-1.50	0.2-0.6	0.05-0.12	5.1-6.5	<2	Moderate----	0.24		
Rock outcrop.											
18B*, 18C*, 18D*, 18E*:											
Gainesboro------	0-8	10-27	1.20-1.50	2.0-6.0	0.12-0.18	4.5-6.0	<2	Low---------	0.28	3	1-2
	8-17	10-27	1.30-1.55	2.0-6.0	0.06-0.11	4.5-6.0	<2	Low---------	0.28		
	17-26	20-35	1.30-1.55	0.6-6.0	0.06-0.11	4.5-6.0	<2	Low---------	0.24		
	26-32	18-35	1.20-1.50	0.6-6.0	0.05-0.10	4.5-6.0	<2	Low---------	0.24		
	32	---	---	---	---	---	---	----------	----		
Lehew-----------	0-9	4-16	1.20-1.40	2.0-20	0.08-0.12	4.5-5.5	<2	Low---------	0.17	3	1-4
	9-15	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	<2	Low---------	0.17		
	15-35	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	<2	Low---------	0.17		
	35	---	---	---	---	---	---	----------	----		
19C--------------	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.16	3.6-5.5	<2	Low---------	0.24	3	.5-4
Gilpin	3-8	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	<2	Low---------	0.24		
	8-37	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	<2	Low---------	0.24		
	37	---	---	---	---	---	---	----------	----		
20B, 20C---------	0-12	13-27	1.30-1.50	0.6-2.0	0.19-0.24	4.5-6.0	<2	Low---------	0.43	3	1-3
Guernsey	12-20	22-38	1.35-1.55	0.2-2.0	0.15-0.21	4.5-6.0	<2	Moderate----	0.43		
	20-54	35-60	1.45-1.70	0.06-0.6	0.10-0.15	5.1-7.8	<2	High--------	0.32		
	54-72	35-60	1.50-1.70	0.06-0.6	0.06-0.10	5.1-8.4	<2	High--------	0.32		
	72	---	---	---	---	---	---	----------	----		
21C, 21D---------	0-9	10-25	1.25-1.55	2.0-6.0	0.08-0.14	5.1-6.5	<2	Low---------	0.20	4	1-3
Hayter	9-60	20-35	1.30-1.60	2.0-6.0	0.11-0.19	5.1-6.5	<2	Moderate----	0.28		
22C, 22D, 22E----	0-9	10-25	1.25-1.55	2.0-6.0	0.08-0.13	5.1-6.5	<2	Low---------	0.15	4	1-3
Hayter	9-60	20-35	1.30-1.60	2.0-6.0	0.10-0.17	5.1-6.5	<2	Moderate----	0.28		
23C, 23D, 23E----	0-4	7-18	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	<2	Low---------	0.15	3	2-4
Hazleton	4-60	5-15	1.20-1.40	2.0-20	0.06-0.12	3.6-5.5	<2	Low---------	0.15		
24E--------------	0-4	7-18	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	<2	Low---------	0.15	3	2-4
Hazleton	4-60	5-15	1.20-1.40	2.0-20	0.06-0.12	3.6-5.5	<2	Low---------	0.15		
25C, 25D, 25E----	0-13	7-27	1.20-1.40	0.6-6.0	0.08-0.12	3.6-5.5	<2	Low---------	0.28	4	.5-2
Laidig	13-36	18-35	1.30-1.50	0.6-6.0	0.08-0.10	3.6-5.5	<2	Low---------	0.28		
	36-60	18-35	1.30-1.60	0.2-0.6	0.06-0.10	3.6-5.5	<2	Low---------	0.17		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
26C, 26D, 26E----	0-9	4-16	1.20-1.40	2.0-20	0.08-0.12	4.5-5.5	<2	Low----------	0.17	3	1-4
Lehew	9-15	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	<2	Low----------	0.17		
	15-35	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	<2	Low----------	0.17		
	35	---	---	---	---	---	---	----------	----		
27----------	0-14	20-35	1.20-1.40	0.06-2.0	0.14-0.18	4.5-6.0	<2	Moderate----	0.37	3-2	2-4
Library	14-36	45-60	1.20-1.50	0.06-0.2	0.10-0.14	4.5-7.3	<2	High--------	0.24		
	36-55	20-60	1.20-1.50	0.06-0.6	0.08-0.12	5.6-7.8	<2	Moderate----	0.10		
28----------	0-9	15-27	1.20-1.40	0.6-2.0	0.20-0.24	5.1-7.3	<2	Low----------	0.37	5	1-3
Lobdell	9-44	18-30	1.25-1.60	0.6-2.0	0.17-0.22	5.1-7.3	<2	Low----------	0.37		
	44-64	15-30	1.20-1.60	0.6-6.0	0.12-0.18	5.6-7.3	<2	Low----------	0.37		
29----------	0-16	15-27	1.20-1.55	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low----------	0.37	5	4-8
Massanetta	16-54	20-25	1.35-1.65	0.6-2.0	0.14-0.20	7.4-8.4	<2	Low----------	0.37		
	54-62	15-35	1.30-1.60	0.6-2.0	0.12-0.20	7.4-8.4	<2	Low----------	0.28		
30B----------	0-7	10-27	1.20-1.40	0.6-2.0	0.16-0.22	4.5-5.5	<2	Low----------	0.37	3	2-4
Monongahela	7-20	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	<2	Low----------	0.43		
	20-31	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	<2	Low----------	0.43		
	31-43	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	<2	Low----------	0.37		
31B----------	0-11	12-30	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	<2	Low----------	0.43	3	2-4
Nicholson	11-18	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	<2	Low----------	0.43		
	18-26	18-35	1.50-1.70	0.06-0.2	0.07-0.12	4.5-6.5	<2	Low----------	0.43		
	26-74	35-60	1.40-1.60	0.06-0.6	0.07-0.12	5.1-7.8	<2	Moderate----	0.37		
32B, 32C----------	0-11	20-40	1.20-1.40	0.6-2.0	0.10-0.19	4.5-6.5	<2	Low----------	0.37	4	1-2
Oaklet	11-51	60-80	1.30-1.60	0.06-0.2	0.08-0.16	4.5-6.5	<2	High--------	0.28		
	51-63	55-80	1.30-1.60	0.06-0.2	0.08-0.16	4.5-8.4	<2	High--------	0.28		
33C*, 33E*:											
Opequon----------	0-7	27-45	1.20-1.50	0.2-2.0	0.16-0.21	5.6-7.8	<2	High--------	0.37	1	1-4
	7-15	35-65	1.40-1.70	0.2-2.0	0.12-0.16	5.6-7.8	<2	High--------	0.32		
	15	---	---	---	---	---	---	----------	----		
Chilhowie-------	0-7	40-55	1.30-1.50	0.2-0.6	0.12-0.15	6.1-7.8	<2	Moderate----	0.28	2	.5-1
	7-17	60-80	1.30-1.50	0.06-0.2	0.10-0.15	6.1-7.8	<2	High--------	0.24		
	17-27	55-80	1.20-1.50	0.06-0.2	0.02-0.05	6.6-8.4	<2	High--------	0.24		
	27	---	---	---	---	---	---	----------	----		
34----------	0-21	25-40	1.20-1.45	0.6-2.0	0.12-0.18	5.1-7.8	<2	Low----------	0.37	3	1-2
Pagebrook	21-42	45-60	1.30-1.60	0.06-0.2	0.08-0.14	5.1-7.8	<2	High--------	0.28		
	42-62	40-50	1.30-1.55	0.06-0.6	0.08-0.14	6.1-8.4	<2	High--------	0.28		
35----------	0-9	25-40	1.20-1.45	0.6-2.0	0.12-0.18	5.1-7.8	<2	Low----------	0.37	3	2-4
Pagebrook	9-30	45-60	1.30-1.60	0.06-0.2	0.08-0.14	5.1-7.8	<2	High--------	0.28		
	30-60	40-50	1.30-1.55	0.06-0.6	0.08-0.14	6.1-8.4	<2	High--------	0.28		
36*. Pits											
37D, 37E----------	0-4	1-3	1.20-1.30	>6.0	0.04-0.09	3.6-5.5	<2	Low----------	0.17	3	.5-2
Schaffenaker	4-14	1-3	1.30-1.40	>6.0	0.04-0.09	3.6-5.5	<2	Low----------	0.17		
	14-23	1-3	1.40-1.50	>6.0	0.04-0.09	3.6-5.5	<2	Low----------	0.17		
	23	---	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Organic matter
									K	T	
	In	Pct	G/cc	In/hr	In/in	pH	mmhos/cm				Pct
38B, 38C, 38D----	0-8	15-27	1.30-1.50	0.6-2.0	0.17-0.20	4.5-5.5	<2	Low---------	0.37	3	.5-2
Sequoia	8-52	35-60	1.35-1.55	0.2-0.6	0.08-0.16	4.5-5.5	<2	Moderate----	0.24		
	52	---	---	---	---	---	---	----------	----		
39B, 39C---------	0-11	25-40	1.20-1.40	0.6-2.0	0.12-0.19	4.5-7.3	<2	Low---------	0.37	4	.5-1
Swimley	11-43	25-45	1.30-1.55	0.6-2.0	0.10-0.19	4.5-7.3	<2	Low---------	0.37		
	43-67	60-80	1.30-1.60	0.6-2.0	0.08-0.14	4.5-7.3	<2	Moderate----	0.28		
40B----------	0-10	6-25	1.30-1.50	2.0-6.0	0.11-0.18	3.6-6.0	<2	Low---------	0.32	4	1-3
Timberville	10-22	13-25	1.30-1.50	0.6-2.0	0.11-0.19	3.6-6.0	<2	Low---------	0.24		
	22-66	35-60	1.40-1.60	0.6-2.0	0.14-0.18	3.6-6.0	<2	Moderate----	0.24		
41B*, 41C*, 41D*, 41E*:											
Weikert--------	0-3	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	<2	Low---------	0.28	2	1-3
	3-15	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	<2	Low---------	0.28		
	15	---	---	---	---	---	---	----------	----		
Berks----------	0-8	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	<2	Low---------	0.17	3	.5-3
	8-22	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	<2	Low---------	0.17		
	22-30	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	<2	Low---------	0.17		
	30	---	---	---	---	---	---	----------	----		
42C*, 42D*, 42E*:											
Weikert---------	0-3	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-5.5	<2	Low---------	0.20	2	1-3
	3-13	15-27	1.20-1.40	2.0-6.0	0.04-0.08	3.6-5.5	<2	Low---------	0.28		
	13	---	---	---	---	---	---	----------	----		
Berks----------	0-8	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	<2	Low---------	0.17	3	.5-3
	8-22	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	<2	Low---------	0.17		
	22-30	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	<2	Low---------	0.17		
	30	---	---	---	---	---	---	----------	----		
43----------	0-14	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.5	<2	Low---------	0.37	4	1-3
Wheeling	14-50	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	<2	Low---------	0.32		
	50-60	8-15	1.30-1.50	6.0-20	0.04-0.08	5.1-6.0	<2	Low---------	0.20		
44B, 44C---------	0-9	15-30	1.20-1.40	0.6-2.0	0.15-0.18	4.5-5.5	<2	Low---------	0.43	3	1-4
Zoar	9-42	35-50	1.30-1.60	0.06-0.6	0.12-0.15	4.5-5.5	<2	Moderate----	0.32		
	42-60	35-50	1.40-1.70	0.06-0.2	0.08-0.12	4.5-5.5	<2	Moderate----	0.32		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" 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				
1B, 1C---------- Berks	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	Low------	High.
2---------- Birdsboro	B	Rare--------	---	---	2.0-6.0	Apparent	Nov-Mar	>60	---	Moderate	Moderate	High.
3B, 3C---------- Blairton	C	None--------	---	---	0.5-3.0	Perched	Nov-Mar	20-40	Soft	High-----	High-----	High.
4B, 4C---------- Buchanan	C	None--------	---	---	0.5-3.0	Perched	Nov-Mar	>60	---	Moderate	High-----	High.
5B, 5C---------- Carbo	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
6C*:												
Carbo----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
Oaklet----------	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
7C*:												
Carbo----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
Oaklet----------	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
Rock outcrop.												
8B, 8C---------- Chilhowie	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
9B, 9C---------- Clearbrook	D	None--------	---	---	0-0.5	Apparent	Oct-Apr	20-40	Soft	Moderate	High-----	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
10---------- Craigsville	B	Frequent----	Very brief	Nov-May	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
11C, 12E---------- Dekalb	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
13B, 13C, 13D, 13E---------- Frankstown	B	None--------	---	---	>6.0	---	---	>40	Hard	Moderate	Moderate	Moderate.
14B*, 14C*, 14D*, 15C*, 15D*, 15E*, 16B*, 16C*, 16D*:												
Frederick-------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
Poplimento------	C	None--------	---	---	>6.0	---	---	>60	Hard	Moderate	High-----	Moderate.
17C*, 17E*:												
Frederick--------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
Poplimento-------	C	None--------	---	---	>6.0	---	---	>60	Hard	Moderate	High-----	Moderate.
Rock outcrop.												
18B*, 18C*, 18D*, 18E*:												
Gainesboro------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
Lehew-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
19C---------- Gilpin	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
20B, 20C---------- Guernsey	C	None--------	---	---	2.0-3.5	Perched	Jan-Apr	50-80	Soft	High-----	High-----	Moderate.
21C, 21D, 22C, 22D, 22E--------- Hayter	B	None--------	---	---	>6.0	---	---	>48	Hard	Moderate	Moderate	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
23C, 23D, 23E, 24E---------- Hazleton	B	None--------	---	---	>6.0	---	---	>40	Hard	Moderate	Low------	High.
25C, 25D, 25E----- Laidig	C	None--------	---	---	2.5-4.0	Perched	Jan-Mar	>60	---	Moderate	Moderate	High.
26C, 26D, 26E----- Lehew	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
27---------- Library	D	None--------	---	---	0.5-1.5	Apparent	Oct-May	40-60	Soft	High-----	High-----	Moderate.
28---------- Lobdell	B	Occasional	Brief-----	Jan-Apr	2.0-3.5	Apparent	Dec-Apr	>60	---	High-----	Low------	Moderate.
29---------- Massanetta	B	Occasional	Very brief	May-Sep	2.0-3.5	Apparent	Jan-Apr	>60	---	Moderate	Low------	Low.
30B---------- Monongahela	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	40-60	---	Moderate	High-----	High.
31B---------- Nicholson	C	None--------	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	Moderate	High-----	Moderate.
32B, 32C---------- Oaklet	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
33C*, 33E*: Opequon----------	C	None--------	---	---	>6.0	---	---	12-20	Hard	Moderate	Moderate	Low.
Chilhowie--------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
34, 35---------- Pagebrook	D	Frequent----	Very brief	Oct-Mar	2.0-4.0	Apparent	Dec-Mar	>60	---	Moderate	High-----	Moderate.
36*. Pits												

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
37D, 37E---------- Schaffenaker	A	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
38B, 38C, 38D----- Sequoia	C	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	High-----	Moderate.
39B, 39C---------- Swimley	C	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
40B--------------- Timberville	B	Frequent----	Very brief	Apr-Oct	>6.0	---	---	>60	---	Moderate	Low------	High.
41B*, 41C*, 41D*, 41E*, 42C*, 42D*, 42E*:												
Weikert----------	C/D	None---------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
Berks------------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low------	Low------	High.
43---------------- Wheeling	B	Rare---------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
44B, 44C---------- Zoar	C	None---------	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	Moderate	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
*Birdsboro	Fine-loamy, mixed, mesic Typic Hapludults
Blairton	Fine-loamy, mixed, mesic Aquic Hapludults
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Carbo	Very-fine, mixed, mesic Typic Hapludalfs
Chilhowie	Very-fine, mixed, mesic Typic Hapludalfs
Clearbrook	Loamy-skeletal, mixed, mesic Aeric Ochraquults
Craigsville	Loamy-skeletal, mixed, mesic Fluventic Dystrochrepts
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Frankstown	Fine-loamy, mixed, mesic Typic Hapludults
Frederick	Clayey, mixed, mesic Typic Paleudults
Gainesboro	Loamy-skeletal, mixed, mesic Typic Hapludults
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Guernsey	Fine, mixed, mesic Aquic Hapludalfs
Hayter	Fine-loamy, mixed, mesic Ultic Hapludalfs
Hazleton	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Laidig	Fine-loamy, mixed, mesic Typic Fragiudults
Lehew	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Library	Fine, mixed, mesic Aeric Ochraqualfs
Lobdell	Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Massanetta	Fine-loamy, carbonatic, mesic Fluvaquentic Hapludolls
*Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Nicholson	Fine-silty, mixed, mesic Typic Fragiudalfs
Oaklet	Very-fine, mixed, mesic Typic Paleudalfs
Opequon	Clayey, mixed, mesic Lithic Hapludalfs
Pagebrook	Fine, montmorillonitic, mesic Vertic Eutrochrepts
Poplimento	Fine, mixed, mesic Ultic Hapludalfs
Schaffenaker	Mesic, coated Typic Quartzipsamments
Sequoia	Clayey, mixed, mesic Typic Hapludults
Swimley	Very-fine, mixed, mesic Typic Paleudalfs
Timberville	Clayey, mixed, mesic Fluventic Dystrochrepts
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs
Zoar	Clayey, mixed, mesic Aquic Hapludults

*The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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