United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
West Virginia Agricultural
and Forestry Experiment
Station

Soil Survey of Berkeley County, West Virginia

How to Use This Soil Survey

General Soil Map

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

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

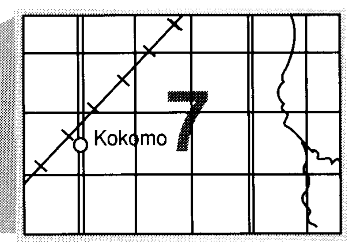
Detailed Soil Maps

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

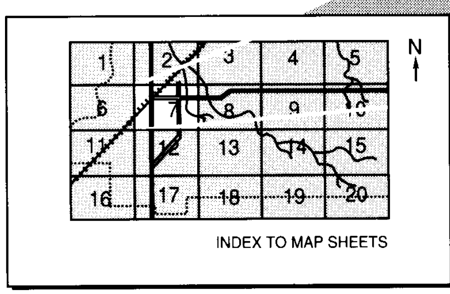
To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

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

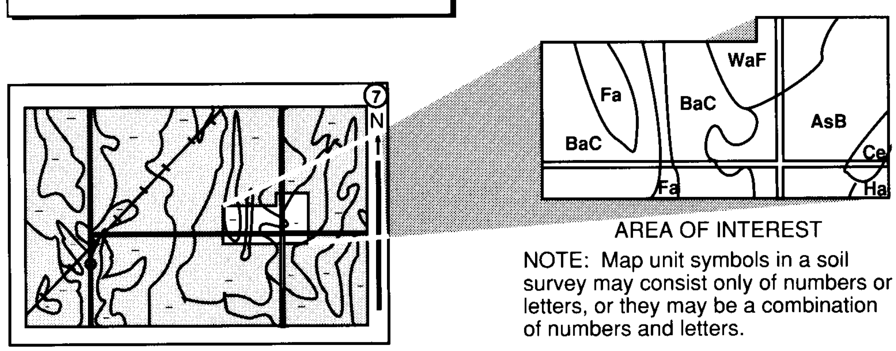
The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



MAP SHEET



INDEX TO MAP SHEETS



MAP SHEET

AREA OF INTEREST

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

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

Major fieldwork for this soil survey was completed in 1994. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1994. This survey was made cooperatively by the Natural Resources Conservation Service and the West Virginia Agricultural and Forestry Experiment Station. It is part of the technical assistance furnished to the Eastern Panhandle Soil Conservation District.

Cover: Sleepy Creek Lake, an impoundment of Meadow Branch in Sleepy Creek Public Hunting and Fishing Area. It is an excellent largemouth bass fishery. Calvin channery loam, 8 to 15 percent slopes, and Dekalb channery sandy loam, 3 to 15 percent slopes, extremely stony, are on the adjacent uplands.

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

Contents

Issued 2000

Foreword

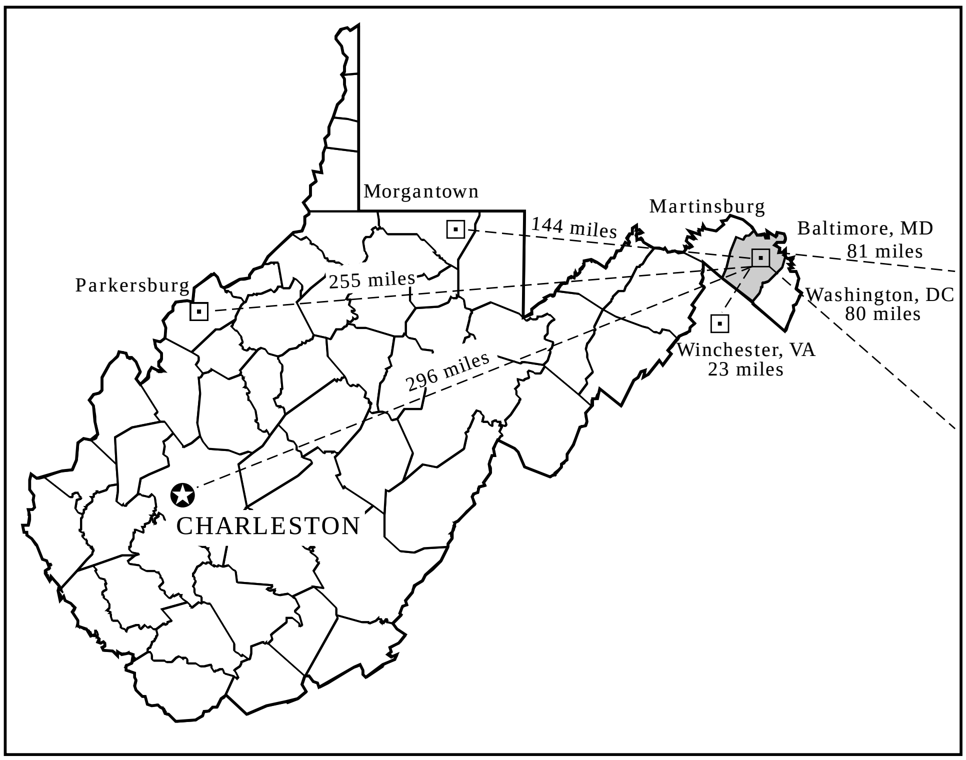
This soil survey contains information that can be used in land-planning programs in Berkeley County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact 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 Natural Resources Conservation Service or the Cooperative Extension Service.

William J. Hartman
State Conservationist
Natural Resources Conservation Service



Location of Berkeley County in West Virginia.

Soil Survey of
Berkeley County, West Virginia

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United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with the
West Virginia Agricultural and Forestry Experiment Station

BERKELEY COUNTY is in the eastern panhandle of West Virginia (see map on facing page). It has an area of 205,900 acres, or approximately 322 square miles. The county is bounded on the north by the Potomac River, which separates it from Washington County, Maryland; on the east by Jefferson County, West Virginia; on the west by Morgan County, West Virginia; and on the south by Frederick County, Virginia. The eastern three-fifths of the county is part of the smooth, fertile Shenandoah Valley. The landscape in the western two-fifths of the county is characterized by narrow valleys and steep, rugged mountains.

This soil survey updates the survey of the county that was completed in 1960 (Gorman, Pasto, and Crocker 1966). It provides additional information and has a more recent aerial photobase.

General Nature of the County

This section provides general information about Berkeley County. It describes settlement and population, farming, transportation and industry, relief and drainage, climate, and water supply.

Settlement and Population

Berkeley County was formed in 1772 from the northern third of Frederick County by an Act of the Virginia Assembly (Doherty 1972). It was named for Norborne Berkeley (Baron de Botetourt), who was the Colonial Governor of Virginia from 1768 to 1770.

In about 1726, Colonel Morgan Morgan founded the first permanent settlement when he built a log cabin near what is now Bunker Hill. German and Scots-Irish immigrants from the northern colonies next settled in the area. They were attracted by the fertile soils, flowing springs, and abundant game in the Shenandoah Valley.

Martinsburg, the county seat, was founded by Adam Stephen and named in honor of Thomas Bryan Martin, a nephew of Lord Fairfax and member of the Virginia House of Burgesses. It was incorporated in 1778.

In 1990, Berkeley County had a population of 59,253, which ranked as the eighth largest population in West Virginia (West Virginia State Senate 1992). In recent years, it has experienced a significant influx of people from the urban centers to the east. It is now considered to be part of the Greater Baltimore-Washington, DC, metropolitan area. The population of Martinsburg, the largest town in the county, was 14,073 in 1990.

Farming

In 1997, the county had 509 farms, averaging about 143 acres in size. The total acreage of farmland was 72,603, which was down from 80,255 acres in 1987

(USDA 1999; U.S. Department of Commerce 1994). About 37 percent of the farms in the county were operated on a full-time commercial basis. Cropland and pasture made up about 29 percent of the county. Most of the farmland is in the Shenandoah Valley. Farming and the acreage used for farming have declined in recent years because of an increase in urbanization.

The total market value of all farm products sold in Berkeley County in 1997 was $17,114,000. The principle sources of farm income were fruit, dairy products, beef, hogs, and poultry. The county was the number one producer of fruit, chiefly apples and peaches, in West Virginia.

Transportation and Industry

Interstate 81 and U.S. Route 11 are the main highways that run north and south through the county. They run roughly parallel to each other through the Shenandoah Valley. Interstate 81 has seven interchanges in the county. State Routes 45, 51, and 9 are the main east-west thoroughfares in the county. Two major railroads serve the county, along with Amtrak passenger service and a commuter rail service from Martinsburg. The Eastern Regional Airport, located south of Martinsburg, provides service to private airplanes.

The county has a diverse economy. Goods manufactured in the county include bricks, cement, cookware, fiberglass products, and prefabricated homes. The manufacture of apple products also contributes to the economy. Limestone continues to be quarried in several locations. The county is a center for product supply and distribution because of its accessibility to the interstate highway system.

Relief and Drainage

Berkeley County lies completely within the Northern Appalachian Ridges and Valleys physiographic province (Austin 1965). The major landforms consist of a series of parallel ridges and valleys that have a southwest-northeast orientation. The county is drained by the Potomac River and its tributaries. The lowest elevation in the county is 340 feet, where the Potomac River leaves the county.

The eastern three-fifths of the county is located within the Shenandoah Valley, which is part of the Great Valley of the Appalachians that extends from Georgia to New York. The average elevation in the Shenandoah Valley is about 650 feet. The valley is underlain by Ordovician and Cambrian age limestones and shales. Most of the valley is drained by Opequon Creek and its tributaries—Dry Run, Evans Run, Hoke Run, Middle Creek, Mill Creek, Sylvan Run, and Tuscarora Creek. In addition, significant areas are drained by Harland Run and Rockymarsh Run, which flow directly into the Potomac River.

The part of the valley that is underlain by limestone is characterized by gently sloping and strongly sloping, low upland ridges. These ridges are shallowly dissected by nearly level valleys, depressions, and intermittent drainageways. In many areas the slopes are complex, giving the landscape an undulating appearance. Sinkholes are common in many areas. Surface water often disappears underground through sinkholes and solution channels in the limestone bedrock. Intermittent drainageways commonly do not have a defined channel.

The part of the valley that is underlain by shale is characterized by gently sloping and strongly sloping ridgetops and steep and very steep side slopes. The landscape is strongly dissected by intermittent and perennial streams. The flood plains along streams are generally narrow.

North Mountain is a prominent landscape feature that marks the western flank of the Shenandoah Valley. It rises dramatically from 400 to 1,000 feet above the valley floor to the east. It bisects the county completely from north to south and is broken by gaps through which the major east-west roadways run. The most prominent gap is at Hedgesville in the northern part of the county, where State Route 9 breaches the mountain.

To the west of North Mountain, the landscape is characterized by narrower valleys and low ridges underlain by Devonian and Silurian age shales and limestones and by higher, prominent ridges formed by Mississippian and Devonian age sandstones. Most of this area is drained by Back Creek and its tributaries—Elk Branch and Tilhance Creek. These drainageways form a trellis pattern, which is typical in the Northern Appalachian Ridges and Valleys physiographic province. Broad areas of nearly level flood plains and alluvial terraces are along Back Creek.

The shale uplands are strongly dissected and have low, narrow to broad, gently sloping or strongly sloping ridgetops and steep or very steep side slopes. The streams dissecting these uplands have narrow flood plains. The relief from the flood plains to the ridgetops generally ranges from 100 to 300 feet.

The limestone forms a narrow valley that has strongly sloping valley sides. This valley is surrounded by low, rather broad sandstone ridges, including Ferrel and Wilson Ridges.

Third Hill and Sleepy Creek Mountains dominate the landscape along the western edge of the county.

These mountains are very steep and rugged and are capped by hard sandstone that outcrops in many areas along their crest. They rise about 1,000 to 1,600 feet above the flood plain of Back Creek to the east. About 5 1/2 miles north of the West Virginia-Virginia State line, the mountains are united at "Locks of the Mountain." Directly southeast of this point, along the crest of Third Hill Mountain is "Shanghai Beacon," which at 2,172 feet is the highest point in the county. The high, narrow valley between Sleepy Creek and Third Hill Mountains is drained by Meadow Branch, which is impounded near its headwaters to form Sleepy Creek Lake.

Climate

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

In winter, the average temperature is 32 degrees F and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Martinsburg on January 17, 1982, is -13 degrees. In summer, the average temperature is 73 degrees and the average daily maximum is 85 degrees. The highest temperature, which occurred at Martinsburg on July 11, 1936, is 112 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 37.54 inches. Of this, about 20.38 inches, or 54 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 4.15 inches at Martinsburg on October 15, 1942. Thunderstorms occur on about 28 days each year, and most occur in July.

The average seasonal snowfall is 25.3 inches. The greatest snow depth at any one time during the period of record was 37 inches. On an average, 7 days per year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year. The heaviest 1-day snowfall on record is 26 inches.

The average relative humidity in midafternoon is about 54 percent. Humidity is higher at night, and the average at dawn is about 77 percent. The sun shines 63 percent of the time in summer and 52 percent in winter. The prevailing wind is from the west-northwest. Average windspeed is highest, 11 miles per hour, in March.

Water Supply

Most parts of the county have an adequate water supply from wells, springs, or streams. Drilled wells commonly supply domestic water systems in rural areas. Sources of water for public water-supply systems include abandoned limestone quarries, large limestone springs, and drilled wells (fig. 1). Farm ponds often supply water for livestock and fire protection in rural areas. There is an abundance of springs in the county. The springs are most numerous and most productive in the areas of limestone.

The primary source of water for most domestic and public water-supply systems is ground water. The ground water of the county can be divided into two categories in accordance with its rock source. The two principal types of rocks from which water is obtained are carbonate rocks, mostly limestone and dolomite, and noncarbonate rocks, mostly shale (Beiber 1961).

In those areas underlain by limestone, the supply of ground water is generally abundant, but the depth to good water-bearing strata varies and water levels are subject to a rapid and wide range of seasonal fluctuations. The average depth of wells in these areas is about 150 to 200 feet, but some wells may be much deeper. The ground water obtained from limestone sources generally is very hard. It is high in dissolved calcium and magnesium but generally is low in iron.

The ground water in the areas underlain by limestone is especially vulnerable to contamination from poor land use practices. Precautions should be taken to prevent pollutants from entering the ground water through sinkholes and solution channels in the limestone bedrock

The yield of ground water in areas underlain by shale generally is less than that in areas underlain by limestone, but the depth to and yield of the ground water generally are dependable. Most wells in these areas are 100 to 150 feet deep. The ground water from shale sources generally is hard and often is high in iron and sometimes high in sulfur.

Farm ponds in areas underlain by limestone are subject to seepage and have a high failure rate. Many ponds can be successfully built in areas underlain by shale if dams are constructed across drainageways.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a

Figure 1.—An abandoned limestone quarry used as a source of water for a public water-supply system.

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 is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

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

Some of the boundaries on the soil maps of Berkeley County do not match those on the soil maps of Jefferson and Morgan Counties, West Virginia, or Frederick County, Virginia, and some of the soil names and descriptions do not fully agree. The differences are a result of improvements in the classification of soils, particularly modifications or refinements in soil series concepts. Also, there may be differences in the intensity of mapping or in the extent of the soils within the survey area.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

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

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit 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 map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

1. Buchanan-Poorhouse

Nearly level to steep, moderately well drained and somewhat poorly drained soils that have a medium textured or fine textured subsoil and formed in material weathered from acid sandstone, shale, or limestone; on uplands

Setting

These soils are mainly on slightly concave footslopes and toeslopes of North Mountain, Third Hill Mountain, and Sleepy Creek Mountain. Slopes range from 0 to 35 percent. Many areas of the Buchanan soils have an extremely stony surface.

Composition

Extent of the general soil map unit: 7 percent
Percentage of components in the map unit:
Buchanan soils—68 percent
Poorhouse soils—10 percent
Minor soils—22 percent (including the somewhat excessively drained Weikert soils, the well drained Berks and Murrill soils, the moderately well drained Swanpond soils, and the somewhat poorly drained Clearbrook soils)

Soil Characteristics

Buchanan

Surface layer: Organic duff from hardwood leaf litter underlain by very dark gray loam
Subsurface layer: Light yellowish brown loam
Subsoil: Upper part—brownish yellow loam; next part—light yellowish brown gravelly loam that has strong brown mottles; next part—strong brown gravelly loam mottled in shades of red, brown, and gray; lower part—strong brown, firm and brittle gravelly loam mottled in shades of yellow, gray, and red
Depth: Very deep
Drainage class: Moderately well drained
Depth to the seasonal high water table: 1.5 to 3.0 feet
Slope: 3 to 35 percent
Parent material: Material weathered from acid sandstone and shale

Poorhouse

Surface layer: Light olive brown silt loam
Subsoil: Yellowish brown to brown silty clay or clay mottled in shades of gray and brown
Depth: Very deep
Drainage class: Somewhat poorly drained
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Slope: 0 to 8 percent
Parent material: Material weathered from limestone mixed with some colluvial material

Use and Management

Most areas of the Buchanan soils are wooded. Most areas of the Poorhouse soils have been cleared and are used for pasture or hay. Some areas are used as cropland or for orchards.

Cropland

The Buchanan soils are suited to cropland if the surface is free of stones. The Poorhouse soils are suited to cropland if they are adequately drained. The hazard of erosion is slight or moderate in most areas.

Pasture and Hayland

These soils are suited to pasture and hay. Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns. Because of the seasonal wetness, these soils are better suited to grasses than to legumes.

Woodland

These soils have moderately high potential productivity for trees. The seasonal wetness is a limitation affecting logging operations.

Community Development

The seasonal wetness is the main limitation affecting community development.

2. Calvin

Gently sloping to very steep, well drained, moderately deep soils that have a medium textured subsoil and formed in material weathered from reddish brown, fine grained sandstone and shale; on uplands

Setting

These soils are on convex ridges, nose slopes, and side slopes in the western part of the county. Slopes range from 3 to 65 percent.

Composition

Extent of the general soil map unit: 4 percent
Percentage of components in the map unit:
Calvin soils—87 percent
Minor soils—13 percent (including the well drained Berks soils, the somewhat excessively drained Dekalb soils, and the somewhat poorly drained Clearbrook soils on uplands; and the poorly drained Atkins soils, the moderately well drained Philo soils, and the well drained Pope soils on narrow flood plains)

Soil Characteristics

Surface layer: Organic duff from hardwood leaf litter underlain by very dark brown channery loam
Subsoil: Reddish brown very channery loam
Depth: Moderately deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 3 to 65 percent
Parent material: Material weathered from reddish brown, fine grained sandstone and shale

Use and Management

Most of the gently sloping and strongly sloping areas have been cleared and are used for pasture or hay. Cultivated crops are grown in a few areas. Almost all of the moderately steep to very steep hillsides are forested. The woodland consists mainly of the oak-hickory and Virginia pine-pitch pine forest types.

Cropland

Droughtiness and the slope are the main limitations affecting crop production.

Pasture and Hayland

Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns. The droughtiness limits forage production during midsummer.

Woodland

These soils have moderate or moderately high potential productivity for woodland. Erosion is a hazard affecting logging operations.

Community Development

The depth to bedrock and the slope are limitations affecting community development.

3. Dekalb-Hazleton

Gently sloping to very steep, somewhat excessively drained and well drained soils that have a medium textured subsoil and formed in material weathered from acid sandstone and shale; on uplands

Setting

These soils are on the convex ridgetops and convex to slightly concave side slopes of North Mountain (fig. 2), Third Hill Mountain, and Sleepy Creek Mountain. Slopes range from 3 to 65 percent.

Composition

Extent of the general soil map unit: 7 percent
Percentage of components in the map unit:
Dekalb soils—41 percent

Figure 2.—A typical area of the Dekalb-Hazleton general soil map unit, including North Mountain, in the background. The alluvial soils in the foreground are along Back Creek. They are in an area of the Monongahela-Pope-Tygart-Philo general soil map unit.

Hazleton soils—39 percent
Minor inclusions—20 percent (including the somewhat excessively drained Weikert soils, the well drained Berks and Calvin soils, and areas of rock outcrop)

Soil Characteristics

Dekalb

Surface layer: Organic duff from hardwood leaf litter underlain by very dark brown channery sandy loam

Subsurface layer: Grayish brown very channery sandy loam

Subsoil: Upper part—yellowish brown very channery sandy loam; lower part—yellowish brown extremely flaggy sandy loam

Depth: Moderately deep

Drainage class: Somewhat excessively drained

Depth to the seasonal high water table: More than 6 feet

Slope: 3 to 65 percent

Parent material: Material weathered from acid sandstone and some interbedded shale

Hazleton

Surface layer: Organic duff from hardwood leaf litter underlain by very dark brown gravelly loam
Subsurface layer: Dark yellowish brown gravelly loam
Subsoil: Upper part—yellowish brown very gravelly loam; next part—strong brown very gravelly loam; lower part—strong brown very gravelly sandy loam
Depth: Very deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 15 to 65 percent
Parent material: Material weathered from acid sandstone and shale

Use and Management

Most areas are forested. A few small areas are used for orchards or pasture. The woodland consists mainly of the oak-hickory and Virginia pine-pitch pine forest types.

Cropland

Most areas are not suited to cropland. The slope and the stones on the surface make cultivation impractical.

Pasture and Hayland

Most areas are not suited to hay and are difficult to manage for pasture. The slope and the stones on the surface are the main limitations.

Woodland

Potential productivity is moderate on south aspects and moderate or moderately high on north aspects. The slope is the main limitation affecting logging operations.

Community Development

Many areas are not suited to development because of the very steep slope. The depth to bedrock is an additional limitation in areas of the Dekalb soils.

4. Downsville

Gently sloping to moderately steep, well drained soils that have a medium textured subsoil and formed in material washed from upland soils; on high river terraces

Setting

These soils are on old river terraces high above the Potomac River. Some areas that are underlain by limestone have sinkholes. Slopes range from 3 to 25 percent.

Composition

Extent of the general soil map unit: 1 percent
Percentage of components in the map unit:
Downsville soils—84 percent
Minor soils—16 percent (including the well drained Hagerstown, Murrill, and Berks soils on adjacent uplands; and the moderately well drained Monongahela soils on the lower river terraces)

Soil Characteristics

Surface layer: Dark yellowish brown gravelly loam
Subsoil: Upper part—brown gravelly loam; lower part—yellowish red very gravelly loam and yellowish red very gravelly sandy clay loam
Depth: Very deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 3 to 25 percent
Parent material: Material washed from upland soils

Use and Management

Many areas have been cleared and are used for crops, hay, or community development. Some areas are forested. The woodland consists of the oak-hickory and mixed hardwood forest types.

Cropland

Most areas are suited to cropland. The gently sloping areas are prime farmland. The hazard of erosion is moderate or severe in unprotected areas.

Pasture and Hayland

These soils are suited to pasture and hay. Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.

Woodland

These soils have moderately high potential productivity for trees. Erosion on logging roads and skid trails is a management concern.

Community Development

The slope is the main limitation affecting community development. In some areas solution channels in the underlying limestone bedrock increase the hazard of ground-water pollution from septic tank absorption fields.

5. Duffield-Ryder-Nollville

Gently sloping to moderately steep, well drained, moderately deep to very deep soils that have a medium textured subsoil and formed in material weathered from interbedded limestone and limy shale; on uplands

Setting

These soils are on convex, parallel ridges of low relief in the Great Valley of the Appalachians (fig. 3). They are prominent on Apple Pie Ridge. Limestone outcrops are common in some areas. Slopes range from 3 to 25 percent.

Composition

Extent of the general soil map unit: 5 percent
Percentage of components in the map unit:
Duffield soils—32 percent
Ryder soils—32 percent
Nollville soils—25 percent
Minor soils—11 percent (including the very deep Hagerstown soils and the shallow Opequon soils on uplands; the moderately well drained Funkstown soils along upland drainageways; and the moderately well drained Lindside soils on flood plains)

Soil Characteristics

Duffield

Surface layer: Dark yellowish brown channery silt loam
Subsoil: Upper part—yellowish brown channery silt loam; lower part—yellowish brown to dark yellowish brown silty clay loam or silty clay
Depth: Very deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet

Figure 3.—A typical area of the Duffield-Ryder-Nollville general soil map unit. A large acreage of these soils is used for orchards. North Mountain is on the left side of the photograph. It is in an area of the Dekalb-Hazleton general soil map unit.

Slope: 3 to 15 percent
Parent material: Limestone

Ryder

Surface layer: Dark yellowish brown channery silt loam
Subsoil: Strong brown channery silt loam
Depth: Moderately deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 3 to 25 percent
Parent material: Interbedded limestone and limy shale

Nollville

Surface layer: Dark yellowish brown channery silt loam
Subsoil: Upper part—yellowish brown channery silty clay loam; lower part—strong brown silty clay
Depth: Deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 3 to 25 percent
Parent material: Interbedded limestone and limy shale

Use and Management

Most areas have been cleared. A large acreage is used for orchards. These soils are also used for cultivated crops, hay, and pasture. A small acreage supports mixed hardwoods. Some areas have been used for community development.

Cropland

Most areas are suited to cropland. The gently sloping areas are prime farmland. The hazard of erosion is moderate or severe in unprotected areas.

Pasture and Hayland

These soils are suited to pasture and hayland. Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns. Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Woodland

These soils have moderately high potential productivity for trees. Erosion on logging roads and skid trails is a management concern.

Community Development

In some areas solution channels and fractures in the limestone bedrock increase the hazard of ground-water pollution from septic tank absorption fields. The depth to bedrock is a limitation on homesites in areas of the Ryder and Nollville soils.

6. Hagerstown-Funkstown

Very deep, well drained and moderately well drained, nearly level to steep soils that have a medium textured or fine textured subsoil and formed in material weathered from limestone; on uplands and along upland drainageways

Setting

These soils are on broad, rolling uplands that are shallowly dissected by narrow drainageways. Limestone outcrops are common throughout the map unit. Sinkholes also are common. Many large springs are in the unit. Slopes range from 0 to 35 percent. They are generally short and often complex, giving the landscape an undulating appearance.

Composition

Extent of the general soil map unit: 26 percent
Percentage of components in the map unit:
- Hagerstown soils—52 percent
- Funkstown soils—9 percent
- Minor inclusions—39 percent (including the well drained Duffield soils on ridges and hillsides; the moderately well drained Swanpond soils on head slopes and in upland depressions; the well drained Murrill soils on the toeslopes of North Mountain; the shallow Opequon soils on rocky uplands; the well drained Combs soils on the flood plain along the Potomac River; the well drained Lappans soils and the very poorly drained Fairplay soils on narrow flood plains below limestone springs; and areas of limestone outcrops)

Soil Characteristics

Hagerstown

Surface layer: Brown silt loam
Subsoil: Upper part—strong brown silt loam; next part—yellowish red and strong brown silty clay; next part—yellowish red and strong brown silty clay loam; lower part—strong brown and dark yellowish brown silty clay loam

Depth: Very deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Parent material: Limestone

Funkstown

Surface layer: Dark yellowish brown silt loam
Subsoil: Upper part—yellowish brown gravelly loam; next part—yellowish brown very gravelly loam; lower part—strong brown and brownish yellow clay
Depth: Very deep
Drainage class: Moderately well drained
Depth to the seasonal high water table: 2.0 to 3.5 feet
Parent material: Local alluvial or colluvial material washed from upland soils that are underlain by limestone

Use and Management

About 70 percent of this unit has been cleared of trees and is used for cultivated crops, orchards, hay, pasture, or community development. The remaining wooded areas include up to 30 percent limestone outcrops. They support hardwoods or hardwoods mixed with eastern redcedar.

Cropland

Most areas are suited to cultivated crops. Many areas of prime farmland are in this unit. Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution.

Pasture and Hayland

Most areas are suited to pasture and hay. Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Woodland

These soils have moderately high potential productivity for trees.

Community Development

The depth to hard limestone bedrock is a limitation in many areas. Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution from septic tank absorption fields. Some areas of the Funkstown soils are subject to occasional periods of flooding or ponding.

7. Monongahela-Pope-Tygart-Philo

Nearly level to strongly sloping, well drained and somewhat poorly drained, very deep soils that have a medium textured or fine textured subsoil; formed in material washed from upland soils that are underlain mainly by acid shale and sandstone; on flood plains and terraces

Setting

These soils are mainly on the flood plain and low stream terraces along Back Creek in the western part of the county (fig. 4). Slopes range from 0 to 15 percent.

Composition

Extent of the general soil map unit: 4 percent
Percentage of components in the map unit:
Monongahela soils—33 percent
Pope soils—18 percent
Tygart soils—17 percent
Philo soils—14 percent
Minor soils—18 percent (including the poorly drained Atkins soils on flood plains; the somewhat excessively drained Weikert soils, the well drained Berks soils, and the somewhat poorly drained Clearbrook soils on the adjacent shale uplands; and the moderately well drained Buchanan soils on concave footslopes)

Soil Characteristics

Monongahela

Surface layer: Dark yellowish brown silt loam
Subsoil: Upper part—yellowish brown silt loam; next part—dark yellowish brown silt loam mottled in shades of brown and gray; next part—light olive brown, firm and brittle silt loam mottled in shades of brown and gray; lower part—yellowish brown clay loam that has gray mottles
Depth: Very deep
Drainage class: Moderately well drained
Depth to the seasonal high water table: 1.5 to 3.0 feet
Slope: 0 to 8 percent
Parent material: Material washed from upland soils that are underlain by acid shale and sandstone

Pope

Surface layer: Brown silt loam
Subsoil: Brown silt loam

Figure 4.—A typical area of the Monongahela-Pope-Tygart-Philo general soil map unit. The moderately well drained Monongahela soils are in the tilled area on the right side of the photograph. They are on a low stream terrace. The poorly drained Atkins soils, which are minor soils in the unit, are on the flood plain on the left side of the photograph.

Depth: Very deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 0 to 3 percent
Parent material: Material washed from upland soils that are underlain by acid shale and sandstone

Tygart

Surface layer: Brown silt loam
Subsoil: Upper part—light yellowish brown silt loam mottled in shades of brown and gray; next part—yellowish brown silty clay loam mottled in shades of brown and gray; next part—gray clay mottled in shades of brown and red; lower part—gray and yellowish brown silty clay
Depth: Very deep
Drainage class: Somewhat poorly drained
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Slope: 0 to 8 percent
Parent material: Material washed from upland soils that are underlain by acid shale and sandstone

Philo

Surface layer: Brown silt loam
Subsoil: Upper part—dark yellowish brown silt loam; next part—yellowish brown silt loam that has a few mottles in shades of brown and gray; lower part—brown silt loam that has common or many mottles in shades of brown and gray
Depth: Very deep
Drainage class: Moderately well drained
Depth to the seasonal high water table: 1.5 to 3.0 feet
Slope: 0 to 3 percent
Parent material: Material washed from upland soils that are underlain by acid shale and sandstone

Use and Management

Most areas have been cleared and are used for crops, hay, or pasture. Some areas that are frequently flooded support mixed hardwoods.

Cropland

The Monongahela, Pope, and Philo soils are suited to cropland. The Tygart soils are suited to cropland if they are adequately drained. Some areas are prime farmland. Flooding in areas of the Pope and Philo soils may occasionally damage crops.

Pasture and Hayland

These soils are suited to pasture and hay. Because of the seasonal wetness, the Tygart and Philo soils are better suited to grasses than to legumes.

Woodland

These soils have moderately high potential productivity for trees. The seasonal wetness may limit logging operations in areas of the Monongahela, Philo, and Tygart soils.

Community Development

The seasonal wetness is the main limitation affecting community development in areas of the Monongahela and Tygart soils. The Pope and Philo soils are not suited to community development because of the flooding.

8. Pecktonville-Blackthorn-Caneyville

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

Setting

These soils are in many areas of the small limestone valley and the adjacent ridges in the western part of the county. The areas extend from near Jones Springs northward to Ferrel Ridge. The soils are on gently sloping and strongly sloping, convex ridges and valley sides and on steep and very steep, convex or slightly concave hillsides. Slopes range from 3 to 45 percent.

Composition

Extent of the general soil map unit: 3 percent
Percentage of components in the map unit:
Pecktonville soils—45 percent
Blackthorn soils—22 percent
Caneyville soils—18 percent
Minor soils—15 percent (including the somewhat excessively drained Dekalb soils on ridges; the moderately well drained Buchanan soils on footslopes; and the somewhat poorly drained Poorhouse soils in concave upland depressions)

Soil Characteristics

Pecktonville

Surface layer: Organic duff from hardwood leaf litter underlain by very dark grayish brown very gravelly loam
Subsurface layer: Yellowish brown gravelly loam
Subsoil: Upper part—strong brown silt loam; next part—yellowish red gravelly silty clay loam; next part—yellowish red gravelly clay mottled in shades of brown and red; lower part—yellowish red gravelly clay mottled in shades of red, yellow, and gray
Depth: Very deep
Drainage class: Well drained
Depth to the seasonal high water table: 3.5 to 6.0 feet
Slope: 3 to 45 percent
Parent material: Material weathered from limestone mixed with some material weathered from sandstone and chert

Blackthorn

Surface layer: Organic duff from hardwood leaf litter underlain by very dark brown very gravelly loam
Subsurface layer: Brown very gravelly sandy loam
Subsoil: Upper part—light yellowish brown gravelly sandy loam; next part—yellowish brown very gravelly sandy loam; next part—strong brown very gravelly loam; next part—red and strong brown very gravelly clay; lower part—red and strong brown clay
Depth: Very deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 15 to 45 percent
Parent material: Material weathered from limestone mixed with some material weathered from sandstone and chert

Caneyville

Surface layer: Dark grayish brown silty clay loam underlain by brown silty clay loam
Subsoil: Upper part—strong brown silty clay that has yellowish brown mottles; lower part—yellowish red silty clay
Depth: Moderately deep

Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 3 to 25 percent
Parent material: Material weathered from limestone interbedded with thin layers of shale and siltstone

Use and Management

Most stony areas are forested. The woodland consists of the oak-hickory or mixed hardwood forest types. Most of the nonstony areas have been cleared and are used for pasture, hay, or crops. A few small areas are used for orchards.

Cropland

The nonstony, gently sloping and strongly sloping Pecktonville and Caneyville soils are suited to cropland. The hazard of erosion is moderate or severe in unprotected areas. Solution channels in the limestone bedrock increase the hazard of ground-water pollution.

Pasture and Hayland

The nonstony areas are suited to pasture and hayland. The stony areas are not suited to hay and are difficult to manage for pasture. Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Woodland

Potential productivity is moderately high in most areas.

Community Development

The slope is a limitation affecting community development in many areas of these soils. A seasonally wet subsoil and slow permeability are additional limitations in areas of the Pecktonville soils, and the depth to bedrock is an additional limitation in areas of the Caneyville soils. In most areas solution channels in the limestone bedrock increase the hazard of ground-water pollution from septic tank absorption fields.

9. Swanpond-Carbo-Opequon

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

Setting

The Swanpond soils generally are on broad, topographically low, slightly convex to slightly concave uplands. The Carbo and Opequon soils are on long, narrow, slightly convex uplands. Sinkholes occur in some areas. Limestone outcrops are common in other areas. Slopes are generally short and often complex. They range from 3 to 35 percent.

Composition

Extent of the general soil map unit: 4 percent
Percentage of components in the map unit:
Swanpond soils—39 percent
Carbo soils—30 percent
Opequon soils—15 percent
Minor soils—16 percent (including the very deep Hagerstown soils and the deep Endcav soils on uplands; the moderately well drained Funkstown soils along upland drainageways; and the shallow Weikert soils and the moderately deep Berks and Clearbrook soils on adjacent shale uplands)

Soil Characteristics

Swanpond

Surface layer: Brown silt loam
Subsoil: Upper part—yellowish brown clay; lower part—yellowish brown and strong brown clay that has gray mottles
Depth: Very deep
Drainage class: Moderately well drained
Depth to the seasonal high water table: 2.5 to 3.5 feet
Parent material: Limestone

Carbo

Surface layer: Dark yellowish brown silty clay
Subsoil: Strong brown and yellowish brown clay
Depth: Moderately deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 3 to 35 percent
Parent material: Limestone

Opequon

Surface layer: Dark yellowish brown silty clay
Subsoil: Yellowish brown clay
Depth: Shallow
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Slope: 3 to 35 percent
Parent material: Limestone

Use and Management

Most areas have been cleared of trees and are used for pasture or hay. A small acreage is used for cultivated crops. Some areas are used for community development. The wooded areas are in hardwoods or hardwoods mixed with eastern redcedar. The limestone underlying this map unit is of very high quality and has been extensively quarried. Both active and abandoned quarries are common throughout the unit.

Cropland

Most areas are generally suited to cultivated crops. Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution. The high content of clay in the surface layer makes these soils difficult to till. The Opequon soils are droughty during the growing season.

Pasture and Hayland

These soils are suited to pasture and hay. Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Woodland

Potential productivity is moderately high in areas of the Swanpond and Carbo soils and moderate in areas of the Opequon soils. The high content of clay limits the use of logging equipment during wet periods.

Community Development

The depth to hard limestone bedrock and a high shrink-swell potential are the main limitations affecting community development. Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution from septic tank absorption fields.

10. Urban Land

Setting

This map unit consists of areas where the majority of the landscape has been altered during community development. It is mostly in the city of Martinsburg and the surrounding area.

Composition

Extent of the general soil map unit: 2 percent
Percentage of components in the map unit:
Urban land—62 percent
Minor soils—38 percent (including areas of the very deep Hagerstown and Swanpond soils; the deep Endcav soils; the moderately deep Carbo, Berks, and Clearbrook soils; the shallow Opequon and Weikert soils; and Udorthents)

Characteristics of Urban Land

Urban land consists of areas where at least 90 percent of the land surface is covered by asphalt, concrete, or other impervious material.

Use and Management

This map unit has been used for industrial, commercial, and residential development.

11. Weikert-Berks-Clearbrook

Nearly level to very steep, somewhat excessively drained to somewhat poorly drained, shallow and moderately deep soils that have a medium textured subsoil and formed in material weathered from acid shale; on uplands

Setting

The Weikert and Berks soils are generally on convex upland ridges, nose slopes, and side slopes that have been deeply dissected by drainageways. The Clearbrook soils are generally on broad, smooth ridges and concave head slopes, mostly in the eastern part of the county. Slopes range from 3 to 70 percent in areas of the Weikert and Berks soils and from 0 to 8 percent in areas of the Clearbrook soils.

Composition

Extent of the general soil map unit: 37 percent
Percentage of components in the map unit:
Weikert soils—34 percent
Berks soils—31 percent
Clearbrook soils—11 percent
Minor soils—24 percent (including the poorly drained Atkins soils and the moderately well drained Philo soils on narrow flood plains)

Soil Characteristics

Weikert

Surface layer: Dark brown channery silt loam
Subsoil: Yellowish brown very channery silt loam
Depth: Shallow
Drainage class: Somewhat excessively drained
Depth to the seasonal high water table: More than 6 feet
Parent material: Soft, rippable, acid shale

Berks

Surface layer: Brown channery silt loam
Subsoil: Upper part—yellowish brown channery silt loam; lower part—yellowish brown and strong brown very channery silt loam

Depth: Moderately deep
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Parent material: Soft, rippable, acid shale

Clearbrook

Surface layer: Brown silt loam
Subsoil: Upper part—light olive brown very channery silty clay loam that has yellowish brown and gray mottles; lower part—gray extremely channery silty clay loam that has yellowish brown mottles
Depth: Moderately deep
Drainage class: Somewhat poorly drained
Depth to the seasonal high water table: 0.5 foot to 2.5 feet
Parent material: Soft, rippable, acid shale

Use and Management

Most of the broad ridgetops have been cleared and are used for pasture, hay, cultivated crops, or community development. Many areas are forested. A few small areas are used for orchards. The steep and very steep side slopes are generally forested. The woodland consists of the oak-hickory and Virginia pine-pitch pine forest types.

Cropland

The gently sloping and strongly sloping areas are generally suited to cropland, but production generally is low. Droughtiness and low natural fertility are the main limitations.

Pasture and Hayland

These soils are suited to pasture and hay. The droughtiness limits forage production during midsummer.

Woodland

Potential productivity is moderate in most areas. The droughtiness and the low natural fertility result in a high seedling mortality rate in tree plantations, especially on south-facing slopes.

Community Development

The depth to bedrock and the slope are limitations affecting community development. The seasonal high water table is an additional limitation in areas of the Clearbrook soils.

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 the heading "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, Monongahela silt loam, 3 to 8 percent slopes, is a phase of the Monongahela series.

Some map units are made up of two or more major soils. These map units are called soil complexes. 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. Weikert-Berks channery silt loams, 8 to 15 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. Urban land 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 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

At—Atkins silt loam

Setting

This soil is on nearly level, slightly concave flood plains, mainly along Back Creek and its tributaries and, to a lesser extent, along the Potomac River and, in many areas, on the backside of the flood plain nearest the uplands. Most areas of the soil that have not been drained previously are considered to be wetlands. A Federal permit may be required before these areas are disturbed.

Composition

Atkins soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

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

Subsoil:
4 to 20 inches—gray silt loam that has strong brown and grayish brown mottles
20 to 26 inches—light gray silt loam that has grayish

brown, strong brown, and yellowish brown mottles
26 to 36 inches—light gray silty clay loam that has grayish brown, strong brown, and yellowish brown mottles

Underlying material:
36 to 50 inches—light brownish gray loam that has gray and yellowish brown mottles
50 to 70 inches—light gray, stratified gravelly silt loam and gravelly sandy loam having brownish yellow mottles

Soil Properties and Qualities

Drainage class: Poorly drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: Within a depth of 1 foot
Flooding: Frequently flooded (more than a 50 percent chance of flooding in any year) for brief periods
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5) above a depth of 40 inches ranging to moderately acid (pH 5.6 to 6.0) below a depth of 40 inches
Surface runoff: Very slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
- The moderately well drained Philo soils
- The well drained Pope soils

Similar soils:
- Soils that have silty clay or clay in the subsoil
- Very poorly drained soils that are subject to ponding
- Soils that are frequently flooded
- Soils that are moderately acid to neutral throughout

Use and Management

Uses: In many areas, the Atkins soil is wooded or the acreage is idle land. Some areas are used as pasture. Some large areas along Back Creek have been drained and are used for crops.

Cropland

Suitability: Suited if the soil has been adequately drained
Management concerns:
- Most climatically adapted crops cannot be grown unless an adequate drainage system has been installed.
- Tilling or harvesting when the soil is wet may cause compaction and deterioration of tilth.
- The flooding may damage crops and delay fieldwork in some years.
- This soil must be properly protected if cultivated crops are grown year after year.

Management measures:
- Applying a system of conservation tillage, growing green manure crops, returning crop residue to the soil, and deferring tillage and harvest when the soil is wet help to improve or maintain tilth.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
- Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
- Grazing when the soil is too wet may damage the sod.
- Unless the soil is drained, harvesting of hay is commonly restricted to long, dry periods.
- Debris may be deposited on the grassland during periods of flooding.

Management measures:
- The hay and pasture plants that can withstand the wetness should be selected for planting.
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants.

Woodland

Potential productivity: Moderately high for water-tolerant species
Management concerns:
- The use of equipment is restricted during wet periods when the soil is soft.
- The wetness may result in a high seedling mortality rate.
- The windthrow hazard is moderate because of the wetness.
- Competition from undesirable plants may slow the growth of planted tree seedlings.

Management measures:
- Year-round logging roads require additions of roadfill and gravel.
- The tree species that can withstand the wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.

• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
• Because of the flooding and the wetness, this soil is not suited to building site development.
• Because of the flooding, the wetness, and the slow permeability, this soil is not suited to septic tank absorption fields.
• The flooding, the wetness, and the potential for frost action are severe limitations affecting the construction of local roads and streets.
Management measures:
• Soils that are better suited to buildings and septic tank absorption fields should be selected for development.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness.

Interpretive Groups

Land capability classification: IIIw
Woodland ordination symbol: 5W

BkE—Blackthorn very gravelly loam, 15 to 35 percent slopes, extremely stony

Setting

This soil is on moderately steep or steep, slightly concave benches on the west side of North Mountain.

Composition

Blackthorn soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

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

Subsurface layer:
4 to 7 inches—brown gravelly loam

Subsoil:
7 to 12 inches—brown gravelly loam
12 to 65 inches—brown very gravelly loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour) in the surface layer and upper part of the subsoil and moderate or moderately slow (0.2 inch to 2.0 inches per hour) in the lower part of the subsoil
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low in the surface layer and the upper part of the subsoil and moderate in the lower part of the subsoil
Erosion hazard: Severe
Slope class: Moderately steep or steep
Stoniness: 3 to 15 percent of the surface covered with stones and boulders
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Rapid or very rapid
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
• The moderately deep Berks and Calvin soils, which are in small convex areas
• Small areas of the moderately well drained Buchanan soils
• Small very rubbly areas of soils that have more than 50 percent of their surface covered with stones and boulders
• Areas of limestone rock outcrop
Similar soils:
• The well drained Hazleton soils
• Small rubbly areas of soils that have 15 to 50 percent of their surface covered with stones and boulders
• Soils that are not stony
• Soils that have slopes of less than 15 percent or more than 35 percent

Use and Management

Uses: All areas of the Blackthorn soil are wooded.

Cropland

Suitability: Not suited
Management concerns:
• The slope and the stones and boulders on the surface of the soil make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hayland; difficult to manage for pasture

Management concerns:
• Because of the slope and the stones and boulders on the surface of the soil, it is difficult to operate conventional equipment used in applying fertilizer and in clipping.
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The large stones on the surface of the soil can hinder harvesting operations and damage equipment.
• The slope is a moderate limitation affecting the use of logging equipment.
• The stones and boulders on the surface of the soil may interfere with site preparation when tree seedlings are planted.
• Competition from brush can delay or prevent natural regeneration of desired species after trees are harvested.
Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled; and installing water bars and culverts.

Community Development

Suitability: Poorly suited
Management concerns:
• Erosion is a severe hazard on construction sites.
• Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is done.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by surface runoff and by seepage from septic tank absorption fields.
• The moderate shrink-swell potential is a limitation on sites for dwellings with basements.
• Low strength and the potential for frost action are moderate limitations affecting the construction of roads.
• Rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation and to protect the ground water from pollution.
• Buildings should be designed so that they conform to the natural slope of the land.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or where excavation has exposed the limestone bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Placing a filter fabric between the subgrade and the road base when roads are constructed helps to prevent the damage caused by low strength.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: 4R

BpE—Blackthorn-Pecktonville very gravelly loams, 15 to 35 percent slopes, extremely stony

Setting

These soils are on moderately steep or steep, slightly concave hillsides and benches and slightly convex shoulder slopes and hillsides on Ferrell and Wilson Ridges in the western part of the county. The Blackthorn soil is mainly in concave areas of the landscape, and the Pecktonville soil is mainly in the convex areas. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Blackthorn soil and similar soils: 50 percent
Pecktonville soil and similar soils: 40 percent
Dissimilar inclusions: 10 percent

Representative Profile

Blackthorn

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 3 inches—very dark brown very gravelly loam

Subsurface layer:
3 to 6 inches—brown very gravelly sandy loam

Subsoil:
6 to 14 inches—light yellowish brown gravelly sandy loam
14 to 24 inches—yellowish brown very gravelly sandy loam
24 to 35 inches—strong brown very gravelly loam
35 to 75 inches—red and strong brown very gravelly clay
75 to 90 inches—red and strong brown clay

Pecktonville

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 3 inches—very dark grayish brown very gravelly loam

Subsurface layer:
3 to 7 inches—yellowish brown gravelly loam

Subsoil:
7 to 12 inches—strong brown silt loam
12 to 17 inches—yellowish red gravelly silty clay loam
17 to 32 inches—yellowish red, strong brown, and brownish yellow gravelly clay
32 to 48 inches—yellowish red, red, and brownish yellow gravelly clay
48 to 62 inches—yellowish red, red, and brownish yellow gravelly clay that has pinkish gray mottles
62 to 65 inches—red clay

Soil Properties and Qualities

Blackthorn

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour) in the upper part of the subsoil and moderately slow (0.2 to 0.6 inch per hour) in the lower part of the subsoil
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the lower part of the subsoil
Erosion hazard: Severe
Stoniness: 3 to 15 percent of the surface covered with stones and boulders
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0) in the surface layer and upper part of the subsoil and very strongly acid or strongly acid (pH 4.5 to 5.5) in the lower part of the subsoil
Surface runoff: Rapid
Depth to bedrock: More than 60 inches

Pecktonville

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour) in the upper part of the subsoil and slow or moderately slow (0.06 to 0.6 inch per hour) in the lower part
Available water capacity: Moderate or high
Depth to the seasonal high water table: 3.5 to 6.0 feet
Flooding: None
Shrink-swell potential: High in the lower part of the subsoil
Erosion hazard: Severe
Stoniness: 3 to 15 percent of the surface covered with stones and boulders
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Siliceous limestone that contains fairly high amounts of sandstone and chert

Minor Components

Dissimilar inclusions:
• The moderately well drained Buchanan soils, which are on concave foot slopes
• The moderately deep Caneyville soils
• The moderately deep Berks soils and the shallow Weikert soils, which are on convex hillsides
Similar soils:
• Small areas of rubbly or extremely bouldery soils
• Soils that have slopes of less than 15 percent or more than 35 percent
• Soils that have less than 3 percent of their surface covered with stones

Use and Management

Uses: Most areas of the Blackthorn and Pecktonville soils are wooded. A few small areas have been cleared and are used as pasture. A few areas have been developed as homesites.

Cropland

Suitability: Not suited
Management concerns:
• The stones on the surface of the soils and the slope make cultivation impractical.

Pasture and Hayland

Suitability: Not suited for hay; difficult to manage for pasture
Management concerns:
• Because of the slope and the stones on the surface of the soils, it is difficult to operate conventional equipment used in clipping and in applying fertilizer.
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The large stones on the surface of the soils can hinder harvesting operations and damage equipment.
• Competition from weeds may slow the growth of planted tree seedlings.
• Seedling mortality may be a problem on south aspects because of droughtiness during the summer.
• The stones and rock fragments in the surface layer may interfere with the planting of tree seedlings.
Management measures:
• The hazard of erosion can be reduced by seeding logging roads, log landings, and areas that have been cut and filled and by installing water bars and culverts.
• Drought-tolerant species, such as white pine, Scotch pine, and Norway spruce, should be selected for planting on south aspects.
• Logging roads should be designed so that they conform to the topography.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• Erosion is a severe hazard on construction sites.
• Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is done.
• The high shrink-swell potential and the seasonally wet subsoil are additional limitations affecting building site development in areas of the Pecktonville soil.
• The stones and boulders may interfere with construction, with the establishment of lawns, and with landscaping.
• The slope and the slow or moderately slow permeability in the clayey layer of the subsoil are limitations affecting septic tank absorption fields in areas of the Pecktonville soil.
• The slope, the high shrink-swell potential, and the low strength of the Pecktonville soil are limitations on sites for local roads and streets.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Enlarging or pressurizing septic tank absorption fields or installing alternating drainfields helps to overcome the restricted permeability.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Seeding and mulching roadbanks after construction is completed helps to control erosion.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: Blackthorn—4R; Pecktonville—4R

BpF—Blackthorn-Pecktonville very gravelly loams, 35 to 45 percent slopes, extremely stony

Setting

These soils are on very steep, slightly concave hillsides and benches and slightly convex shoulder slopes and hillsides on Ferrell and Wilson Ridges in the western part of the county. The Blackthorn soil is mainly in concave areas of the landscape, and the Pecktonville soil is mainly in convex areas. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Blackthorn soil and similar soils: 60 percent
Pecktonville soil and similar soils: 30 percent
Dissimilar inclusions: 10 percent

Representative Profile

Blackthorn

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 3 inches—very dark brown very gravelly loam

Subsurface layer:
3 to 6 inches—brown very gravelly sandy loam

Subsoil:
6 to 14 inches—light yellowish brown gravelly sandy loam
14 to 24 inches—yellowish brown very gravelly sandy loam
24 to 35 inches—strong brown very gravelly loam
35 to 75 inches—red and strong brown very gravelly clay
75 to 90 inches—red and strong brown clay

Pecktonville

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 3 inches—very dark grayish brown very gravelly loam

Subsurface layer:
3 to 7 inches—yellowish brown gravelly loam

Subsoil:
7 to 12 inches—strong brown silt loam
12 to 17 inches—yellowish red gravelly silty clay loam
17 to 32 inches—yellowish red, strong brown, and brownish yellow gravelly clay
32 to 48 inches—yellowish red, red, and brownish yellow gravelly clay
48 to 62 inches—yellowish red, red, and brownish yellow gravelly clay that has pinkish gray mottles
62 to 65 inches—red clay

Soil Properties and Qualities

Blackthorn

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour) in the upper part of the subsoil and moderately slow (0.2 to 0.6 inch per hour) in the lower part of the subsoil
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the lower part of the subsoil
Erosion hazard: Very severe
Stoniness: 3 to 15 percent of the surface covered with stones and boulders
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0) in the surface layer and upper part of the subsoil and very strongly acid or strongly acid (pH 4.5 to 5.5 percent) in the lower part of the subsoil
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches

Pecktonville

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour) in the upper part of the subsoil and slow or moderately slow (0.06 to 0.6 inch per hour) in the lower part of the subsoil
Available water capacity: Moderate or high
Depth to the seasonal high water table: 3.5 to 6.0 feet
Flooding: None
Shrink-swell potential: High in the lower part of the subsoil
Erosion hazard: Very severe
Stoniness: 3 to 15 percent of the surface covered with stones and boulders
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches
Bedrock type: Siliceous limestone that has a fairly high content of sandstone and chert

Minor Components

Dissimilar inclusions:
- The moderately deep Caneyville and Berks soils and the shallow Weikert soils, which are in convex areas of the landscape
- The very deep Buchanan soils, which are on concave footslopes
- Areas of rock outcrop

Similar soils:
- Rubbly or extremely bouldery soils
- Soils that have slopes of less than 35 percent or more than 45 percent

• Soils that have less than 3 percent of their surface covered with stones

Use and Management

Uses: Nearly all areas of the Blackthorn and Pecktonville soils are wooded.

Cropland

Suitability: Not suited
Management concerns:
• The stones on the surface of the soils and the slope make cultivation impractical.

Pasture and Hayland

Suitability: Not suited for hay; difficult to manage for pasture
Management concerns:
• Because of the slope and the stones on the surface of the soils, it is difficult to operate conventional equipment used in clipping and in applying fertilizer.
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a severe hazard on logging roads and skid trails.
• Operating logging equipment is hazardous because of the very steep slope.
• Competition from weeds may slow the growth of planted tree seedlings.
• Seedling mortality may be a problem on south aspects because of the droughtiness during the summer.
• The stones and chert fragments in the surface layer may interfere with the planting of tree seedlings.
Management measures:
• Logging roads should be designed so that they conform to the topography.
• The hazard of erosion can be reduced by seeding logging roads, log landings, and areas that have been cut and filled and by installing water bars and culverts.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Drought-tolerant species, such as white pine, Scotch pine, and Norway spruce, should be selected for planting on south aspects.

Community Development

Suitability: Not suited
Management concerns:
• Because of the very steep slope, these soils are unsuited to building site development, septic tank absorption fields, and local roads and streets. A better suited soil should be selected for development.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: Blackthorn—4R; Pecktonville—4R

BuB—Buchanan gravelly loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, slightly concave mountain footslopes and toeslopes.

Composition

Buchanan soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 8 inches—dark brown gravelly loam

Subsoil:
8 to 10 inches—yellowish brown gravelly loam
10 to 20 inches—yellowish brown gravelly loam
20 to 32 inches—yellowish brown gravelly clay loam that has light brownish gray mottles
32 to 42 inches—light brown, very firm and brittle very gravelly loam that has light gray and strong brown mottles
42 to 65 inches—strong brown, very firm and brittle very gravelly clay loam that has light brown and strong brown mottles

Soil Properties and Qualities

Drainage class: Moderately well drained; common seepy spots during wet periods in winter and spring

Permeability: Moderate (0.6 inch to 2.0 inches per hour) above the firm layer in the subsoil and slow (0.06 to 0.2 inch per hour) in the firm layer
Available water capacity: Very low to moderate
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Natural fertility: Low or medium
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• Small areas of the moderately deep, well drained Berks soils
• Small areas of the well drained Murrill soils
• Poorly drained soils, which are in depressions
• Soils that do not have a firm and brittle layer in their subsoil
Similar soils:
• Soils that have stones on the surface
• Soils that have a surface layer of sandy loam
• Soils that have slopes of less than 3 percent or more than 8 percent

Use and Management

Uses: About one-half of the acreage of the Buchanan soil is wooded. Most of the cleared areas are used for pasture or hay. A few small areas are used for cultivated crops or as sites for community development.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• The seasonal high water table and the firm layer in the subsoil may restrict the rooting depth of some crops.
• Erosion is a moderate hazard in unprotected areas.
• Because of the restricted rooting depth, crops may be adversely affected by a shortage of water as the soil dries out in summer.
• The wetness may delay planting in the spring.
Management measures:
• Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture in summer.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• Grazing early in spring when the soil is soft and wet can damage the sod.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Restricted grazing during wet periods helps to minimize compaction and maintain tilth.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
• The use of equipment is restricted during wet periods because this soil is soft when wet.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The seasonal high water table is the main limitation affecting building site development and septic tank absorption fields.
• The seasonal high water table and the potential for frost action are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.

• The wetness is a limitation affecting excavation and trafficability and may delay construction in winter and spring.
• Erosion is a moderate hazard on construction sites.
Management measures:
• The included well drained soils, which are better suited to buildings and septic tank absorption fields than the Buchanan soil, should be selected for development.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Installing tile drainage lines upslope from absorption fields can be effective in lowering the seasonal high water table.
• Enlarging septic tank absorption fields, installing alternating absorption fields, installing distribution lines on the contour, and backfilling lines with gravel help to overcome the restricted permeability in the lower part of the subsoil.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness and frost action.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 4A

BuC—Buchanan gravelly loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, slightly concave mountain footslopes and toeslopes.

Composition

Buchanan soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 6 inches—brown gravelly loam

Subsoil:
6 to 10 inches—olive brown gravelly loam
10 to 21 inches—yellowish brown gravelly loam
21 to 48 inches—yellowish brown, firm and brittle gravelly loam that has light brownish gray and strong brown mottles
48 to 65 inches—strong brown, very firm and brittle gravelly loam that has light brownish gray and reddish brown mottles

Soil Properties and Qualities

Drainage class: Moderately well drained; seepy spots common during wet periods in winter and spring
Permeability: Moderate (0.6 inch to 2.0 inches per hour) above the firm layer in the subsoil and slow (0.06 to 0.2 inch per hour) in the firm layer
Available water capacity: Very low to moderate
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Natural fertility: Low or medium
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• Poorly drained soils, which are in depressions
• Small areas of the moderately deep Berks soils
• Small areas of the well drained Murrill soils
• Soils that do not have a very firm and brittle layer in the subsoil
Similar soils:
• Soils that have slopes of less than 8 percent or more than 15 percent
• Soils that have stones on the surface

Use and Management

Uses: Most areas of the Buchanan soil are used as woodland. Some areas are used for cultivated crops or for hay and pasture. A few small areas are used as sites for community development.

Cropland

Suitability: Suited
Management concerns:
• The seasonal high water table and the firm layer in the subsoil may restrict the rooting depth of some crops.
• Erosion is a severe hazard in unprotected areas.
• Because of the restricted rooting depth, some crops may be adversely affected by a shortage of water as the soil dries out in summer.
• The wetness may delay planting in the spring.

Management measures:
• Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Leaving crop residue on the surface and adding other organic material help to conserve moisture in summer.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• Because this soil is soft when wet, grazing early in spring can damage the sod.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Restricted grazing during wet periods helps to minimize compaction and maintain tilth.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
• The use of equipment is restricted during wet periods because this soil is soft when wet.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The seasonal high water table is the main limitation affecting building site development and septic tank absorption fields.
• The slope increases the extent of excavation required during the construction of roads and buildings.
• The seasonal high water table and the potential for frost action are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in winter and spring.
• Erosion is a severe hazard on construction sites.
Management measures:
• The included well drained soils, which are better suited to buildings and septic tank absorption fields than the Buchanan soil, should be selected for development.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Installing tile drainage lines upslope from absorption fields can be effective in lowering the seasonal high water table.
• Enlarging septic tank absorption fields, installing alternating absorption fields, installing distribution lines on the contour, and backfilling lines with gravel help to overcome the restricted permeability in the lower part of the subsoil.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness and frost action.
• Roads and streets should be built on the contour.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 4A

BxC—Buchanan loam, 3 to 15 percent slopes, extremely stony

Setting

This soil is on gently sloping or strongly sloping, slightly concave mountain footslopes and toeslopes. Seeps and springs are common in some areas.

Composition

Buchanan soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 2 inches—very dark gray loam

Subsurface layer:
2 to 4 inches—light yellowish brown loam

Subsoil:
4 to 13 inches—brownish yellow gravelly loam
13 to 21 inches—light yellowish brown gravelly loam that has strong brown mottles
21 to 30 inches—strong brown gravelly loam that has yellowish red, pale brown, and light brownish gray mottles
30 to 49 inches—strong brown, firm and brittle gravelly loam that has brownish yellow, light brownish gray, and dark red mottles

Underlying material:
49 to 65 inches—reddish brown, very firm and brittle gravelly loam that has gray and red mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour) above the firm or very firm layer in the subsoil and slow (0.06 to 0.2 inch per hour) in the firm or very firm layer
Available water capacity: Low or moderate
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate or severe
Stoniness: 3 to 15 percent of the surface covered with stones and boulders
Rockiness: None
Natural fertility: Low or medium
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Medium or rapid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• Small areas of the poorly drained Atkins soils, the moderately well drained Philo soils, and the well drained Pope soils, which are along narrow drainageways
• Very rubbly soils that have more than 50 percent of their surface covered with stones and boulders; mainly on the footslopes of Sleepy Creek and Third Hill Mountains
• Small areas of soils that are not stony
• Soils that do not have a firm or very firm and brittle layer in the subsoil

Similar soils:
• Rubbly soils that have 15 to 50 percent of their surface covered with stones and boulders
• Soils that have slopes of less than 3 percent or more than 15 percent

Use and Management

Uses: Most areas of the Buchanan soil are wooded. A few small areas are used as pasture.

Cropland

Suitability: Not suited
Management concerns:
• The stones and boulders on the surface of the soil make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hayland; difficult to manage for pasture; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a moderate or severe hazard in areas where the plant cover has been destroyed.
• Because this soil is soft when wet, grazing early in spring damages the sod.
• Because of the slope and the stones on the surface of the soil, it is difficult to operate conventional equipment used in clipping and in applying fertilizer.

Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Restricted grazing during wet periods helps to minimize compaction and maintain tilth.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high

Management concerns:
• The large stones on the surface of the soil can hinder harvesting operations and damage equipment.
• The use of equipment is restricted during wet periods because this soil is soft when wet.
• Plant competition is moderate if openings are made in the canopy.
• The stones and boulders on the surface of the soil may interfere with the planting of tree seedlings.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled; and installing water bars and culverts.

Community Development

Suitability: Poorly suited
Management concerns:
• The seasonal high water table is the main limitation affecting building site development, septic tank absorption fields, and local roads and streets.
• The slow permeability in the lower part of the subsoil is a severe limitation on sites for septic tank absorption fields.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in winter and spring.
• Water may seep from cutbanks during wet periods.
• The slope and the potential for frost action are limitations on sites for local roads and streets.
• The wetness is an additional limitation on sites for local roads and streets. Because this soil is soft when wet, pavement cracks under heavy loads.
• The stones and boulders may interfere with construction, with the establishment of lawns, and with landscaping.
• Erosion is a moderate or severe hazard in unprotected areas on construction sites.
Management measures:
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Installing tile drainage lines upslope from septic tank absorption fields can be effective in lowering the seasonal high water table.
• Enlarging septic tank absorption fields, installing alternating absorption fields, installing distribution lines on the contour, and backfilling lines with gravel help to overcome the restricted permeability in the lower part of the subsoil.
• Roads and streets should be built on the contour.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness and frost action.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: 4X

BxE—Buchanan loam, 15 to 35 percent slopes, extremely stony

Setting

This soil is on moderately steep or steep, slightly concave mountain benches, footslopes, and toeslopes. Seeps and springs are common in some areas.

Composition

Buchanan soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 2 inches—very dark gray loam

Subsurface layer:
2 to 4 inches—light yellowish brown loam

Subsoil:
4 to 13 inches—brownish yellow gravelly loam
13 to 21 inches—light yellowish brown gravelly loam that has strong brown mottles
21 to 30 inches—strong brown gravelly loam that has yellowish red, pale brown, and light brownish gray mottles
30 to 49 inches—strong brown, firm and brittle gravelly loam that has brownish yellow, light brownish gray, and dark red mottles
49 to 65 inches—reddish brown, very firm and brittle gravelly loam that has gray and red mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour) above the firm or very firm layer in the

subsoil and slow (0.06 to 0.2 inch per hour) in the firm or very firm layer
Available water capacity: Low or moderate
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe or very severe
Stoniness: 3 to 15 percent of the surface covered with stones and boulders
Rockiness: None
Natural fertility: Low or medium
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Rapid or very rapid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• Small areas of the moderately deep Berks and Dekalb soils and the shallow Weikert soils, which are on adjacent convex hillsides
• Very rubbly soils that have more than 50 percent of their surface covered with stones and boulders; mainly on the footslopes of Sleepy Creek and Third Hill Mountains
• Small areas of the well drained Hazleton soils
• Soils that do not have a firm or very firm and brittle layer in the subsoil
Similar soils:
• Rubbly soils that have 15 to 50 percent of their surface covered with stones and boulders
• Soils that have slopes of less than 15 percent or more than 35 percent
• Soils that are not stony

Use and Management

Uses: Most areas of the Buchanan soil are used as woodland. A few small areas are used as pasture.

Cropland

Suitability: Not suited
Management concerns:
• The slope and the stones and boulders on the surface of the soil make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hayland; difficult to manage for pasture; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe or very severe hazard in areas where the plant cover has been destroyed.
• Because this soil is soft when wet, grazing early in spring damages the sod.
• Because of the slope and the stones on the surface of the soil, it is difficult to operate conventional equipment used in clipping and in applying fertilizer.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Restricted grazing during wet periods helps to minimize compaction and maintain tilth.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The large stones on the surface of the soil can hinder harvesting operations and damage equipment.
• The use of equipment is restricted during wet periods because this soil is soft when wet.
• Plant competition is moderate if openings are made in the canopy.
• The stones and boulders on the surface may interfere with the planting of tree seedlings.
Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled; and installing water bars and culverts.

Community Development

Suitability: Poorly suited
Management concerns:
• The slope and the seasonal high water table are the main limitations affecting building site development, septic tank absorption fields, and local roads and streets.
• The slow permeability in the lower part of the subsoil is a severe limitation on sites for septic tank absorption fields.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in winter and spring.
• Water may seep from cutbanks during wet periods.

• The potential for frost action is a limitation on sites for local roads and streets.
• The wetness is an additional limitation on sites for local roads and streets. Because this soil is soft when wet, pavement cracks under heavy loads.
• The stones and boulders may interfere with construction, with the establishment of lawns, and with landscaping.
• Erosion is a severe hazard in unprotected areas on construction sites.

Management measures:
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings should be designed so that they conform to the natural slope of the land. Extensive land shaping is necessary in most areas.
• Installing tile drainage lines upslope from septic tank absorption fields can be effective in lowering the seasonal high water table.
• Enlarging septic tank absorption fields, installing alternating absorption fields, installing distribution lines on the contour, and backfilling lines with gravel help to overcome the restricted permeability in the lower part of the subsoil.
• Roads and streets should be built on the contour.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness and frost action.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: 4X

CaB—Calvin channery loam, 3 to 8 percent slopes

Setting

This soil is on convex, dissected uplands, mainly on gently sloping, low ridges in the western part of the county.

Composition

Calvin soil and similar soils: 95 percent
Dissimilar inclusions: 5 percent

Representative Profile

Surface layer:
0 to 8 inches—reddish brown channery loam

Subsoil:
8 to 24 inches—yellowish red very channery silt loam
24 to 30 inches—yellowish red very channery loam
30 to 34 inches—reddish brown very channery loam

Underlying material:
34 to 35 inches—reddish brown extremely channery loam

Bedrock:
35 inches—dusky red, fractured shale

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Low or moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Reddish shale, fine grained sandstone, or siltstone; interbedded in some areas

Minor Components

Dissimilar inclusions:
• The somewhat excessively drained Dekalb soils, which are underlain by hard, gray sandstone
• Moderately well drained soils, which are on head slopes
• Severely eroded soils

Similar soils:
• Soils that are less than 20 inches deep over bedrock
• The moderately deep Berks soils and the shallow Weikert soils that are yellowish brown in the subsoil
• Soils that have slopes of less than 3 percent
• Soils that have slopes ranging from 8 to 15 percent
• Stony soils
• Soils in which the subsoil has a fine-earth texture of sandy loam
• Soils that have a lower content of rock fragments throughout the profile than is typical for the Calvin soil

Use and Management

Uses: Most areas of the Calvin soil are wooded. Some areas have been cleared and are used for pasture or hay. A few small areas are used for cultivated crops or orchards or as sites for community development.

Cropland

Suitability: Suited
Management concerns:
• The hazard of erosion is moderate in unprotected areas.
• Droughtiness during the growing season and the low natural fertility are management concerns.
Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
• A system of conservation tillage that leaves crop residue on the surface helps to conserve soil moisture.
• Applying lime and fertilizer according to the results of soil tests helps to ensure maximum production.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• The droughtiness limits forage production during midsummer.
• Water for livestock is scarce, but potential sites where ponds or springs can be developed generally are available along nearby drainageways.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Seedling mortality is a management concern because of the droughtiness.
• Competition from weeds may slow the growth of planted tree seedlings.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.

Community Development

Suitability: Limited
Management concerns:
• The bedrock may interfere with excavations for roads and foundations. In most areas, however, it is soft enough to be excavated with conventional earthmoving equipment.
• The bedrock may interfere with the proper functioning of septic tank absorption fields on some sites.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• Establishing and maintaining vegetation on roadbanks is difficult on this droughty soil, especially on south aspects.
• The hazard of erosion is moderate on construction sites.
Management measures:
• Selecting the deepest areas of this soil as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 4F

CaC—Calvin channery loam, 8 to 15 percent slopes

Setting

This soil is on convex, dissected uplands, mainly on strongly sloping hillsides and low ridges in the western part of the county.

Composition

Calvin soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Surface layer:
0 to 8 inches—reddish brown channery loam

Subsoil:
8 to 24 inches—yellowish red very channery silt loam
24 to 30 inches—yellowish red very channery loam
30 to 34 inches—reddish brown very channery loam

Underlying material:
34 to 35 inches—reddish brown extremely channery loam

Bedrock:
35 inches—fractured, dusky red shale

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Low or moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Reddish shale, fine grained sandstone, or siltstone; interbedded in some areas

Minor Components

Dissimilar inclusions:
- The somewhat excessively drained Dekalb soils, which are underlain by hard, gray sandstone
- The moderately well drained Buchanan soils
- Moderately well drained to poorly drained soils, which are on head slopes and along intermittent drainageways

Similar soils:
- Soils that are less than 20 inches deep over bedrock
- The moderately deep Berks soils and the shallow Weikert soils that are yellowish brown in the subsoil
- Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent
- Soils that have a lower content of rock fragments throughout the profile than is typical for the Calvin soil
- Stony soils

Use and Management

Uses: Most areas of the Calvin soil are wooded. Some have been cleared and are used for pasture or hay. A few small areas are used for cultivated crops or orchards or as sites for community development.

Cropland

Suitability: Suited
Management concerns:
- The erosion hazard is severe in unprotected areas.
- Droughtiness during the growing season and the low natural fertility are management concerns.

Management measures:
- Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
- Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
- A system of conservation tillage that leaves crop residue on the surface conserves soil moisture.
- Applying lime and fertilizer according to the results of soil tests helps to ensure maximum production.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- The droughtiness limits forage production during midsummer.
- Water for livestock is scarce, but potential sites where ponds or springs can be developed generally are available along nearby drainageways.

Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Seedling mortality is a management concern because of the droughtiness.
• Competition from weeds may slow the growth of planted tree seedlings.
• Erosion is a hazard on logging roads and skid trails.
Management measures:
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.

Community Development

Suitability: Limited
Management concerns:
• The bedrock may interfere with excavations for roads and foundations. In most areas, however, it is soft enough to be excavated with conventional earthmoving equipment.
• The bedrock may interfere with the proper functioning of septic tank absorption fields on some sites.
• The slope is a moderate limitation affecting building site development.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• Establishing and maintaining vegetation on roadbanks is difficult on this droughty soil, especially on south aspects.
• The erosion hazard is severe on construction sites.
Management measures:
• Selecting the deepest areas of this soil as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 4F

CaD—Calvin channery loam, 15 to 25 percent slopes

Setting

This soil is on convex, dissected uplands, mainly on moderately steep hillsides and ridges in the western part of the county.

Composition

Calvin soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 6 inches—reddish brown channery loam

Subsoil:
6 to 24 inches—yellowish red very channery silt loam
24 to 30 inches—yellowish red very channery loam
30 to 34 inches—reddish brown very channery loam

Underlying material:
34 to 35 inches—reddish brown extremely channery loam

Bedrock:
34 inches—dusky red, weathered shale

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Low or moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low

Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Reddish shale, fine grained sandstone, or siltstone; interbedded in some areas

Minor Components

Dissimilar inclusions:
- The somewhat excessively drained Dekalb soils, which are underlain by hard, gray sandstone
- The moderately well drained Buchanan soil, which are on footslopes and head slopes
- The moderately well drained Philo soils and the poorly drained Atkins soils, which are along drainageways

Similar soils:
- Soils that are less than 20 inches deep over bedrock
- The moderately deep Berks soils and the shallow Weikert soils that are yellowish brown in the subsoil
- Soils that have slopes ranging from 8 to 15 percent or from 25 to 35 percent
- Stony soils

Use and Management

Uses: Most areas of the Calvin soil are wooded. A few small areas have been cleared and are used for pasture, hay, cultivated crops, or orchards.

Cropland

Suitability: Poorly suited; better suited to hay and pasture because of the hazard of erosion
Management concerns:
- The hazard of erosion is severe in unprotected areas.
- Droughtiness during the growing season and the low natural fertility are management concerns.

Management measures:
- Conservation tillage, contour farming, contour stripcropping, cover crops, a cropping system that includes grasses and legumes, and crop residue management help to control erosion and to maintain fertility and tilth.
- Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
- A system of conservation tillage that leaves crop residue on the surface conserves soil moisture.
- Applying lime and fertilizer according to the results of soil tests helps to ensure maximum production.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- If pastures are overgrazed, erosion is a severe hazard where the plant cover has been destroyed.
- The droughtiness limits forage production during midsummer.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate on south aspects; moderately high on north aspects
Management concerns:
- Because this soil is droughty, seedling mortality is a management concern, especially on south aspects.
- Competition from weeds may slow the growth of planted tree seedlings.
- Erosion is a hazard on logging roads and skid trails.

Management measures:
- Planting should be timed so that seedlings can take full advantage of spring rains.
- Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
- Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
- The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.

Community Development

Suitability: Poorly suited
Management concerns:
- The slope is a severe limitation affecting building site development. This soil is poorly suited to buildings and to local roads and streets unless extensive land shaping is done.
- The bedrock may interfere with excavations for

roads and foundations. In most areas, however, it is soft enough to be excavated with conventional earthmoving equipment.
• The bedrock may interfere with the proper functioning of septic tank absorption fields on some sites.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• Establishing and maintaining vegetation on roadbanks is difficult on this droughty soil, especially on south aspects.
• The hazard of erosion is severe on construction sites.
Management measures:
• Selecting the deepest areas of this soil as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock and the slope.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: 3R on south aspects; 4R on north aspects

CaE—Calvin channery loam, 25 to 35 percent slopes

Setting

This soil is on convex, dissected uplands, mainly on steep hillsides in the western part of the county.

Composition

Calvin soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 2 inches—very dark brown channery loam

Subsoil:
2 to 8 inches—reddish brown very channery loam
8 to 23 inches—reddish brown very channery loam

Underlying material:
23 to 34 inches—reddish brown extremely channery loam

Bedrock:
34 inches—fractured, reddish brown, fine grained sandstone

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Low or moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Reddish, fine grained sandstone; interbedded with siltstone in some areas

Minor Components

Dissimilar inclusions:
• The somewhat excessively drained Dekalb soils, which are underlain by hard, gray sandstone
• The moderately well drained Buchanan soils, which are on footslopes and head slopes
• The moderately well drained Philo soils and the poorly drained Atkins soils, which are along drainageways
• Extremely stony soils
Similar soils:
• Soils that are less than 20 inches deep over bedrock
• The moderately deep Berks soils and the shallow Weikert soils that are yellowish brown in the subsoil
• Soils that have slopes ranging from 15 to 25 percent
• Soils that have slopes of more than 35 percent
• Soils that have a lower content of rock fragments throughout the profile than is typical for the Calvin soil

Use and Management

Uses: Most areas of the Calvin soil are wooded. A few small areas are used as pasture.

Cropland

Suitability: Not suited
Management concerns:
• This soil is unsuited to cultivated crops because of the steep slope, the very severe hazard of erosion, droughtiness, and the low fertility level.

Pasture and Hayland

Suitability: Not suited to hay; difficult to manage for pasture
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
• If pastures are overgrazed, erosion is a very severe hazard in areas where the plant cover has been destroyed.
• The droughtiness limits forage production during midsummer.
• Because of the slope, it is difficult to safely operate conventional equipment used in clipping and in applying fertilizer.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate on south aspects; moderately high on north aspects
Management concerns:
• Because the soil is droughty, seedling mortality is a management concern, especially on south aspects.
• Competition from weeds may slow the growth of planted tree seedlings.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.

Community Development

Suitability: Poorly suited
Management concerns:
• The steep slope and the depth to bedrock are the main limitations affecting community development.
• Because of the slope, this soil is generally unsuited to building site development.
• Because of the slope and the depth to bedrock, this soil is generally unsuited to septic tank absorption fields.
• The hazard of erosion is very severe on construction sites.
Management measures:
• A better suited soil should be selected for development.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIIe
Woodland ordination symbol: 3R on south aspects; 4R on north aspects

CaF—Calvin channery loam, 35 to 65 percent slopes

Setting

This soil is on convex, dissected uplands, mainly on very steep hillsides in the western part of the county.

Composition

Calvin soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

Surface layer:
0 to 2 inches—very dark brown channery loam

Subsoil:
2 to 8 inches—reddish brown very channery loam
8 to 23 inches—reddish brown very channery loam

Underlying material:
23 to 34 inches—reddish brown extremely channery loam

Bedrock:
34 inches—fractured, reddish brown, fine grained sandstone

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Very low to moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Reddish, fine grained sandstone; interbedded with siltstone in some areas

Minor Components

Dissimilar inclusions:
- The somewhat excessively drained Dekalb soils, which are underlain by hard, gray sandstone
- The very deep Hazleton soils, which are on concave hillsides
- The moderately well drained Buchanan soils, which are on footslopes and benches
- The moderately well drained Philo soils and the poorly drained Atkins soils, which are along drainageways
- Extremely stony soils

Similar soils:
- Soils that are less than 20 inches deep over bedrock
- The moderately deep Berks soils and the shallow Weikert soils that are yellowish brown in the subsoil
- Soils that have slopes ranging from 25 to 35 percent
- Soils that have slopes of more than 65 percent
- Soils that have a lower content of rock fragments throughout the profile than is typical for the Calvin soil

Use and Management

Uses: Nearly all areas of the Calvin soil are wooded.

Cropland

Suitability: Not suited
Management concerns:
- The very steep slope and the very severe hazard of erosion make tillage unsafe and impractical.

Pasture and Hayland

Suitability: Not suited to hay; difficult to manage for pasture
Management concerns:
- Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
- If pastures are overgrazed, erosion is a very severe hazard in areas where the plant cover has been destroyed.
- Droughtiness limits forage production during midsummer.
- Because of the very steep slope, it is difficult to safely operate conventional equipment used in clipping and in applying fertilizer.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderate on south aspects; moderately high on north aspects
Management concerns:
- Because of the very steep slope, special care should be taken when logging roads and log landings are laid out.
- Operating logging equipment is hazardous because of the very steep slope.
- Erosion is a management concern on logging roads and skid trails.
- Because this soil is droughty, seedling mortality is a management concern, especially on south aspects.
- Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
- Cable yarding generally is safer than other logging methods and causes less surface disturbance.
- Because of the erosion hazard, water should be removed from logging roads by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid trails, and log landings after the trees are logged also help to prevent excessive erosion.
- Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
- Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

• Planting should be timed so that seedlings can take full advantage of spring rains.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
• The very steep slope and the depth to bedrock are the main limitations affecting community development.
• Because of the very steep slope, this soil is unsuited to building site development.
• Because of the slope and the depth to bedrock, this soil is unsuited to septic tank absorption fields.
• The hazard of erosion is very severe on construction sites.
Management measures:
• A better suited soil should be selected for development.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIIe
Woodland ordination symbol: 3R on south aspects; 4R on north aspects

CbB—Caneyville silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, slightly convex uplands underlain by limestone. It is in an oblong band from Ferrel Ridge south to Jones Springs in the western part of the county.

Composition

Caneyville soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Surface layer:
0 to 7 inches—brown silt loam

Subsoil:
7 to 15 inches—yellowish red silty clay
15 to 22 inches—yellowish red clay that has coarse yellowish brown pockets

Underlying material:
22 to 24 inches—strong brown and dark yellowish brown clay

Bedrock:
24 inches—grayish limestone

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch per hour)
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) in the surface layer and the upper part of the subsoil and moderately acid to slightly alkaline (pH 5.6 to 7.8) in the lower part of the subsoil and in the underlying material
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Limestone interbedded with thin layers of shale and siltstone

Minor Components

Dissimilar inclusions:
• Small areas of the very deep Pecktonville soils
• Moderately well drained soils
• Areas of limestone rock outcrop
• Very shallow soils that are less than 10 inches deep over bedrock
• Severely eroded soils that have a surface layer of silty clay loam or silty clay
Similar soils:
• The shallow Opequon soils
• The deep Endcav soils
• The moderately deep Carbo soils
• Soils that have slopes of less than 3 percent
• Soils that have slopes ranging from 8 to 15 percent
• Soils that have a channery or flaggy surface layer

Use and Management

Uses: Most areas of the Caneyville soil have been cleared and are used for cultivated crops, hay, or pasture. Some are used for orchards. A few areas have been developed for housing, and a few small areas are wooded.

Cropland

Suitability: Suited

Management concerns:
• The hazard of erosion is moderate in unprotected areas.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• This soil tends to be droughty during the growing season.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Manure should be stored in a properly designed storage facility.
• Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
• A system of conservation tillage that leaves crop residue on the surface helps to conserve soil moisture.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.
• The droughtiness limits forage production during midsummer.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.

Community Development

Suitability: Poorly suited
Management concerns:
• In many areas the nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines.
• The depth to bedrock and the slow permeability are severe limitations on sites for septic tank absorption fields.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The moderate shrink-swell potential is a limitation affecting the construction of buildings.
• Low strength is a severe limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• Erosion is a moderate hazard on construction sites.
Management measures:
• Selecting the deepest areas of this soil as sites for septic tank absorption fields, installing the absorption fields on the contour, pressurizing or enlarging the absorption fields, or installing alternating drainfields can help to overcome the limitations in absorption areas.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the limestone bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and

providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 4C

CcC—Caneyville silty clay loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex uplands underlain by limestone. It is in an oblong band from Ferrel Ridge south to Jones Springs in the western part of the county.

Composition

Caneyville soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 4 inches—dark grayish brown silty clay loam
4 to 8 inches—brown silty clay loam that has a few medium yellowish brown pockets

Subsoil:
8 to 16 inches—strong brown silty clay that has common fine to coarse yellowish brown mottles
16 to 28 inches—yellowish red silty clay

Bedrock:
28 inches—unweathered, grayish limestone

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch per hour)
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) in the surface layer and the upper part of the subsoil and moderately acid to slightly alkaline (pH 5.6 to 7.8) in the lower part of the subsoil
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Limestone interbedded with thin layers of shale and siltstone

Minor Components

Dissimilar inclusions:
• Small areas of the very deep Pecktonville and Blackthorn soils
• Moderately well drained soils
• Areas of limestone rock outcrop
• Severely eroded soils that have a surface layer of silty clay
Similar soils:
• The deep Endcav soils
• The shallow Opequon soils
• The moderately deep Carbo soils
• Soils that have a surface layer of silt loam
• Soils that have a channery surface layer
• Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent

Use and Management

Uses: Many areas of the Caneyville soil have been cleared and are used for pasture or hay. A few areas are used for cultivated crops or orchards. Some areas have been developed as homesites, and some are wooded.

Cropland

Suitability: Suited
Management concerns:
• The hazard of erosion is severe in unprotected areas.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• This soil tends to be droughty during the growing season.
• In some areas limestone channers may interfere with tillage.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

• Manure should be stored in a properly designed storage facility.
• Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
• A system of conservation tillage that leaves crop residue on the surface helps to conserve soil moisture.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• The droughtiness limits forage production during midsummer.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
• Seedling mortality may be a problem because of the droughtiness during the summer.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

Community Development

Suitability: Poorly suited
Management concerns:
• In many areas nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines.
• The depth to bedrock and the slow permeability are severe limitations on sites for septic tank absorption fields.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The moderate shrink-swell potential is a limitation affecting the construction of buildings.
• Low strength is a severe limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• Erosion is a severe hazard on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Selecting the deepest areas of this soil as sites for septic tank absorption fields, installing the absorption fields on the contour, pressurizing or enlarging the absorption fields, or installing alternating drainfields can help to overcome the limitations in absorption areas.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the limestone bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: 4C

CcD—Caneyville silty clay loam, 15 to 25 percent slopes

Setting

This soil is on moderately steep, convex uplands underlain by limestone. It is in an oblong band from Ferrel Ridge south to Jones Springs in the western part of the county.

Composition

Caneyville soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 2 inches—dark grayish brown silty clay loam
2 to 6 inches—brown silty clay loam that has a few medium yellowish brown pockets

Subsoil:
6 to 14 inches—strong brown silty clay that has common fine to coarse yellowish brown mottles
14 to 26 inches—yellowish red silty clay

Bedrock:
26 inches—unweathered, grayish limestone

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately slow (0.2 to 0.6 inch per hour)
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) in the surface layer and the upper part of the subsoil and moderately acid to slightly alkaline (pH 5.6 to 7.8) in the lower part of the subsoil
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Limestone interbedded with thin layers of shale and siltstone

Minor Components

Dissimilar inclusions:
- Small areas of the very deep Pecktonville and Blackthorn soils
- Moderately well drained soils
- Areas of limestone rock outcrop
- Severely eroded soils that have a surface layer of silty clay

Similar soils:
- The shallow Opequon soils
- The deep Endcav soils
- The moderately deep Carbo soils
- Soils that have a surface layer of silt loam
- Soils that have a channery surface layer
- Soils that have slopes ranging from 8 to 15 percent or from 25 to 35 percent

Use and Management

Uses: Most areas of the Caneyville soil have been cleared and are used as pasture or woodland. A few areas are used for orchards, and a few have been developed as homesites.

Cropland

Suitability: Not suited
Management concerns:
- Because of the slope and the severe hazard of erosion, this soil is generally unsuited to cultivated crops.

Pasture and Hayland

Suitability: Not suited to hay; suited to pasture
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- Droughtiness limits forage production during midsummer.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate on south aspects; moderately high on north aspects
Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
- Because of the droughtiness during the summer, seedling mortality may be a problem, especially on south aspects.

Management measures:
- The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding

logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• Drought-tolerant species, such as white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Tree plantations should be on north-facing slopes where possible.

Community Development

Suitability: Poorly suited
Management concerns:
• Because of the slope, this soil is poorly suited to buildings and to local roads and streets unless extensive land shaping is done.
• In many areas nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines.
• The depth to bedrock, the slow permeability, and the slope are severe limitations on sites for septic tank absorption fields.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The moderate shrink-swell potential is a limitation affecting the construction of buildings.
• Low strength is a severe limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• Erosion is a severe hazard on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Selecting the deepest areas of this soil as sites for septic tank absorption fields, installing the absorption fields on the contour, pressurizing or enlarging the absorption fields, or installing alternating drainfields can help to overcome the limitations in absorption areas.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the limestone bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIe
Woodland ordination symbol: 3R on south aspects; 4R on north aspects

CeB—Carbo-Endcav silty clay loams, 3 to 8 percent slopes

Setting

These soils are on gently sloping, slightly convex limestone upland ridges and hillsides that are shallowly dissected by intermittent drainageways. They are in the Great Valley. Sinkholes occur in some areas. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Carbo soil and similar soils: 45 percent
Endcav soil and similar soils: 40 percent
Dissimilar inclusions: 15 percent

Representative Profile

Carbo

Surface layer:
0 to 2 inches—dark yellowish brown silty clay loam
2 to 9 inches—silty clay that has medium strong brown pockets

Subsoil:
9 to 18 inches—variegated strong brown and yellowish brown clay
18 to 28 inches—variegated yellowish brown and strong brown clay
28 to 34 inches—variegated dark yellowish brown, strong brown, and yellowish brown clay

Bedrock:
34 inches—hard limestone

Endcav

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

Subsoil:
8 to 23 inches—strong brown clay

23 to 41 inches—strong brown clay that has coarse pockets of yellowish brown loam around weathered limestone channers

Bedrock:
41 inches—weathered limestone

Soil Properties and Qualities

Carbo

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Limestone

Endcav

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Medium
Depth to bedrock: 40 to 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
- The very deep Hagerstown soils
- The very deep Funkstown soils, which are subject to flooding and ponding and are along intermittent drainageways
- The moderately well drained Swanpond soils
- Severely eroded soils that have a surface layer of silty clay or clay
- Areas of rock outcrop

Similar soils:
- The shallow Opequon soils
- Soils that have slopes of less than 3 percent
- Soils that have slopes ranging from 8 to 15 percent

Use and Management

Uses: Most areas of this map unit have been cleared and are used for pasture or hay. A few areas are used for cultivated crops. Some areas are used as sites for community development. In a few areas, the acreage is idle land or the soils are wooded.

Cropland

Suitability: Suited
Management concerns:
- The hazard of erosion is moderate in unprotected areas.
- The high clay content in the surface layer makes tillage difficult and soil compaction a problem.
- Limestone rock outcrop may limit the direction of tillage in some areas.
- Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Returning crop residue to the soil, adding other organic material, and including grasses and legumes in the cropping sequence help to improve soil structure, increase the rate of water infiltration, and overcome the restricted permeability of the soils.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

Pasture and Hayland

Suitability: Suited

Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Operating logging equipment during wet periods when the soils are soft and sticky results in excessive rutting.
• Competition from weeds may slow the growth of planted tree seedlings.
• Seedling mortality may be a problem because of droughtiness during the summer.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails to perennial grasses and legumes when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

Community Development

Suitability: Poorly suited
Management concerns:
• The depth to bedrock and the slow permeability are severe limitations on sites for septic tank absorption fields.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The high shrink-swell potential in the subsoil is a limitation on sites for buildings if foundations and footers are improperly constructed.
• In many areas nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. Blasting may be necessary in some areas.
• Low strength and the high shrink-swell potential are severe limitations affecting the construction of roads. Because these soils are soft when wet, pavement cracks under heavy loads if roads are improperly constructed.
• Erosion is a moderate hazard on construction sites.
Management measures:
• Selecting the deepest areas of these soils as sites for septic tank absorption fields, installing the absorption fields on the contour, oversizing or pressurizing the absorption fields, or installing alternating drainfields can help to overcome the limitations in absorption areas.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: Carbo—4C; Endcav—5C

CeC—Carbo-Endcav silty clay loams, 8 to 15 percent slopes

Setting

These soils are on strongly sloping, convex limestone upland ridges and hillsides in the Great Valley. Sinkholes occur in some areas. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Carbo soil and similar soils: 55 percent
Endcav soil and similar soils: 35 percent
Dissimilar inclusions: 10 percent

Representative Profile

Carbo

Surface layer:
0 to 2 inches—dark yellowish brown silty clay loam
2 to 9 inches—silty clay that has medium strong brown pockets

Subsoil:
9 to 18 inches—variegated strong brown and yellowish brown clay
18 to 28 inches—variegated yellowish brown and strong brown clay
28 to 34 inches—variegated dark yellowish brown, strong brown, and yellowish brown clay

Bedrock:
34 inches—hard limestone

Endcav

Surface layer:
0 to 6 inches—brown silty clay loam

Subsoil:
6 to 23 inches—strong brown clay
23 to 41 inches—strong brown clay that has coarse pockets of yellowish brown loam around weathered limestone channers

Bedrock:
41 inches—weathered limestone

Soil Properties and Qualities

Carbo

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Limestone

Endcav

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
- The very deep Hagerstown soils
- The moderately well drained Swanpond soils
- Severely eroded soils that have a surface layer of silty clay or clay
- Areas of rock outcrop

Similar soils:
- The shallow Opequon soils
- Soils that have slopes ranging from 15 to 25 percent or from 3 to 8 percent

Use and Management

Uses: Most areas of the map unit have been cleared and are used for pasture or hay. A few areas are used for cultivated crops. Some areas are used as sites for community development. In a few areas, the acreage is idle land or the soils are wooded.

Cropland

Suitability: Limited; better suited to hay and pasture
Management concerns:
- The hazard of erosion is severe in unprotected areas.
- The high clay content in the surface layer makes tillage difficult and soil compaction a problem.
- Limestone rock outcrop may limit the direction of tillage in some areas.
- Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops,

and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Grassed waterways, diversions, and grade stabilization structures help to prevent gully erosion.
• Returning crop residue to the soil, adding other organic material, and including grasses and legumes in the cropping sequence help to improve soil structure, increase the rate of water infiltration, and overcome the restricted permeability of the soils.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Because the soils are soft and sticky when wet, operating logging equipment during wet periods results in excessive rutting.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails to perennial grasses and legumes when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The depth to bedrock and the slow permeability are severe limitations on sites for septic tank absorption fields.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The high shrink-swell potential in the subsoil is a limitation on building sites.
• In many areas nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. Blasting may be necessary in some areas.
• Low strength and the high shrink-swell potential are severe limitations affecting the construction of roads. Because these soils are soft when wet, pavement cracks under heavy loads if roads are improperly constructed.
• Erosion is a severe hazard on construction sites.
Management measures:
• Selecting the deepest areas of these soils as sites for septic tank absorption fields, installing the absorption fields on the contour, oversizing or pressurizing the absorption fields, or installing alternating drainfields can help to overcome the limitations in absorption areas.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: Carbo—4C; Endcav—5C

CgB—Carbo-Opequon complex, 3 to 8 percent slopes

Setting

These soils are on gently sloping limestone uplands in the eastern and central parts of the Great Valley. Sinkholes are common in some areas. The bedrock is steeply tilted under the soils, and soil depth may vary greatly within short distances. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Carbo soil and similar soils: 55 percent
Opequon soil and similar soils: 25 percent
Dissimilar inclusions: 20 percent

Representative Profile

Carbo

Surface layer:
0 to 2 inches—dark yellowish brown silty clay loam
2 to 9 inches—dark yellowish brown silty clay

Subsoil:
9 to 18 inches—variegated strong brown and yellowish brown clay
18 to 28 inches—variegated yellowish brown and strong brown clay
28 to 34 inches—variegated dark yellowish brown, strong brown, and yellowish brown clay

Bedrock:
34 inches—hard, bluish gray limestone

Opequon

Surface layer:
0 to 8 inches—dark yellowish brown silty clay

Subsoil:
8 to 14 inches—variegated yellowish brown and strong brown clay
14 to 17 inches—variegated yellowish brown and dark yellowish brown clay

Bedrock:
17 inches—hard, bluish gray limestone

Soil Properties and Qualities

Carbo

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Opequon

Drainage class: Well drained
Permeability: Moderately slow or moderate (0.2 inch to 2.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Medium
Depth to bedrock: 12 to 20 inches
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Minor Components

Dissimilar inclusions:
• The very deep Swanpond soils
• Severely eroded soils that have a surface layer of clay
• Areas of limestone rock outcrop
• Soils that are less than 12 inches deep over bedrock
Similar soils:
• The deep Endcav soils
• Soils that have slopes of less than 3 percent or more than 8 percent
• Soils that have a channery or flaggy surface layer

Use and Management

Uses: Most areas of this map unit are used as pasture. Some areas are used for cultivated crops. A few small areas are used as sites for community development or are wooded.

Cropland

Suitability: Suited
Management concerns:
• The hazard of erosion is moderate in unprotected areas.
• These soils are droughty during the growing season and generally have poor tilth.
• The limestone rock outcrop may limit the extent and direction of cultivation in some areas.
• In some areas rock fragments in the surface layer may interfere with tillage and planting.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Because of the droughtiness, these soils are better suited to early maturing small grain than to late maturing crops, such as corn.
• Leaving crop residue on the surface and adding other organic material help to improve tilth and conserve soil moisture.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• The droughtiness limits forage production during midsummer.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate or moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Operating logging equipment during wet periods when the soils are soft results in excessive rutting.
• Because of the droughtiness during the summer, seedling mortality may be a problem, especially in areas of the Opequon soil.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall, especially in areas of the Opequon soil.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails to perennial grasses and legumes when they are no longer used help to control erosion.
• Because of the sticky and plastic subsoil, logging roads should be graveled.
• Drought-tolerant species, such as white pine, Scotch pine, Virginia pine, and Norway spruce, should be selected for planting.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The depth to hard, nonrippable limestone bedrock and the high shrink-swell potential are the main

limitations affecting building site development, local roads and streets, and septic tank absorption fields.
• In most areas the bedrock has to be blasted before it can be excavated.
• Low strength is an additional limitation affecting the construction of roads. Because these soils are soft when wet, pavement cracks and buckles under heavy loads.
• The slow permeability and the depth to bedrock are severe limitations on sites for septic tank absorption fields.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• Establishing and maintaining vegetation on roadbanks is difficult on these droughty soils, especially on south aspects.
• The hard bedrock may interfere with landscaping in many areas.
• In some areas rock fragments in the surface layer may interfere with the establishment of lawns.
• Erosion is a moderate hazard on construction sites.

Management measures:
• Building on the bedrock and landscaping with additional fill may be preferable to excavating the bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Selecting deeper areas of the included soils as sites for septic tank absorption fields, installing the absorption fields on the contour, pressurizing or enlarging the absorption fields, or installing alternating drainfields can help to overcome the limitations in absorption areas.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks. Seeded areas should be mulched with straw.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: Carbo—4C; Opequon—3C

CgC—Carbo-Opequon complex, 8 to 15 percent slopes

Setting

These soils are on strongly sloping limestone upland ridges and hillsides in the eastern and central parts of the Great Valley. Sinkholes are common in some areas. The bedrock is steeply tilted under the soils, and the depth to bedrock may vary greatly within short distances. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Carbo soil and similar soils: 50 percent
Opequon soil and similar soils: 35 percent
Dissimilar inclusions: 15 percent

Representative Profile

Carbo

Surface layer:
0 to 2 inches—dark yellowish brown silty clay loam
2 to 7 inches—dark yellowish brown silty clay

Subsoil:
7 to 16 inches—variegated strong brown and yellowish brown clay
16 to 26 inches—variegated yellowish brown and strong brown clay
26 to 32 inches—variegated dark yellowish brown, strong brown, and yellowish brown clay

Bedrock:
32 inches—hard, bluish gray limestone

Opequon

Surface layer:
0 to 6 inches—dark yellowish brown silty clay

Subsoil:
6 to 12 inches—variegated yellowish brown and strong brown clay
12 to 15 inches—variegated yellowish brown and dark yellowish brown clay

Bedrock:
15 inches—hard, bluish gray limestone

Soil Properties and Qualities

Carbo

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Opequon

Drainage class: Well drained
Permeability: Moderately slow or moderate (0.2 inch to 2.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Rapid
Depth to bedrock: 12 to 20 inches
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Minor Components

Dissimilar inclusions:
- The very deep Swanpond soils
- Severely eroded soils that have a surface layer of clay
- Areas of rock outcrop
- Soils that are less than 12 inches deep over bedrock

Similar soils:
- The deep Endcav soils
- Soils that have slopes of less than 8 percent or more than 15 percent
- Soils that have a channery or flaggy surface layer

Use and Management

Uses: Most areas of this map unit are used as pasture (fig. 5). Some are used for cultivated crops. A few small areas are used as sites for community development or are wooded.

Cropland

Suitability: Limited
Management concerns:
- The hazard of erosion is severe in unprotected areas.
- These soils are droughty during the growing season and generally have poor tilth.
- Limestone rock outcrop may limit the extent and direction of cultivation in some areas.
- In some areas rock fragments in the surface layer may interfere with tillage and planting.
- Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Grassed waterways, diversions, and grade stabilization structures help to prevent gully erosion.
- Because of the droughtiness, these soils are better suited to early maturing small grain than to late maturing crops, such as corn.
- Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited

Figure 5.—A pastured area of Carbo-Opequon complex, 8 to 15 percent slopes. Eastern redcedar commonly grows in areas of these soils.

Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- The droughtiness limits forage production during midsummer.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate or moderately high

Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- Operating logging equipment during wet periods when the soils are soft results in excessive rutting.
- Because of the droughtiness during the summer, seedling mortality may be a problem, especially in areas of the Opequon soil.
- Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall, especially in areas of the Opequon soil.
- Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• Because of the sticky and plastic subsoil, logging roads should be graveled and, in some areas, log landings should be stabilized.
• Drought-tolerant species, such as white pine, Scotch pine, Virginia pine, and Norway spruce, should be selected for planting.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The depth to hard, nonrippable limestone bedrock, the high shrink-swell potential, and the slope are the main limitations affecting building site development, local roads and street, and septic tank absorption fields.
• In most areas the bedrock has to be blasted before it can be excavated.
• Low strength is an additional limitation affecting the construction of roads. Because these soils are soft when wet, pavement cracks and buckles under heavy loads.
• The slow permeability and the depth to bedrock are severe limitations on sites for septic tank absorption fields.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• Establishing and maintaining vegetation on roadbanks is difficult on these droughty soils, especially on south aspects.
• The hard bedrock may interfere with landscaping in many areas.
• The rock fragments in the surface layer may interfere with the establishment of lawns.
• Erosion is a severe hazard on construction sites.
Management measures:
• Building on the bedrock and landscaping with additional fill may be preferable to excavating the bedrock.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Selecting deeper areas of the included soils as sites for septic tank absorption fields, installing the absorption fields on the contour, pressurizing or enlarging the absorption fields, or installing alternating drainfields can help to overcome the limitations in absorption areas.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks. Seeded areas should be mulched with straw.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: Carbo—4C; Opequon—3C

ChC—Carbo-Opequon complex, 3 to 15 percent slopes, very rocky

Setting

These soils are on gently sloping or strongly sloping ridges and hillsides in the eastern and central parts of the Great Valley. Sinkholes are common in some areas. The bedrock is steeply tilted under the soils, and soil depth may vary greatly within short distances. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Carbo soil and similar soils: 50 percent
Opequon soil and similar soils: 35 percent
Dissimilar inclusions: 15 percent

Representative Profile

Carbo

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

2 to 9 inches—dark yellowish brown silty clay

Subsoil:
9 to 18 inches—variegated strong brown and yellowish brown clay
18 to 28 inches—variegated yellowish brown and strong brown clay
28 to 34 inches—variegated dark yellowish brown, strong brown, and yellowish brown clay

Bedrock:
34 inches—hard, bluish gray limestone

Opequon

Surface layer:
0 to 7 inches—dark yellowish brown silty clay

Subsoil:
7 to 14 inches—variegated yellowish brown and strong brown clay
14 to 17 inches—variegated yellowish brown and dark yellowish brown clay

Bedrock:
17 inches—hard, bluish gray limestone

Soil Properties and Qualities

Carbo

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Low or moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Severe
Stoniness: None
Rockiness: 2 to 10 percent limestone rock outcrop
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Opequon

Drainage class: Well drained
Permeability: Moderately slow or moderate (0.2 inch to 2.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Severe
Stoniness: None
Rockiness: 2 to 10 percent limestone rock outcrop
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Rapid
Depth to bedrock: 12 to 20 inches
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Minor Components

Dissimilar inclusions:
- The very deep Swanpond soils
- Severely eroded soils that have a surface layer of clay
- Soils that are less than 12 inches deep over bedrock

Similar soils:
- The deep Endcav soils
- Soils that have slopes of less than 8 percent or more than 15 percent
- Soils that have a channery or flaggy surface layer

Use and Management

Uses: Most areas of this map unit are wooded. Some areas have been cleared and are used as pasture.

Cropland

Suitability: Not suited
Management concerns:
- The droughtiness of these soils and the limestone rock outcrop make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hay; limited suitability for pasture
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Because of the limestone rock outcrop, it is difficult in many areas to operate conventional equipment used in clipping and in applying fertilizer.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- The droughtiness limits forage production during midsummer.
- Ponds constructed for livestock water have a high failure rate.

Management measures:
- Proper stocking rates, controlled grazing, and

restricted use during dry periods help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate or moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The rock outcrop and the clayey texture of these soils limit the use of vehicular equipment.
• Operating logging equipment during wet periods when the soils are soft results in excessive rutting.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall, especially in areas of the Opequon soil.
• The seedling mortality rate is high because of the droughtiness.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Because of the sticky and plastic subsoil, logging roads should be graveled and, in some areas, log landings should be stabilized.
• The rock outcrop and the depth to bedrock should be considered when planning the location of roads and log landings.
• Harvest methods that do not leave the remaining trees widely spaced reduce the hazard of windthrow.
• Drought-tolerant species, such as white pine, Scotch pine, Virginia pine, and Norway spruce, should be selected for planting.
• Planting should be timed so that seedlings can take full advantage of spring rains.

Community Development

Suitability: Poorly suited
Management concerns:
• The hard, nonrippable limestone bedrock interferes with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. Blasting is necessary in most areas before the bedrock can be excavated.
• The slope is a limitation affecting building site development in some areas.
• The high shrink-swell potential is a limitation on sites for buildings if foundations and footers are improperly constructed.
• The depth to bedrock, the slow permeability, and, in some areas, the slope are severe limitations affecting the proper functioning of septic tank absorption fields.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• The high shrink-swell potential and low strength are limitations affecting the construction of local roads and streets. Because these soils are soft when wet, pavement cracks and buckles cracks under heavy loads.
• The slope, the droughtiness, and the thin layer of topsoil make the establishment of lawns difficult on these soils, especially on south aspects.
• Establishing and maintaining vegetation on roadbanks is difficult on these droughty soils, especially on south aspects.
• The bedrock may interfere with landscaping.
• Erosion can be severe on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Building on the bedrock and landscaping with additional fill may be preferable to excavating the bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Selecting deeper areas of the included soils as sites for septic tank absorption fields, installing the absorption fields on the contour, enlarging or pressurizing the absorption fields, or installing alternating drainfields helps to overcome the limitations in absorption areas.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• The rock outcrop and the depth to bedrock should be considered when planning the location of roads.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks. Seeded areas should be mulched with straw.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIs
Woodland ordination symbol: Carbo—4C; Opequon—3C

ChE—Carbo-Opequon complex, 15 to 35 percent slopes, very rocky

Setting

These soils are on moderately steep or steep upland limestone hillsides in the eastern and central parts of the Great Valley. Sinkholes are common in some areas. The bedrock is steeply tilted under the soils, and soil depth may vary greatly within short distances. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Carbo soil and similar soils: 45 percent
Opequon soil and similar soils: 40 percent
Dissimilar inclusions: 15 percent

Representative Profile

Carbo

Surface layer:
0 to 1 inch—dark yellowish brown silty clay loam
1 to 5 inches—dark yellowish brown silty clay

Subsoil:
5 to 16 inches—variegated strong brown and yellowish brown clay
16 to 24 inches—variegated yellowish brown and strong brown clay
24 to 30 inches—variegated dark yellowish brown, strong brown, and yellowish brown clay

Bedrock:
30 inches—hard, bluish gray limestone

Opequon

Surface layer:
0 to 3 inches—dark yellowish brown silty clay

Subsoil:
3 to 12 inches—variegated yellowish brown and strong brown clay
12 to 15 inches—variegated yellowish brown and dark yellowish brown clay

Bedrock:
15 inches—hard, bluish gray limestone

Soil Properties and Qualities

Carbo

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Low or moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Very severe
Stoniness: None
Rockiness: 2 to 10 percent limestone rock outcrop
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Opequon

Drainage class: Well drained
Permeability: Moderately slow or moderate (0.2 inch to 2.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Very severe
Stoniness: None
Rockiness: 2 to 10 percent limestone rock outcrop
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Very rapid
Depth to bedrock: 12 to 20 inches
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Minor Components

Dissimilar inclusions:
- The very deep Swanpond soils
- Severely eroded soils that have a surface layer of clay
- Soils that are less than 12 inches deep over bedrock

Similar soils:
- The deep Endcav soils
- Soils that have slopes of less than 15 percent or more than 35 percent
- Soils that have a channery or flaggy surface layer

Use and Management

Uses: Most areas of this map unit are wooded. A few small areas have been cleared and are used as pasture.

Cropland

Suitability: Not suited
Management concerns:
• The rock outcrop and the slope make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hay; difficult to manage for pasture
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Because of the slope and the rock outcrop, it is difficult to operate conventional equipment used in clipping and in applying fertilizer.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• The droughtiness limits forage production during midsummer.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, controlled grazing, and restricted use during dry periods help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate on south aspects; moderate or moderately high on north aspects
Management concerns:
• Erosion is a severe hazard on logging sites.
• The slope, the rock outcrop, the clayey texture of the soils, and a hazard of slippage severely limit the use of vehicular equipment.
• Operating logging equipment during wet periods when the soils are soft results in excessive rutting.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall, especially in areas of the Opequon soil.
• Because of the droughtiness, seedling mortality may be a problem, especially on south aspects.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• The rock outcrop and the depth to bedrock should be considered when planning the location of roads and log landings.
• Because of the sticky and plastic subsoil, logging roads should be graveled and, in some areas, log landings should be stabilized.
• Harvest methods that do not leave the remaining trees widely spaced, selective cutting, and strip cutting reduce the hazard of windthrow.
• Drought-tolerant species, such as white pine, Scotch pine, Virginia pine, and Norway spruce, should be selected for planting.
• Tree plantations should be on north-facing slopes where possible.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The hard, nonrippable limestone bedrock interferes with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. Blasting is necessary in most areas before the bedrock can be excavated.
• Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is done.
• The high shrink-swell potential is a limitation on sites for buildings if foundations and footers are improperly constructed.
• The slope, the depth to bedrock, and the slow permeability are severe limitations affecting the proper functioning of septic tank absorption fields.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• The high shrink-swell potential, low strength, and a hazard of slippage are limitations affecting the

construction of local roads and streets. Because these soils are soft when wet, pavement cracks and buckles under heavy loads.
• The slope, the droughtiness, and the thin layer of topsoil make the establishment of lawns difficult on these soils, especially on south aspects.
• Establishing and maintaining vegetation on roadbanks is difficult on these droughty soils, especially on south aspects.
• The bedrock may interfere with landscaping.
• Erosion is a severe hazard on construction sites.

Management measures:
• Buildings should be designed so that they conform to the natural slope of the land.
• Building on the bedrock and landscaping with additional fill may be preferable to excavating the bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• An alternative to a septic tank absorption field or a better suited soil should be considered for onsite sewage disposal.
• Roads should be built on the contour.
• The rock outcrop and the depth to bedrock should be considered when planning the location of roads.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks. Seeded areas should be mulched with straw.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: Carbo—3R on south aspects and 4R on north aspects; Opequon—2R on south aspects and 3R on north aspects

CkB—Clearbrook silt loam, 0 to 8 percent slopes

Setting

This soil is on nearly level or gently sloping, concave head slopes and in broad upland depressions in the eastern part of the county.

Composition

Clearbrook soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 9 inches—brown silt loam

Subsoil:
9 to 11 inches—light olive brown very channery silty clay loam that has yellowish brown and brownish gray mottles
11 to 22 inches—gray extremely channery silty clay loam that has yellowish brown mottles

Bedrock:
22 inches—soft shale

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderately slow (0.2 to 0.6 inch per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Soft, acid Martinsburg Shale

Minor Components

Dissimilar inclusions:
• The very deep Poorhouse soils, which have a subsoil of heavy clay
• The well drained Berks soils and the somewhat excessively drained Weikert soils, which are on the higher, convex part of the landscape
• The poorly drained Atkins soils, which are flooded and are along drainageways and in depressions

Similar soils:
• Soils that are less than 20 inches or more than 40 inches deep over bedrock
• Soils that have fewer rock fragments in the subsoil than is typical for the Clearbrook soil
• Moderately well drained soils

Use and Management

Uses: Most areas of the Clearbrook soil are used for pasture or hay. A few areas are used for cultivated crops or are wooded.

Cropland

Suitability: Limited
Management concerns:
• Erosion is a moderate hazard if cultivated crops are grown.
• The seasonal high water table is near the surface during wet periods. It may restrict the roots of some plants and delay tillage in the spring.
• Droughtiness during the growing season and the low natural fertility are management concerns.
Management measures:
• Using crop rotations that include grasses and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
• Applying lime and fertilizer according to the results of soil tests helps to ensure maximum crop production.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Grazing during wet periods causes surface compaction and poor tilth and can damage the sod.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• The hay and pasture species that can withstand the wetness should be selected for planting.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• The limited depth to bedrock, the low natural fertility, and the droughtiness result in a high seedling mortality rate.
• Competition from undesirable plants may slow the growth of planted tree seedlings.
• This soil is soft when wet and will not support heavy logging equipment.
• Because the rooting depth is limited by the bedrock and the seasonal high water table, trees are subject to windthrow during wet periods.
Management measures:
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Logging should be deferred during wet periods.
• Year-round logging roads and log landings require additions of roadfill and gravel.
• Harvest methods that do not leave the remaining trees widely spaced, selective cutting, and strip cutting reduce the hazard of windthrow.

Community Development

Suitability: Poorly suited
Management concerns:
• The wetness is a severe limitation affecting building site development.
• The wetness and the depth to bedrock are severe limitations on sites for septic tank absorption fields.
• The wetness is a limitation on sites for local roads and streets. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in winter and spring.
• Establishing and maintaining lawns is difficult on this droughty soil.
• The shale bedrock generally is rippable with conventional earthmoving equipment.
• Erosion is a moderate hazard on construction sites.
Management measures:
• An alternative to a septic tank absorption field or a better suited soil should be considered for onsite sewage disposal. If an alternative system is used, it should be approved by the health department.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings can be constructed on well compacted fill

material, which raises the site a sufficient distance above the water table.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVw
Woodland ordination symbol: 4W

CmB—Clearbrook channery silt loam, 0 to 8 percent slopes

Setting

This soil is on nearly level or gently sloping, slightly concave head slopes, in broad upland depressions, and on interfluves, mainly in the Great Valley.

Composition

Clearbrook soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 7 inches—brown channery silt loam

Subsoil:
7 to 13 inches—brown very channery silt loam that has strong brown mottles
13 to 22 inches—light brownish gray extremely channery silty clay loam that has strong brown mottles

Bedrock:
22 inches—soft, rippable shale

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderately slow (0.2 to 0.6 inch per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Soft, gray, acid Martinsburg Shale

Minor Components

Dissimilar inclusions:
• Poorly drained soils that have a subsoil of heavy clay
• The well drained Berks soils and the somewhat excessively drained Weikert soils, which are on the higher, slightly convex part of the landscape
• The poorly drained Atkins soils, which are flooded and are along drainageways and in depressions
Similar soils:
• Soils that are more than 40 inches deep over bedrock
• Soils that have fewer rock fragments in the subsoil than is typical for the Clearbrook soil
• Moderately well drained soils

Use and Management

Uses: Most areas of the Clearbrook soil are used for pasture or hay. A few areas are used for cultivated crops, and a few areas are wooded.

Cropland

Suitability: Limited
Management concerns:
• Erosion is a moderate hazard in unprotected areas.
• The seasonal high water table is near the surface during wet periods. It may restrict the roots of some plants and delay tillage in the spring.
• Droughtiness during the growing season and the low natural fertility are management concerns.
Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
• Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
• Applying lime and fertilizer according to the results of soil tests helps to ensure maximum crop production.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table

Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• Grazing during wet periods causes surface compaction and poor tilth and damages the sod.
• The droughtiness limits forage production during midsummer.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• The hay and pasture species that can withstand the wetness should be selected for planting.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• The limited depth to bedrock, the low natural fertility, and the droughtiness result in a high seedling mortality rate.
• Competition from weeds may slow the growth of planted tree seedlings.
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
• Because the rooting depth is limited by the bedrock and the seasonal high water table, trees are subject to windthrow during wet periods.
Management measures:
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Logging should be deferred during wet periods.
• Year-round logging roads and log landings require additions of roadfill and gravel.
• Harvest methods that do not leave the remaining trees widely spaced, selective cutting, and strip cutting reduce the hazard of windthrow.

Community Development

Suitability: Poorly suited
Management concerns:
• The wetness is a severe limitation affecting building site development.
• The depth to bedrock and the wetness are severe limitations affecting the proper functioning of septic tank absorption fields.
• The wetness is a limitation on sites for local roads and streets. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in winter and spring.
• The underlying shale bedrock is generally rippable with conventional earthmoving equipment.
• Establishing and maintaining lawns is difficult on this droughty soil.
• Erosion is a moderate hazard on construction sites.
Management measures:
• An alternative to a septic tank absorption field or a better suited soil should be considered for onsite sewage disposal. If an alternative system is used, it should be approved by the health department.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVw
Woodland ordination symbol: 4W

CrB—Clearbrook-Berks channery silt loams, 3 to 8 percent slopes

Setting

These soils are on gently sloping, shallowly dissected shale uplands in the Great Valley. The Clearbrook soil is on the less sloping, smooth ridgetops and the slightly convex saddles and head slopes, and the Berks soil is on the more sloping, slightly convex shoulder slopes and ridgetops. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Clearbrook soil and similar soils: 45 percent
Berks soil and similar soils: 40 percent
Dissimilar inclusions: 15 percent

Representative Profile

Clearbrook

Surface layer:
0 to 8 inches—brown channery silt loam

Subsoil:
8 to 19 inches—yellowish brown channery silt loam that has light gray mottles
19 to 24 inches—light brownish gray extremely channery silty clay loam that has yellowish red mottles

Bedrock:
24 inches—soft, gray shale

Berks

Surface layer:
0 to 8 inches—brown channery silt loam

Subsoil:
8 to 16 inches—light yellowish brown very channery silt loam
16 to 22 inches—yellowish brown very channery silt loam

Bedrock:
22 inches—yellowish brown, fractured shale

Soil Properties and Qualities

Clearbrook

Drainage class: Somewhat poorly drained
Permeability: Moderately slow (0.2 to 0.6 inch per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: 1.0 to 2.5 feet
Flooding: None
Shrink-swell potential: Moderate
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, strongly acid or very strongly acid (pH 4.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Fractured and tilted, rippable shale; mainly members of the Martinsburg Formation

Berks

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 60 inches
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to slightly acid (pH 4.5 to 6.5)
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Fractured and tilted, rippable shale; mainly members of the Martinsburg Formation

Minor Components

Dissimilar inclusions:
• Small areas of the shallow, somewhat excessively drained Weikert soils
• Small areas of the well drained Carbo and Opequon soils and the moderately well drained Swanpond soils, which are clayey and underlain by limestone bedrock
Similar soils:
• Soils that have slopes of less than 3 percent or more than 8 percent
• Soils that are more than 40 inches deep over shale bedrock
• Soils that do not have as many shale fragments in the subsoil as is typical of the Clearbrook and Berks soils

Use and Management

Uses: Most areas of the unit have been cleared and are used for pasture or hay. Some areas are used for cultivated crops, orchards, or woodland or as sites for community development.

Cropland

Suitability: Suited
Management concerns:
• Erosion is a moderate hazard in unprotected areas.
• Tillage may be delayed in the spring because of the seasonal high water table in the Clearbrook soil.
• Droughtiness during the growing season and the low natural fertility are management concerns.

Management measures:
• Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Because of the droughtiness, these soils are better suited to early maturing small grain, than to late maturing crops, such as corn.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.
• Applying lime and fertilizer according to the results of soil tests helps to ensure maximum crop production.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the limited rooting depth and the seasonal high water table in the Clearbrook soil
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• Grazing during wet periods causes surface compaction and poor tilth and damages the sod.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Seedling mortality is a problem because of the droughtiness during the growing season.
• Competition from weeds may slow the growth of planted tree seedlings.
• The wetness may limit the use of logging equipment during the winter and spring in areas of the Clearbrook soil.
Management measures:
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, Scotch pine, white pine, and Norway spruce, should be selected for planting.
• Site preparation by mechanical or chemical means is necessary to control competing vegetation.

Community Development

Suitability: Poorly suited
Management concerns:
• The depth to bedrock in both soils and the seasonal high water table in the Clearbrook soil are severe limitations on sites for septic tank absorption fields. Sewage effluent may come to the surface causing foul odors and unhealthy conditions.
• The wetness of the Clearbrook soil is a limitation affecting building site development and construction of roads. It also is a limitation affecting excavation and trafficability and may delay construction in the winter and spring.
• Establishing and maintaining vegetation on roadbanks is difficult on these droughty soils.
• The hazard of erosion is moderate on construction sites.
Management measures:
• The included deep soils, which are better suited to septic tank absorption fields than the Clearbrook and Berks soils, should be selected for development.
• When building in areas of the Clearbrook soil, installing wide reinforced footers and footer drains, sealing the foundation walls, and backfilling with porous material help to keep basements dry and to prevent walls and foundations from cracking.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock and the water table.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by the wetness of the Clearbrook soil.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks. Seeded areas should be mulched with straw.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: Clearbrook—4W; Berks—4F

Cs—Combs fine sandy loam

Setting

This soil is on nearly level flood plains along the Potomac River.

Composition

Combs soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 10 inches—dark brown fine sandy loam

Subsurface layer:
10 to 20 inches—dark brown fine sandy loam

Subsoil:
20 to 53 inches—dark yellowish brown fine sandy loam

Underlying material:
53 to 65 inches—brown to dark brown fine sandy loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year) for brief periods
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to neutral (pH 5.6 to 7.3)
Surface runoff: Slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The moderately well drained Lindside soils and the poorly drained Atkins soils, which are in sloughs and high water channels
• The well drained Huntington soils, which have a higher content of silt than the Combs soil
• Soils that have a subsoil of loamy sand and are on natural levees
• Soils that do not have the thick, dark surface layer that is typical of the Combs soil

Similar soils:
• Soils that have slopes of more than 3 percent
• Soils that have a surface layer of loam

Use and Management

Uses: Most areas of the Combs soil are used for cultivated crops or hay. Some are used as pasture. A few small areas are wooded.

Cropland

Suitability: Well suited. This soil is prime farmland.
Management concerns:
• This soil is suited to cultivated crops, but it must be properly protected if cultivated crops are grown year after year.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of surface water by nutrients.
• The flooding occasionally damages crops or delays fieldwork.
• This soil is subject to streambank erosion in many areas.
Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to maintain soil tilth and fertility and to control erosion.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Leaving a border of trees along streams helps to prevent excessive erosion on streambanks.

Pasture and Hayland

Suitability: Well suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.
• The flooding occasionally deposits debris on the grassland.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.
• Applying lime and fertilizer according to the results

of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from undesirable plants may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
• Because of the flooding, this soil is not suited to septic tank absorption fields or buildings.
• The flooding is a severe limitation affecting local roads and streets.
Management measures:
• Soils that are better suited to buildings and septic tank absorption fields should be selected for development.
• Constructing roads on raised fill material helps to prevent the damage caused by flooding.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 5A

DaC—Dekalb channery loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex ridgetops in the western part of the county.

Composition

Dekalb soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Surface layer:
0 to 2 inches—very dark grayish brown channery loam

Subsurface layer:
2 to 4 inches—brown channery loam

Subsoil:
4 to 10 inches—yellowish brown very channery loam
10 to 22 inches—yellowish brown very channery loam

Bedrock:
22 inches—fractured, fine grained sandstone

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Permeability: Rapid (6.0 to 20 inches per hour)
Available water capacity: Very low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Hard sandstone

Minor Components

Dissimilar inclusions:
• Moderately well drained soils, which are in slight depressions and on head slopes
Similar soils:
• The well drained Berks soils
• Stony soils
• Soils that have slopes ranging from 15 to 25 percent or from 3 to 8 percent
• Soils that have fewer rock fragments in the subsoil than is typical for the Dekalb soil
• Soils that are more than 40 inches deep over bedrock

Use and Management

Uses: Most areas of the Dekalb soil are wooded. A few small areas have been cleared and are used as pasture. A few areas have been developed as homesites.

Cropland

Suitability: Suited
Management concerns:
• Erosion is a severe hazard in unprotected areas.
• This soil is commonly droughty during the growing season.
• The low natural fertility is a limitation in areas of this soil.
Management measures:
• Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
• Leaving crop residue on the surface and adding

other organic material help to conserve soil moisture.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of crops.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• The droughtiness limits forage production during midsummer.
• Water for livestock is scarce, and ponds constructed for livestock water are susceptible to seepage.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderate
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The low natural fertility and the droughtiness result in a high seedling mortality rate.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

Community Development

Suitability: Poorly suited
Management concerns:
• Erosion is a severe hazard on construction sites.
• The hard bedrock may interfere with excavations for roads and foundations. In many areas the bedrock is too hard to be excavated with conventional equipment.
• The slope is a moderate limitation affecting building site development.
• The depth to bedrock is a severe limitation on sites for septic tank absorption fields.
• Establishing and maintaining vegetation on roadbanks is difficult on this droughty soil, especially on south aspects.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Building on the bedrock and landscaping with additional fill can help to overcome the depth to bedrock.
• Selecting the deepest areas of this soil as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 3F

DaD—Dekalb channery loam, 15 to 25 percent slopes

Setting

This soil is on moderately steep, convex shoulder slopes and hillsides in the western part of the county.

Composition

Dekalb soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 2 inches—very dark grayish brown channery loam

Subsurface layer:
2 to 4 inches—brown channery loam

Subsoil:
4 to 10 inches—yellowish brown very channery loam
10 to 22 inches—yellowish brown very channery loam

Bedrock:
22 inches—fractured, fine grained sandstone

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Permeability: Rapid (6.0 to 20 inches per hour)
Available water capacity: Very low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Hard sandstone

Minor Components

Dissimilar inclusions:
- The moderately well drained Buchanan soils, which are on footslopes
- The very deep Hazleton soils

Similar soils:
- The well drained Berks soils
- Soils that have slopes ranging from 25 to 35 percent or from 8 to 15 percent
- Soils that have fewer rock fragments in the subsoil than is typical for the Dekalb soil
- Stony soils

Use and Management

Uses: Most areas of the Dekalb soil are wooded. A few small areas have been cleared and are used for pasture or orchards. A few areas have been developed as homesites.

Cropland

Suitability: Poorly suited; better suited to hay and pasture because of the hazard of erosion
Management concerns:
- Erosion is a severe hazard in unprotected areas.
- This soil commonly is droughty during the growing season.
- The low natural fertility is a limitation in areas of this soil.

Management measures:
- Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
- Because of the droughtiness, this soil is better suited to early maturing small grain than to late maturing crops, such as corn.
- Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of crops.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- The droughtiness limits forage production during midsummer.
- Water for livestock is scarce, and ponds constructed for livestock water are susceptible to seepage.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderate
Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- The low natural fertility and the droughtiness result in a high seedling mortality rate, especially on south aspects.
- Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall.

Management measures:
- Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
- Planting should be timed so that seedlings can take full advantage of spring rains.

- Drought-tolerant species, such as white pine, Scotch pine, and Norway spruce, should be selected for planting.
- Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

Community Development

Suitability: Poorly suited
Management concerns:
- Erosion is a severe hazard on construction sites.
- The hard bedrock may interfere with excavations for roads and foundations. In many areas it is too hard to be excavated with conventional equipment.
- The slope is a severe limitation affecting building site development.
- The depth to bedrock and the slope are severe limitations on sites for septic tank absorption fields.
- Establishing and maintaining vegetation on roadbanks is difficult on this droughty soil, especially on south aspects.
- The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
- The droughtiness and the slope make it difficult to maintain lawns.

Management measures:
- Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
- Buildings should be designed so that they conform to the natural slope of the land. Extensive land shaping is necessary in most areas.
- Building on the bedrock and landscaping with additional fill can help to overcome the depth to bedrock.
- Selecting areas where the soil is deeper and less sloping, installing absorption fields on the contour, and enlarging absorption fields can help to overcome the depth to bedrock and the slope on sites for septic tank absorption fields.
- Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: 2R on south aspects; 3R on north aspects

DaE—Dekalb channery loam, 25 to 35 percent slopes

Setting

This soil is on steep, convex shoulder slopes and hillsides in the western part of the county.

Composition

Dekalb soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 2 inches—very dark grayish brown channery loam

Subsurface layer:
2 to 4 inches—brown channery loam

Subsoil:
4 to 10 inches—yellowish brown very channery loam
10 to 22 inches—yellowish brown very channery loam

Bedrock:
22 inches—fractured, fine grained sandstone

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Permeability: Rapid (6.0 to 20 inches per hour)
Available water capacity: Very low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Hard sandstone

Minor Components

Dissimilar inclusions:
- The moderately well drained Buchanan soils, which are on footslopes
- The very deep Hazleton soils
- Extremely stony soils
- Areas of rock outcrop

Similar soils:
- The well drained Berks soils
- Soils that have slopes ranging from 15 to 25 percent

- Soils on slopes of more than 35 percent
- Stony soils
- Soils that have fewer rock fragments in the subsoil than is typical for the Dekalb soil

Use and Management

Uses: All areas of the Dekalb soil are wooded.

Cropland

Suitability: Not suited
Management concerns:
- This soil is unsuited to conventional row crops because of the steep slope, the severe hazard of erosion, droughtiness, and the low natural fertility.

Pasture and Hayland

Suitability: Not suited to hay; suited to pasture
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a very severe hazard in areas where the plant cover has been destroyed.
- The droughtiness limits forage production during midsummer.
- Water for livestock is scarce in areas of this soil.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderate
Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- The low natural fertility and the droughtiness result in a high seedling mortality rate, especially on south aspects.
- Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall.

Management measures:
- Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
- Planting should be timed so that seedlings can take full advantage of spring rains.
- Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
- Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

Community Development

Suitability: Poorly suited
Management concerns:
- Erosion is a very severe hazard on construction sites.
- The hard sandstone bedrock may interfere with excavations for roads and foundations. In many areas it is too hard to be excavated with conventional equipment.
- The slope is a severe limitation affecting building site development.
- Because of the slope and the depth to bedrock, this soil is generally unsuited to septic tank absorption fields.
- Establishing and maintaining vegetation on roadbanks is difficult on this droughty soil, especially on south aspects.
- The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
- The droughtiness and the slope make it difficult to maintain lawns.

Management measures:
- Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
- Buildings should be designed so that they conform to the natural slope of the land. Extensive land shaping is necessary in most areas.
- Building on the bedrock and landscaping with additional fill can help to overcome the depth to bedrock.
- An alternative to a septic tank absorption field or a better suited soil should be considered for onsite sewage disposal.
- Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks.

Interpretive Groups

Land capability classification: VIe
Woodland ordination symbol: 2R on south aspects; 3R on north aspects

DkC—Dekalb channery sandy loam, 3 to 15 percent slopes, extremely stony

Setting

This soil is on gently sloping or strongly sloping, convex ridgetops, mainly on Third Hill and Sleepy Creek Mountains.

Composition

Dekalb soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 4 inches—very dark brown channery sandy loam

Subsurface layer:
4 to 6 inches—grayish brown very channery loamy sand

Subsoil:
6 to 15 inches—yellowish brown very channery sandy loam
15 to 24 inches—yellowish brown extremely flaggy sandy loam

Bedrock:
24 inches—fractured, gray sandstone

Soil Properties and Qualities

Drainage class: Somewhat excessively drained
Permeability: Rapid (6.0 to 20 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate or severe
Stoniness: 3 to 15 percent of the surface covered with stones
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Medium or rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Mainly acid sandstone; interbedded with shale and siltstone in some areas

Minor Components

Dissimilar inclusions:
• Moderately well drained soils, which are in shallow depressions
• Small areas of the very deep Hazleton soils
• The moderately well drained Buchanan soils, which are on concave head slopes
• Small areas of sandstone rock outcrop
• Very rubbly soils that have more than 50 percent of their surface covered with stones
Similar soils:
• Soils that are 10 to 20 inches deep over bedrock
• Soils that have slopes ranging from 15 to 25 percent
• Soils that have slopes of less than 3 percent
• Rubbly soils that have 15 to 50 percent of their surface covered with stones
• Soils that have less than 3 percent of their surface covered with stones

Use and Management

Uses: Most areas of the Dekalb soil are wooded.

Cropland

Suitability: Not suited
Management concerns:
• The stones at or near the surface of the soil make tilling, planting, and harvesting with conventional farm equipment impractical.

Pasture and Hayland

Suitability: Not suited to hay; limited suitability for pasture
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
• Because of the stones on the surface of the soil, it is difficult to operate conventional equipment used in clipping and in applying fertilizer.
• Droughtiness limits forage production during midsummer.
• Water for livestock is scarce, and ponds constructed for livestock water are susceptible to seepage.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate
Management concerns:
• The large stones on the surface of the soil can hinder harvesting operations and damage equipment.
• The limited depth to bedrock, the low natural fertility,

and the droughtiness result in a high seedling mortality rate.
• The stones on the surface and other rock fragments interfere with the planting of seedlings.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall.
Management measures:
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.

Community Development

Suitability: Poorly suited
Management concerns:
• The depth to bedrock is the main limitation affecting building site development, septic tank absorption fields, excavations, and local roads and streets. In most areas the bedrock is too hard to be excavated with conventional earthmoving equipment.
• The large stones may interfere with the operation of construction equipment.
• Establishing and maintaining vegetation on roadbanks is difficult on this droughty soil, especially on south aspects.
• The large stones on the surface of the soil may interfere with the establishment of lawns and with landscaping.
• The hazard of erosion is moderate or severe on construction sites.
Management measures:
• Building on the bedrock and landscaping with additional fill may be preferable to excavating the bedrock.
• Selecting the deepest areas of this soil as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: 3X

DrE—Dekalb-Rock outcrop complex, 15 to 25 percent slopes, rubbly

Setting

This map unit is on narrow ridges (hogbacks of sandstone rock outcrop) on North, Third Hill, and Sleepy Creek Mountains. The Dekalb soil and the Rock outcrop occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Dekalb soil and similar soils: 70 percent
Rock outcrop: 15 percent
Dissimilar inclusions: 15 percent

Representative Profile

Dekalb

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 3 inches—very dark gray channery sandy loam

Subsurface layer:
3 to 6 inches—brown very channery sandy loam

Subsoil:
6 to 24 inches—brownish yellow very channery sandy loam

Underlying material:
24 to 34 inches—yellowish brown extremely flaggy sandy loam

Bedrock:
34 inches—fractured, gray sandstone

Rock outcrop

The Rock outcrop occurs as exposed areas of sandstone bedrock. In some areas it forms nearly vertical cliffs.

Soil Properties and Qualities

Dekalb

Drainage class: Somewhat excessively drained
Permeability: Rapid (6.0 to 20 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe or very severe
Stoniness: 15 to 50 percent of the surface covered with rocks and boulders
Natural fertility: Low

Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Rapid or very rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Mainly acid sandstone; interbedded with shale and siltstone in some areas

Minor Components

Dissimilar inclusions:
• The very deep Hazleton soils
Similar soils:
• The well drained Berks soils
• Shallow soils that are less than 20 inches deep over bedrock
• Soils that are on slopes ranging from 8 to 15 percent
• Soils that have slopes of more than 35 percent
• Soils that have 3 to 15 percent of their surface covered with stones

Use and Management

Uses: All areas of this map unit are wooded.

Cropland

Suitability: Not suited
Management concerns:
• The slope and the stones, boulders, and rock outcrop prevent the operation of conventional farm equipment.

Pasture and Hayland

Suitability: Not suited
Management concerns:
• The slope and the stones, boulders, and rock outcrop prevent the operation of conventional farm equipment.

Woodland

Potential productivity: Moderate
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The stones and boulders on the surface of the soil can hinder harvesting operations and damage equipment.
• Short escarpments in this map unit may interfere with the use of harvesting equipment.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall.
• The trees produced in areas of this map unit generally are of low commercial value.
Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• The rock outcrop should be considered when planning the location of roads and log landings.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Tree plantations should be on north-facing slopes where possible.

Community Development

Suitability: Not suited
Management concerns:
• The moderately steep or steep slope, the common areas of sandstone rock outcrop, and the depth to bedrock are the main limitations affecting building site development, septic tank absorption fields, and local roads and streets. A better suited soil should be selected for development.

Interpretive Groups

Land capability classification: Dekalb—VIIs
Woodland ordination symbol: Dekalb—2R

DsB—Downsville gravelly loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, convex, slightly dissected, old river terraces high above the Potomac River. Sinkholes occur in some areas that are underlain by limestone.

Composition

Downsville soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 10 inches—dark yellowish brown gravelly loam

Subsoil:
10 to 18 inches—yellowish brown gravelly loam
18 to 30 inches—strong brown very gravelly loam
30 to 41 inches—yellowish red very gravelly clay loam
41 to 99 inches—red very gravelly sandy clay loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)

Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
- Small areas of the moderately well drained Monongahela soils
- Small areas of the moderately deep Berks soils
- Small areas of the well drained Hagerstown soils
- A few small areas of limestone rock outcrop and shallow sinkholes
- Severely eroded soils

Similar soils:
- Soils that have a very gravelly or very cobbly surface layer
- Small areas of the well drained Murrill soils
- Soils that have slopes of less than 3 percent or more than 8 percent

Use and Management

Uses: Most areas of the Downsville soil have been cleared. Many areas are used as sites for community development. Some areas are used for crops, hay, or pasture.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
- Erosion is a moderate hazard in unprotected areas.
- Sinkholes and solution channels in the areas underlain by limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- In many areas gravel and cobbles in the surface layer interfere with the use of tillage, planting, and some harvesting equipment (fig. 6).

Management measures:
- Conservation tillage, contour farming, cover crops, a cropping sequence that includes grasses and legumes, and good crop residue management help to control erosion and to maintain fertility and tilth.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Timing fertilizer applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
- Competition from weeds may slow the growth of planted tree seedlings.
- Erosion is a management concern on logging roads and skid trails.

Management measures:
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
- Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.

Community Development

Suitability: Well suited
Management concerns:
- Sinkholes and solution channels in the areas underlain by limestone bedrock increase the hazard of

Figure 6.—An area of Downsville gravelly loam, 3 to 8 percent slopes. The gravel and cobbles in the surface layer limit the use of equipment in many areas.

ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• Gravel and cobbles in the surface layer may interfere with the establishment of lawns and with landscaping.
• Erosion is a moderate hazard on construction sites.

Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation of streams.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 4A

DsC—Downsville gravelly loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex, slightly dissected, old river terraces high above the Potomac River. Sinkholes occur in some areas that are underlain by limestone.

Composition

Downsville soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

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

Subsoil:
5 to 13 inches—yellowish brown gravelly loam
13 to 25 inches—strong brown very gravelly loam
25 to 36 inches—yellowish red very gravelly clay loam
36 to 99 inches—red very gravelly sandy clay loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
- Small areas of the moderately well drained Monongahela soils
- Small areas of the moderately deep Berks soils
- Small areas of the well drained Hagerstown soils
- A few small areas of limestone rock outcrop and shallow sinkholes
- Severely eroded soils

Similar soils:
- Small areas of the well drained Murrill soils
- Soils that have a very gravelly or very cobbly surface layer
- Soils that have slopes of less than 8 percent or more than 15 percent

Use and Management

Uses: Most areas of the Downsville soil are wooded. Many areas are used as sites for community development. Some areas have been cleared and are used for crops, hay, pasture, or orchards.

Cropland

Suitability: Limited
Management concerns:
- Erosion is a severe hazard in unprotected areas.
- Sinkholes and solution channels in the areas underlain by limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- In many areas pebbles and cobbles in the surface layer interfere with the use of tilling and planting equipment and some kinds of harvesting equipment.

Management measures:
- Conservation tillage, contour farming, cover crops, a cropping sequence that includes grasses and legumes, and good crop residue management help to control erosion and to maintain fertility and tilth.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Timing fertilizer applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.

Community Development

Suitability: Limited
Management concerns:
• The slope is a moderate limitation affecting most urban uses. Land shaping is necessary in some areas.
• In areas underlain by limestone, sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• Gravel and cobbles in the surface layer may interfere with the establishment of lawns and with landscaping.
• Erosion is a severe hazard on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land.
• Septic tank absorption fields should be installed on the contour. They should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation of streams.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 4A

DsD—Downsville gravelly loam, 15 to 25 percent slopes

Setting

This soil is on moderately steep, slightly concave benches and hillsides, mostly on uplands above the Potomac River. It formed in old alluvial deposits. Sinkholes occur in some areas that are underlain by limestone.

Composition

Downsville soil and similar soils: 70 percent
Dissimilar inclusions: 30 percent

Representative Profile

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

Subsoil:
5 to 13 inches—yellowish brown gravelly loam
13 to 25 inches—strong brown very gravelly loam
25 to 36 inches—yellowish red very gravelly clay loam
36 to 99 inches—red very gravelly sandy clay loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The well drained Hagerstown and Murrill soils
• Areas of limestone rock outcrop
Similar soils:
• Soils that have slopes of less than 15 percent or more than 25 percent
• Soils that do not have a gravelly surface layer

Use and Management

Uses: Most areas of the Downsville soil are wooded.

Cropland

Suitability: Poorly suited; better suited to hay and pasture because of the hazard of erosion
Management concerns:
• Erosion is a severe hazard in unprotected areas.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.

• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• In some areas rock fragments in the surface layer may interfere with tillage and planting.
• In some areas the rock outcrop will interfere with tillage.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• The slope is a moderate limitation affecting the use of logging equipment.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour helps to control erosion.
• The grade on logging roads and skid trails should be kept as low as possible.
• The hazard of erosion can be reduced by seeding logging roads, log landings, and areas that have been cut and filled and by installing water bars and culverts.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• Erosion is a severe hazard on construction sites.
• Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is done.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• The rock fragments in the surface layer may interfere with the establishment of lawns.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation and to protect the ground water from pollution.
• Buildings should be designed so that they conform to the natural slope of the land.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: 4R

DuB—Duffield silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, slightly convex upland ridges and hillsides in the Great Valley, mainly on the east side of Apple Pie Ridge. Shallow sinkholes occur in some areas.

Composition

Duffield soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Surface layer:
0 to 9 inches—brown silt loam

Subsurface layer:
9 to 11 inches—yellowish brown silt loam

Subsoil:
11 to 25 inches—yellowish brown silt loam
25 to 32 inches—yellowish red silt loam
32 to 54 inches—strong brown and yellowish brown silty clay loam

Underlying material:
54 to 65 inches—brown and yellowish brown silt loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) to a depth of 50 inches and strongly acid to slightly acid (pH 5.1 to 6.5) below a depth of 50 inches
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Limestone that has a fairly high content of silty shale

Minor Components

Dissimilar inclusions:
• The moderately deep Ryder soils
• The moderately well drained Funkstown soils, which are subject to flooding and ponding and are along concave upland drainageways
• Areas of limestone rock outcrop
Similar soils:
• The very deep Hagerstown soils
• The deep Nollville soils
• Soils that have a gravelly surface layer
• Soils that have slopes of less than 3 percent
• Soils that have slopes ranging from 8 to 15 percent

Use and Management

Uses: Nearly all areas of the Duffield soil have been cleared. This soil is used extensively for orchards. It is also used for crops, hay, or pasture. Many areas have been developed as homesites.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• The hazard of erosion is moderate in unprotected areas.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The slow permeability or the depth to bedrock in some areas may be a limitation on sites for septic tank absorption fields.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The moderate shrink-swell potential may be a limitation affecting the construction of buildings.
• Low strength is a severe limitation affecting the construction of roads.
• Erosion is a moderate hazard on construction sites.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock. They should be installed in the deepest areas of this soil.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 5A

DuC—Duffield silt loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex upland ridges and hillsides in the Great Valley, mainly on the east side of Apple Pie Ridge. Shallow sinkholes occur in some areas.

Composition

Duffield soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 7 inches—brown silt loam

Subsurface layer:
7 to 11 inches—yellowish brown silt loam

Subsoil:
11 to 25 inches—yellowish brown silt loam
25 to 32 inches—yellowish red silt loam
32 to 54 inches—strong brown and yellowish brown silty clay loam

Underlying layer:
54 to 65 inches—brown and yellowish brown silt loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) to a depth of 50 inches and strongly acid to slightly acid (pH 5.1 to 6.5) below a depth of 50 inches
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Limestone that has a fairly high content of silty shale

Minor Components

Dissimilar inclusions:
• The moderately deep Ryder soils
• The moderately well drained Funkstown soils, which are subject to flooding and ponding and are along concave upland drainageways
• Areas of limestone rock outcrop
Similar soils:
• The well drained Hagerstown soils
• The deep Nollville soils
• Soils that have a gravelly surface layer
• Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent

Use and Management

Uses: Nearly all areas of the Duffield soil have been cleared. This soil is used extensively for orchards.

It is also used for crops, hay, or pasture. Many areas have been developed as homesites. A few small areas are used as woodland. The trees in the wooded areas are mixed hardwoods.

Cropland

Suitability: Suited
Management concerns:
• The hazard of erosion is severe in unprotected areas.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Grassed waterways, diversions, and grade stabilization structures help to prevent gully erosion.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• Erosion is a severe hazard on construction sites.
• The slope is a moderate limitation on sites for septic tank absorption fields.
• The slow permeability or the depth to bedrock in some areas may be a limitation on sites for septic tank absorption fields.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The slope is a moderate limitation affecting the construction of buildings.
• The moderate shrink-swell potential may be a limitation on building sites.
• Low strength is a severe limitation affecting the construction of roads.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock. They should be installed in the deepest areas of this soil.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the

installation of properly designed geotextiles helps to prevent the road damage caused by low strength.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 5A

DyB—Duffield gravelly silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, slightly convex upland ridges and hillsides in the Great Valley, mainly on the east side of Apple Pie Ridge. Shallow sinkholes occur in some areas.

Composition

Duffield soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

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

Subsoil:
9 to 15 inches—yellowish brown gravelly silt loam
15 to 36 inches—yellowish brown silty clay loam
36 to 51 inches—dark yellowish brown silty clay
51 to 65 inches—dark yellowish brown silty clay loam that has pockets of coarse brownish yellow silt loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) to a depth of 50 inches and strongly acid to slightly acid (pH 5.1 to 6.5) below a depth of 50 inches
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Limestone that has a fairly high content of silty shale

Minor Components

Dissimilar inclusions:
- The moderately deep Ryder soils
- The moderately well drained Funkstown soils that are subject to flooding and ponding; along concave upland drainageways
- Areas of limestone rock outcrop

Similar soils:
- The deep Nollville soils
- The very deep Hagerstown soils
- Soils that do not have a gravelly surface layer
- Soils that have slopes ranging from 8 to 15 percent
- Soils that have slopes of less than 3 percent

Use and Management

Uses: Nearly all areas of the Duffield soil have been cleared. This soil is used extensively for orchards. It is also used for crops, hay, or pasture. Many areas have been developed as homesites.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
- The rock fragments in the surface layer can interfere with cultivation, but generally they are not a problem.
- The hazard of erosion is moderate in unprotected areas.
- Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited

Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The slow permeability or the depth to bedrock in some areas may be a limitation on sites for septic tank absorption fields.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The moderate shrink-swell potential may be a limitation affecting building site development.
• Low strength is a severe limitation affecting the construction of roads.
• The rock fragments in the surface layer may interfere with the establishment of lawns.
• Erosion on construction sites is a moderate hazard.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock. They should be installed in the deepest areas of this soil.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 5A

DyC—Duffield gravelly silt loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex upland ridges and hillsides in the Great Valley, mainly on the east side of Apple Pie Ridge. Shallow sinkholes occur in some areas.

Composition

Duffield soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

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

Subsoil:
7 to 15 inches—yellowish brown gravelly silt loam
15 to 36 inches—yellowish brown silty clay loam
36 to 51 inches—dark yellowish brown silty clay
51 to 65 inches—dark yellowish brown silty clay loam that has pockets of coarse brownish yellow silt loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) to a depth of 50 inches and

strongly acid to slightly acid (pH 5.1 to 6.5) below a depth of 50 inches
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Limestone that has a fairly high content of silty shale

Minor Components

Dissimilar inclusions:
- The moderately deep Ryder soils
- The moderately well drained Funkstown soils that are subject to flooding and ponding; along concave upland drainageways
- Areas of limestone rock outcrop

Similar soils:
- The very deep Hagerstown soils
- The deep Nollville soils
- Soils that do not have a gravelly surface layer
- Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent

Use and Management

Uses: Nearly all areas of the Duffield soil have been cleared. This soil is used extensively for orchards. It is also used for crops, hay, or pasture. Many areas have been developed as homesites. A few small areas are used as woodland. The trees in the wooded areas are mixed hardwoods.

Cropland

Suitability: Suited
Management concerns:
- The rock fragments in the surface layer can interfere with cultivation, but generally they are not a problem.
- The hazard of erosion is severe in unprotected areas.
- Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Grassed waterways, diversions, and grade stabilization structures help to prevent gully erosion.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
- Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
- Erosion is a severe hazard on construction sites.
- The slope is a moderate limitation on sites for septic tank absorption fields.
- The slow permeability or the depth to bedrock in some areas may be a limitation on sites for septic tank absorption fields.
- Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.

• The slope is a moderate limitation affecting the construction of buildings.
• The moderate shrink-swell potential may be a limitation on sites for buildings.
• Low strength is a severe limitation affecting the construction of roads.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock. They should be installed in the deepest areas of this soil.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 5A

Dz—Dunning silt loam

Setting

This soil is on nearly level flood plains, mainly along Opequon Creek and its tributaries in the Great Valley. Most areas of the soil that have not been drained previously are considered to be wetlands. A Federal permit may be required before these areas are disturbed.

Composition

Dunning soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 10 inches—black silt loam
10 to 16 inches—very dark gray silty clay loam that has brown mottles

Subsoil:
16 to 21 inches—dark gray silty clay that has light olive brown mottles
21 to 40 inches—yellowish brown silty clay that has light gray and light brownish gray mottles
40 to 48 inches—yellowish brown loam that has light gray mottles

Underlying material:
48 to 70 inches—yellowish brown sandy clay loam

Soil Properties and Qualities

Drainage class: Poorly drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: High
Depth to the seasonal high water table: Within a depth of 6 inches
Flooding: Occasionally flooded (a 5 to 50 percent chance in any year) for brief periods
Shrink-swell potential: Moderate
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The moderately well drained Lindside soils
• Soils that do not have the thick, dark surface layer typical of the Dunning soil
Similar soils:
• The very poorly drained Fairplay soils
• Soils that are not clayey in the subsoil and underlying material

Use and Management

Uses: Most areas of the Dunning soil have been cleared and are used for pasture or hay. Some areas have been drained and are used as cropland. Many areas are used as woodland. The trees in the wooded areas are mixed hardwoods.

Cropland

Suitability: Suited
Management concerns:
• This soil must be properly protected if cultivated crops are grown year after year.
• Most climatically adapted crops cannot be grown unless an adequate drainage system is installed.
• The wetness may delay tillage and planting in the spring.
• The flooding occasionally delays fieldwork or damages crops.
• This soil is subject to streambank erosion in some areas.

Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Leaving a border of trees along streams helps to prevent excessive erosion on streambanks.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Grazing during wet periods causes surface compaction and poor tilth and damages the sod.
• The flooding occasionally deposits debris on the grassland.
• Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Restricted grazing during wet periods helps to minimize compaction and maintain tilth.
• The hay and pasture plants that can withstand the wetness should be selected for planting.
• Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• The use of equipment is restricted during wet periods because this soil is soft when wet.
• The seasonal high water table may restrict the rooting depth of some trees, resulting in a high seedling mortality rate and windthrow.
• Competition from weeds may slow the growth of planted tree seedlings.
• Plant competition is severe if openings are made in the canopy.
Management measures:
• Year-round logging roads require additions of roadfill and gravel.
• The tree species that can withstand the wetness should be selected for planting.
• Harvest methods that do not leave the remaining trees widely spaced reduce the hazard of windthrow.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
• Because of the flooding and the wetness, this soil is not suited to building site development.
• Because of the flooding, the wetness, and the slow permeability, this soil is not suited to septic tank absorption fields.
• The flooding, low strength, and the wetness are severe limitations affecting the construction of local roads and streets.
Management measures:
• Soils that are better suited to buildings and septic tank absorption fields should be selected for development.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by low strength and wetness.

Interpretive Groups

Land capability classification: IVw
Woodland ordination symbol: 5W

Fa—Fairplay (marl) silt loam

Setting

This soil is on nearly level flood plains below limestone springs in the Great Valley. Most areas of the soil that have not been drained previously are considered to be wetlands. A Federal permit may be required before these areas are disturbed.

Composition

Fairplay soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Surface layer:
0 to 6 inches—very dark grayish brown marly silt loam that has common yellowish brown mottles
6 to 15 inches—very dark gray marly silt loam that has common light olive brown mottles

Subsoil:
15 to 23 inches—dark gray marly silt loam that has

common light olive brown mottles

Underlying material:
23 to 30 inches—dark grayish brown marly loam that has common light olive brown mottles
30 to 36 inches—dark grayish brown marly loam that has common olive yellow mottles
36 to 39 inches—very dark gray marly silt loam that has common light brownish gray and few olive brown mottles
39 to 49 inches—gray marly loam that has common light brownish gray and few light olive brown mottles
49 to 65 inches—grayish brown marly loam that has common light brownish gray and few light olive brown mottles

Soil Properties and Qualities

Drainage class: Very poorly drained
Permeability: Slow to moderately rapid (0.06 inch to 6.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: Within a depth of 6 inches
Flooding: Frequently flooded (more than a 50 percent chance of flooding in any year)
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, slightly alkaline or moderately alkaline (pH 7.4 to 8.4)
Surface runoff: Slow or ponded
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The well drained Lappans soils
• The moderately well drained Lindside soils
Similar soils:
• The poorly drained Dunning soils
• Soils that have a thick, organic surface layer

Use and Management

Uses: Most areas of the Fairplay soil have been cleared and are used as pasture. Some areas are ponded and used for growing watercress. Some are wooded.

Cropland

Suitability: Not suited
Management concerns:
• This soil is not suited to conventional row crops because of the wetness. Water ponded on the surface of the soil restricts the rooting depth of many plants.

Pasture and Hayland

Suitability: Not suited to hay; limited suitability for pasture because of the wetness; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Because this soil is soft when wet, grazing early in spring damages the sod.
• Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Pasture plants that can withstand the flooding, the ponding, and the wetness should be selected for planting.
• Grazing should be deferred in the spring until the soil is firm.
• Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.
• Applications of fertilizer generally are necessary to increase the amount of available nutrients in the soil. Applications of lime generally are not needed.

Woodland

Potential productivity: Moderately high for water-tolerant species
Management concerns:
• Because of the wetness, the seedling mortality rate, and plant competition, trees generally are not planted in areas of this soil.
• The use of vehicular equipment may be limited because of the wetness.
Management measures:
• The tree species that can withstand the wetness should be selected for planting.

Community Development

Suitability: Not suited
Management concerns:
• Because of the flooding, the ponding, and the wetness, this soil is unsuited to building site development, septic tank absorption fields, and local roads and streets. A better suited soil should be selected for development.

Interpretive Groups

Land capability classification: Vw
Woodland ordination symbol: 4W

Fk—Funkstown silt loam

Setting

This soil is in nearly level, slightly concave upland drainageways in the Great Valley. It is in areas that have no defined stream channels. Sinkholes are common in some areas.

Composition

Funkstown soil and similar soils: 70 percent
Dissimilar inclusions: 30 percent

Representative Profile

Surface layer:
0 to 11 inches—dark yellowish brown silt loam

Subsoil:
11 to 16 inches—dark yellowish brown gravelly loam
16 to 27 inches—yellowish brown very gravelly loam
27 to 47 inches—variegated strong brown and brownish yellow clay
47 to 65 inches—variegated brownish yellow and strong brown clay

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: 2.0 to 3.5 feet
Flooding: Occasionally flooded (a 10 to 50 percent chance in any year) for brief periods by runoff from higher, adjacent uplands; ponded for longer periods of time in some areas
Shrink-swell potential: Moderate in the lower part of the subsoil
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to neutral (pH 5.6 to 7.3)
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
- The well drained Hagerstown and Duffield soils and the moderately well drained Swanpond soils, which are on the slightly higher, convex part of the landscape
- Areas of Funkstown soils that are not subject to flooding or ponding; on the slightly higher, linear part of the landscape
- Soils that are less than 60 inches deep over bedrock
- Areas of limestone rock outcrop

Similar soils:
- Soils that have slopes of more than 3 percent
- Well drained soils

Use and Management

Uses: Most areas of the Funkstown soil are used for cultivated crops, orchards, hay, or pasture. A few areas are wooded.

Cropland

Suitability: Well suited. This soil is prime farmland.
Management concerns:
- This soil must be properly protected if cultivated crops are grown year after year.
- The flooding may occasionally damage crops or delay fieldwork.
- Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- This soil is poorly suited to fruits, nuts, and berries because of the poor air drainage, which increases the chance for frost damage.

Management measures:
- Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
- Timing fertilizer applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Well suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases

the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.

Management measures:

• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.

• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high

Management concerns:

• Competition from weeds may slow the growth of planted tree seedlings.

Management measures:

• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited

Management concerns:

• Because of the flooding and the ponding, this soil generally is not suited to buildings and septic tank absorption fields.

• The flooding and the ponding are severe limitations on sites for local roads and streets.

Management measures:

• Areas of the included soils that are not subject to flooding should be selected for development.

• In many areas buildings and roads can be constructed on well compacted fill material, which raises the site above the level of flooding or ponding. Culverts are needed to maintain the natural drainage system.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 5A

FnA—Funkstown silt loam, nonflooded

Setting

This soil is on nearly level, smooth, topographically low uplands in the Great Valley. Sinkholes occur in some areas.

Composition

Funkstown soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 8 inches—dark brown silt loam
8 to 14 inches—brown silt loam

Subsurface layer:
14 to 19 inches—yellowish brown silt loam

Subsoil:
19 to 30 inches—brown silt loam
30 to 40 inches—strong brown gravelly loam
40 to 65 inches—yellowish red clay

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: 2.0 to 3.5 feet
Flooding: None
Shrink-swell potential: Moderate in the lower part of the subsoil
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to neutral (pH 5.6 to 7.3)
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:

• Areas of Funkstown soils that are subject to shallow flooding or to ponding for brief periods; along drainageways and in depressions

• The well drained Hagerstown and Duffield soils and the moderately well drained Swanpond soils, which are on the slightly higher, convex part of the landscape

• Soils that are less than 60 inches over bedrock

• Areas of limestone rock outcrop

Similar soils:

• Soils that have a gravelly surface layer

Use and Management

Uses: Most areas of the Funkstown soil are used for cultivated crops, orchards, hay, or pasture. A few small areas are wooded or are used as sites for community development.

Cropland

Suitability: Well suited. This soil is prime farmland.

Management concerns:
• This soil must be properly protected if cultivated crops are grown year after year.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Poor air drainage limits the use of this soil for orchards.
Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The seasonal high water table is the main limitation affecting building sites, septic tank absorption fields, and local roads and streets.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• The moderate shrink-swell potential is a limitation on sites for dwellings with basements.
Management measures:
• The included Hagerstown and Duffield soils, which are better suited to buildings and septic tank absorption fields than the Funkstown soil, should be selected for development.
• Buildings can be constructed on well compacted fill, which raises the site a sufficient distance above the water table.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and to protect the ground water from pollution.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 5A

FsA—Funkstown gravelly silt loam, nonflooded

Setting

This soil is on nearly level, smooth, topographically low uplands in the Great Valley. Sinkholes occur in some areas.

Composition

Funkstown soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 10 inches—dark grayish brown gravelly silt loam

Subsoil:
10 to 26 inches—yellowish brown gravelly silt loam

26 to 65 inches—variegated strong brown and red silty clay

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: 2.0 to 3.5 feet
Flooding: None
Shrink-swell potential: Moderate in the lower part of the subsoil
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to neutral (pH 5.6 to 7.3)
Surface runoff: Slow
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
• Areas of Funkstown soils that are subject to shallow flooding or to ponding for brief periods; along drainageways and in depressions
• The well drained Hagerstown and Duffield soils and the moderately well drained Swanpond soils, which are on the slightly higher, convex part of the landscape
• Soils that are less than 60 inches deep over bedrock
• Areas of limestone rock outcrop
Similar soils:
• Soils that have a very gravelly surface layer

Use and Management

Uses: Most areas of the Funkstown soil are used for cultivated crops, orchards, hay, or pasture. A few areas are wooded or are used as sites for community development.

Cropland

Suitability: Well suited. This soil is prime farmland.
Management concerns:
• This soil must be properly protected if cultivated crops are grown year after year.
• In some areas large numbers of rock fragments in the surface layer may interfere with planting and cultivation.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• This soil is limited as a site for orchards because frost pockets can cause crop damage.
Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Well suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The seasonal high water table is the main limitation on sites for buildings, septic tank absorption fields, and local roads and streets.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by

surface runoff and by seepage from septic tank absorption fields.
• The rock fragments in the surface layer may interfere with landscaping and establishment of lawns.
Management measures:
• The included Hagerstown and Duffield soils, which are better suited to buildings and septic tank absorption fields than the Funkstown soil, should be selected for development.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and to protect the ground water from pollution.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 5A

HbA—Hagerstown silt loam, 0 to 3 percent slopes

Setting

This soil is on nearly level, slightly convex uplands in the eastern and central parts of the Great Valley. It is in areas dissected by shallow, intermittent drainageways. Sinkholes occur in some areas.

Composition

Hagerstown soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

Surface layer:
0 to 10 inches—brown silt loam

Subsurface layer:
10 to 17 inches—strong brown silt loam

Subsoil:
17 to 26 inches—yellowish red silty clay loam that has common very dark gray stains and concretions of iron and manganese oxide
26 to 45 inches—reddish brown silty clay that has many very dark gray stains and concretions of iron and manganese oxide
45 to 63 inches—red clay that has brownish yellow mottles and many very dark gray stains of iron and manganese oxide

Underlying layer:
63 to 71 inches—variegated yellowish brown, brown, and yellowish red silty clay loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
• The moderately well drained Swanpond soils
• The moderately well drained Funkstown soils that are subject to flooding and ponding; in shallow, intermittent drainageways and in sinkholes
• Areas of limestone rock outcrop, which can occur singly or in parallel ridges
• The moderately deep Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
Similar soils:
• Soils that have slopes ranging from 3 to 8 percent
• Soils that are not as red in the subsoil as is typical of the Hagerstown soil

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used for cultivated crops, orchards, hay, or pasture or as sites for community development. A few small areas are wooded.

Cropland

Suitability: Well suited. This soil is prime farmland.
Management concerns:
• This soil must be properly protected if cultivated crops are grown year after year.
• Sinkholes and solution channels in the bedrock

increase the hazard of ground-water pollution caused by applications of pesticides, manure, and fertilizers; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water by nutrients.
• The limestone rock outcrop may limit the direction of cultivation in some areas.
• Poor air drainage may limit the use of this soil for orchards.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Well suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Low strength may limit the use of logging equipment, especially during wet periods.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Logging should be deferred during wet periods.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas restricted permeability is a limitation.
• Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• The moderate shrink-swell potential is a limitation on sites for buildings.
• In some areas the hard, nonrippable limestone bedrock may limit excavations, including those for roads, septic tank absorption fields, and foundations. In most areas the bedrock has to be blasted before it can be excavated.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: I
Woodland ordination symbol: 5C

HbB—Hagerstown silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, convex limestone uplands in the eastern and central parts of the Great Valley. It is in areas dissected by shallow, intermittent drainageways. Sinkholes are common in some areas.

Composition

Hagerstown soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 10 inches—brown silt loam

Subsurface layer:
10 to 17 inches—strong brown silt loam

Subsoil:
17 to 26 inches—yellowish red silty clay loam that has common very dark gray stains and concretions of iron and manganese oxide
26 to 45 inches—reddish brown silty clay that has many very dark gray stains and concretions of iron and manganese oxide
45 to 63 inches—red clay that has brownish yellow mottles and many very dark gray stains of iron and manganese oxide

Underlying layer:
63 to 71 inches—variegated yellowish brown, brown, and yellowish red silty clay loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
- The moderately well drained Funkstown soils that are subject to flooding and ponding; along shallow, intermittent drainageways and in sinkholes
- The moderately well drained Swanpond soils
- Severely eroded soils that have a surface layer of silty clay loam or silty clay
- Areas of limestone rock outcrop, which can occur singly or in parallel ridges
- The moderately deep Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
- The deep Endcav soils

Similar soils:
- The well drained Duffield soils on ridges
- Soils that are not as red in the subsoil as is typical of the Hagerstown soil
- Soils that have slopes of less than 3 percent.
- Soils that have slopes ranging from 8 to 15 percent

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used for cultivated crops, orchards, hay, or pasture or as sites for community development. A few small areas are wooded.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
- The hazard of erosion is moderate in unprotected areas.
- Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, manure, and fertilizers; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water by nutrients.
- The limestone rock outcrop may limit the direction of cultivation in some areas.
- Poor air drainage may limit the use of this soil for orchards in some areas.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
- Low strength may limit the use of logging equipment, especially during wet periods.
- Competition from weeds may slow the growth of planted tree seedlings.
- Erosion is a management concern on logging roads and skid trails.

Management measures:
- Logging should be deferred during wet periods.
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
- The hazard of erosion can be reduced by building logging roads and skid trails on the contour and by seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes.

Community Development

Suitability: Limited
Management concerns:
- Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
- In some areas restricted permeability is a limitation.
- Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
- The moderate shrink-swell potential is a limitation affecting the construction of buildings.
- In some areas the hard, nonrippable limestone bedrock may limit excavations, including those for roads, septic tank absorption fields, and foundations. In most areas the bedrock has to be blasted before it can be excavated.
- Erosion is a moderate hazard on construction sites.

Management measures:
- Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
- Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
- Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 5C

HbC—Hagerstown silt loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping uplands in the Great Valley. It is in areas dissected by shallow, intermittent drainageways. Shallow sinkholes occur in some areas.

Composition

Hagerstown soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 7 inches—brown silt loam

Subsurface layer:
7 to 14 inches—strong brown silt loam

Subsoil:
14 to 23 inches—yellowish red silty clay loam that has common very dark gray stains and concretions of iron and manganese oxide
23 to 42 inches—reddish brown silty clay that has many very dark gray stains and concretions of iron and manganese oxide
42 to 60 inches—red clay that has brownish yellow mottles and many very dark gray stains of iron and manganese oxide

Underlying layer:
60 to 68 inches—variegated yellowish brown, brown, and yellowish red silty clay loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil

Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Hard limestone; interbedded with sandstone in some areas

Minor Components

Dissimilar inclusions:
- The moderately well drained Funkstown soils that are subject to flooding and ponding; along shallow drainageways and in sinkholes
- The moderately well drained Swanpond soils
- The deep Endcav soils
- The moderately deep Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
- Severely eroded soils that have a surface layer of silty clay
- Areas of limestone rock outcrop, which can occur singly or in parallel ridges

Similar soils:
- Duffield soils, which are on ridges
- Soils that have a gravelly surface layer
- Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used for cultivated crops, orchards, hay, or pasture or as sites for community development. A few small areas are wooded.

Cropland

Suitability: Suited
Management concerns:
- The hazard of erosion is severe in unprotected areas.
- Solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, manure, and fertilizers.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
- The limestone rock outcrop may limit the direction of cultivation in some areas.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Grassed waterways, diversions, and grade stabilization structures help to prevent gully erosion.
- Including grasses and legumes in crop rotations helps to minimize the loss of nutrients, improve soil structure, and provide nitrogen for use by succeeding crops.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
- Competition from undesirable weeds may slow the growth of planted tree seedlings.

Management measures:
- The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been

cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• Logging should be deferred during wet periods.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The slope is a moderate limitation affecting building site development.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas restricted permeability is a limitation.
• Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• The moderate shrink-swell potential is a limitation affecting the construction of buildings.
• In some areas the hard, nonrippable limestone bedrock may limit excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. In most areas the bedrock must be blasted before it can be excavated.
• Erosion is a severe hazard on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 5C

HcB—Hagerstown silty clay loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, convex limestone upland ridges or hillsides in the Great Valley. It is in areas dissected by shallow, intermittent drainageways. Sinkholes occur in some areas.

Composition

Hagerstown soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 7 inches—dark yellowish brown silty clay loam

Subsoil:
7 to 31 inches—variegated yellowish red and strong brown silty clay
31 to 65 inches—yellowish red silty clay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
• The moderately well drained Swanpond soils, which are in shallow, nearly level depressions and on head slopes
• The moderately well drained Funkstown soils that are subject to flooding and ponding; along shallow, intermittent drainageways and in sinkholes
• Severely eroded soils that have a surface layer of silty clay or clay
• Areas of limestone rock outcrop, which can occur singly or in parallel ridges

• The moderately deep Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
• The deep Endcav soils
Similar soils:
• The well drained Duffield soils
• Soils that have slopes of less than 3 percent
• Soils that have slopes ranging from 8 to 15 percent

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used for crops, hay, or pasture. A few small areas are used for orchards, as woodlots, or as sites for community development.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• The hazard of erosion is moderate in unprotected areas.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water by nutrients.
• The high clay content in the surface layer makes tillage difficult and soil compaction a problem.
• The limestone rock outcrop may limit the direction of tillage in some areas.
• Poor air drainage may limit the use of this soil for orchards in some areas.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.
• Returning crop residue to the soil, adding other organic material, and including grasses and legumes in the cropping sequence help to improve soil structure, increase the rate of water infiltration, and overcome the restricted permeability of the soils.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• Ponds constructed for livestock water are susceptible to seepage and are often unsuccessful.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
• Competition from weeds may slow the growth of planted tree seedlings.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Logging should be deferred during wet periods.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour and by seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes.

Community Development

Suitability: Limited
Management concerns:
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas restricted permeability is a limitation.
• Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks under heavy loads if roads are improperly constructed.

• The moderate shrink-swell potential is a limitation affecting the construction of buildings.
• In some areas the nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. In most areas the bedrock has to be blasted before it can be excavated.
• Erosion is a moderate hazard on construction sites.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Enlarging the absorption area and backfilling with gravel help to overcome the restricted permeability.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 5C

HcC—Hagerstown silty clay loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex upland limestone ridges and hillsides in the Great Valley. It is in areas dissected by shallow, intermittent drainageways. Sinkholes occur in a few areas.

Composition

Hagerstown soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 6 inches—dark yellowish brown silty clay loam

Subsoil:
6 to 29 inches—variegated yellowish red and strong brown silty clay
29 to 65 inches—yellowish red silty clay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
• The moderately well drained Swanpond soils, which are in depressions and on head slopes
• The moderately well drained Funkstown soils that are flooded or ponded; along shallow drainageways
• Severely eroded soils that have a surface layer of silty clay or clay
• Areas of limestone rock outcrop, which can occur singly or in parallel ridges
• The moderately deep Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
• The deep Endcav soils
Similar soils:
• The well drained Duffield soils
• Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used for cultivated crops, orchards, hay, or pasture or as sites for community development. A few small areas are wooded.

Cropland

Suitability: Suited
Management concerns:
• The hazard of erosion is severe in unprotected areas.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.

• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• The high clay content in the surface layer makes tillage difficult and soil compaction a problem.
• Limestone rock outcrop may limit the direction of cultivation in some areas.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.
• Returning crop residue to the soil, adding other organic material, and including grasses and legumes in the cropping sequence help to improve soil structure, increase the rate of water infiltration, and overcome the restricted permeability of the soil.
• Including grasses and legumes in crop rotations also helps to minimize the loss of nutrients and provide nitrogen for use by succeeding crops.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour and by seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes.
• Logging should be deferred during wet periods.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas restricted permeability is a limitation.
• The slope is a limitation affecting most urban uses.
• The moderate shrink-swell potential is a limitation on sites for buildings.
• Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement may crack under heavy loads.
• In some areas the nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. In most areas the bedrock has to be blasted before it can be excavated.
• Erosion is a severe hazard on construction sites.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Septic tank absorption fields should be installed on the contour.
• Enlarging the absorption area and backfilling with gravel help to overcome the restricted permeability.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 5C

HcD—Hagerstown silty clay loam, 15 to 25 percent slopes

Setting

The soil is on moderately steep hillsides in the Great Valley. Sinkholes occur in a few areas.

Composition

Hagerstown soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

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

Subsoil:
5 to 28 inches—variegated yellowish red and strong brown silty clay
28 to 65 inches—yellowish red silty clay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Severe
Slope class: Moderately steep
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
• The moderately deep Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
• The deep Endcav soils
• Severely eroded soils that have a surface layer of silty clay or clay
• Areas of limestone rock outcrop, which can occur singly or in parallel ridges
Similar soils:
• Soils that have slopes ranging from 8 to 15 percent or from 25 to 35 percent

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used as pasture. A few small areas are used as cropland or woodland or for orchards.

Cropland

Suitability: Poorly suited; better suited to hay and pasture because of the hazard of erosion
Management concerns:
• The hazard of erosion is severe in unprotected areas.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• The high clay content in the surface layer makes tillage difficult and soil compaction a problem.
• The limestone rock outcrop may limit the direction of cultivation in some areas.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Returning crop residue to the soil, adding other organic material, and including grasses and legumes in the cropping sequence help to improve soil structure, increase the rate of water infiltration, and overcome the restricted permeability of the soil.
• Including grasses and legumes in crop rotations also helps to minimize the loss of nutrients and provide nitrogen for use by succeeding crops.

• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.
• Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
• Slippage is a hazard on the moderately steep slopes when the soil is wet and soft.
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Logging should be deferred during wet periods.
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas restricted permeability is a limitation.
• The slope is a limitation affecting most urban uses.
• The moderate shrink-swell potential is a limitation on sites for buildings.
• Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement may crack under heavy loads.
• In some areas the nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. In most areas the bedrock has to be blasted before it can be excavated.
• Erosion is a severe hazard on construction sites.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Septic tank absorption fields should be installed on the contour.
• Enlarging the absorption area and backfilling with gravel help to overcome the restricted permeability.
• Buildings should be designed so that they conform to the natural slope of the land. Extensive land shaping is necessary in most areas.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: 5C

HdB—Hagerstown gravelly silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, slightly convex limestone uplands in the Great Valley. It is in areas dissected by shallow, intermittent drainageways. Sinkholes occur in some areas.

Composition

Hagerstown soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 9 inches—brown gravelly silt loam

Subsoil:
9 to 15 inches—yellowish red silty clay loam
15 to 65 inches—red clay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate
Slope class: Gently sloping
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
• The moderately well drained Funkstown soils that are subject to flooding; along shallow, intermittent drainageways and in sinkholes
• The deep Endcav soils
• The moderately well drained Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
• Severely eroded soils that have a surface layer of silty clay
• Areas of limestone rock outcrop, which can occur singly or in parallel ridges
Similar soils:
• The well drained Duffield soils
• Soils that do not have a gravelly surface layer
• Soils that have slopes of less than 3 percent
• Soils that have slopes ranging from 8 to 15 percent

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used for cultivated crops, orchards, hay, or pasture or as sites for community development. A few small areas are wooded.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• The hazard of erosion is moderate.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, manure, and fertilizers; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Rock fragments may interfere with tillage; however, they are neither abundant, only about 15 to 20 percent by volume, nor large enough to interfere seriously.
• Poor air drainage may limit the use of this soil for orchards in some areas.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Low strength may limit the use of logging equipment, especially during wet periods.
• Competition from undesirable plants may slow the growth of planted tree seedlings.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Logging should be deferred during wet periods.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour and by seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes.

Community Development

Suitability: Limited
Management concerns:
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas restricted permeability is a limitation.
• Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• The moderate shrink-swell potential is a limitation on sites for buildings.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• In some areas the hard, nonrippable limestone bedrock may limit excavations, including those for roads, septic tank absorption fields, and foundations. In most areas the bedrock has to be blasted before it can be excavated.
• Erosion is a moderate hazard on construction sites.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the limestone bedrock.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 5C

HdC—Hagerstown gravelly silt loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex limestone uplands in the eastern and central parts of the Great Valley. It is dissected by shallow, intermittent drainageways. Sinkholes occur in a few areas.

Composition

Hagerstown soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

Surface layer:
0 to 8 inches—dark yellowish brown gravelly silt loam

Subsoil:
8 to 65 inches—variegated yellowish red, red, and strong brown clay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
• The moderately well drained Funkstown soils that are subject to flooding; along shallow, intermittent drainageways

- The moderately deep Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
- The deep Endcav soils
- Severely eroded soils that have a surface layer of gravelly silty clay
- Areas of limestone rock outcrop, which can occur singly or in parallel ridges

Similar soils:
- The well drained Duffield soils
- Soils that do not have a gravelly surface layer
- Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used for cultivated crops, orchards, hay, or pasture or as sites for community development. A few small areas are wooded.

Cropland

Suitability: Suited
Management concerns:
- The severe hazard of erosion is a major management concern.
- Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water by nutrients.
- The limestone rock outcrop may limit the direction of cultivation in some areas.
- Rock fragments may interfere with tillage; however, they are neither abundant, only about 15 to 20 percent by volume, nor large enough to interfere seriously.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- Low strength may limit the use of logging equipment, especially during wet periods.
- Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
- The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.
- Logging should be deferred during wet periods.
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
- Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
- In some areas restricted permeability is a limitation.
- The slope is a limitation affecting most urban uses.
- Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
- The moderate or high shrink-swell potential is a limitation on sites for buildings.

• In some areas the nonrippable limestone bedrock may limit excavations, including those for roads, septic tank absorption fields, and foundations. In most areas the bedrock has to be blasted before it can be excavated.
• Erosion is a severe hazard on construction sites.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Septic tank absorption fields should be installed on the contour.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 5C

HdD—Hagerstown gravelly silt loam, 15 to 25 percent slopes

Setting

This soil is on moderately steep, convex hillsides in the Great Valley.

Composition

Hagerstown soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

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

Subsoil:
7 to 42 inches—variegated yellowish red and strong brown silty clay
42 to 55 inches—variegated yellowish red and strong brown silty clay loam
55 to 71 inches—variegated strong brown and dark yellowish brown silt clay loam

Bedrock:
71 inches—hard, bluish gray limestone

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Hard limestone; interbedded with sandstone in some areas

Minor Components

Dissimilar inclusions:
• The moderately well drained Funkstown soils that are subject to flooding; along shallow drainageways
• The deep Endcav soils
• The moderately deep Carbo soils and the shallow Opequon soils, which commonly are in areas near limestone rock outcrop
• Severely eroded soils that have a surface layer of gravelly silty clay loam
• Areas of limestone rock outcrop, which can occur singly or in parallel ridges
Similar soils:
• Duffield soils
• Soils that do not have a gravelly surface layer
• Soils that have slopes ranging from 8 to 15 percent or from 25 to 35 percent

Use and Management

Uses: Most areas of the Hagerstown soil have been cleared and are used for pasture or orchards.

Cropland

Suitability: Poorly suited; better suited to hay and pasture because of the hazard of erosion
Management concerns:
• The severe hazard of erosion in unprotected areas is a major management concern.
• Solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure.

• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Limestone rock outcrop may limit the direction of cultivation in some areas.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Grassed waterways and diversions help to prevent gully erosion.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
• Competition from undesirable plants may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The slope is a severe limitation affecting community development.
• Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is done.
• Solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas restricted permeability is a limitation.
• Low strength is a limitation affecting the construction of roads. Because this soil is soft when wet, pavement cracks under heavy loads if roads are not constructed properly.
• The moderate shrink-swell potential is a limitation on sites for buildings.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• In some areas the nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines. In most areas the bedrock must be blasted before it can be excavated.
• Erosion is a severe hazard on construction sites.
Management measures:
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.
• Buildings should be designed so that they conform to the natural slope of the land. Extensive land shaping is necessary in most areas.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: 5C

HgC—Hagerstown-Opequon-Rock outcrop complex, 3 to 15 percent slopes

Setting

This map unit is on gently sloping or strongly sloping, low ridges in the Great Valley. The limestone rock outcrop generally occurs in parallel clusters that extend in a north-south direction. Sinkholes are common. The bedrock under the soils is steeply tilted, and soil depth may vary greatly within short distances. The two soils and the Rock outcrop occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Hagerstown soil and similar soils: 50 percent
Opequon soil and similar soils: 20 percent
Rock outcrop: 15 percent
Dissimilar inclusions: 15 percent

Representative Profile

Hagerstown

Surface layer:
0 to 5 inches—brown silt loam

Subsurface layer:
5 to 9 inches—brown silty clay loam

Subsoil:
9 to 42 inches—yellowish red clay
42 to 71 inches—yellowish red silty clay

Bedrock:
71 inches—hard, bluish gray limestone

Opequon

Surface layer:
0 to 5 inches—brown silty clay loam

Subsoil:
5 to 18 inches—red clay

Bedrock:
18 inches—hard, bluish gray limestone

Rock outcrop

The Rock outcrop occurs as exposed areas of hard, nonrippable limestone.

Soil Properties and Qualities

Hagerstown

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate or severe
Stoniness: None
Rockiness: 15 percent limestone rock outcrop
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Medium or rapid
Depth to bedrock: More than 60 inches
Bedrock type: Hard, nonrippable limestone

Opequon

Drainage class: Well drained
Permeability: Moderately slow or moderate (0.2 inch to 2.0 inches per hour)
Available water capacity: Low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Moderate or severe
Stoniness: None
Rockiness: 15 percent limestone rock outcrop
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Medium or rapid
Depth to bedrock: 12 to 20 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
- The moderately well drained Funkstown soils that are subject to flooding and ponding; along narrow, concave drainageways and in sinkholes
- The moderately well drained Swanpond soils
- The deep Endcav soils

Similar soils:
- The moderately deep Carbo soils
- Soils that have slopes of less than 3 percent
- Soils that have slopes ranging from 15 to 25 percent
- Soils that have loose limestone flagstones and channers on the surface

Use and Management

Uses: Most areas of this map unit are wooded. Some areas are used as pasture, and a few small areas have been developed as homesites. In the past the small areas between the rock outcroppings were commonly cultivated.

Cropland

Suitability: Not suited
Management concerns:
• This map unit is not suited to cultivated crops or fruit trees because of the rock outcrop, which limits the use of farm machinery and makes tillage impractical.

Pasture and Hayland

Suitability: Not suited to hay; limited suitability for pasture
Management concerns:
• The rock outcrop limits the use of machinery to manage and improve pasture (fig. 7).
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of herbicides and fertilizers.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Figure 7.—A pastured area of Hagerstown-Opequon-Rock outcrop complex, 3 to 15 percent slopes. The rock outcrop hinders the management of pastures.

Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage.

Woodland

Potential productivity: Moderate or moderately high
Management concerns:
• The rock outcrop limits use of logging equipment.
• The rock outcrop and the depth to bedrock should be considered when planning the location of roads and log landings.
• Operating logging equipment during wet periods when the soils are soft results in excessive rutting.
• Competition from weeds may slow the growth of planted tree seedlings.
• The seedling mortality rate may be high in areas of the Opequon soil because of droughtiness.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall, especially in areas of the Opequon soil.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Because of the sticky and plastic subsoil, logging roads should be graveled and, in some areas, log landings should be stabilized.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Drought-tolerant species, such as Virginia pine, Scotch pine, Norway spruce, and white pine, should be selected for planting in areas of the Opequon soil.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.

Community Development

Suitability: Poorly suited
Management concerns:
• The nonrippable bedrock and the rock outcrop may interfere with excavations, including those for roads, foundations, and absorption fields. The depth to bedrock can vary from less than 20 inches to more than 6 feet over a short distance. In most areas the bedrock has to be blasted before it can be excavated.
• The shrink-swell potential is a limitation affecting the construction of footings, foundations, and roads.
• Low strength is an additional limitation affecting the construction of roads.
• The restricted permeability in the subsoil of the Hagerstown soil may prevent the proper functioning of absorption fields in some areas.
• The depth to bedrock and the restricted permeability in the Opequon soil are severe limitations on sites for septic tank absorption fields.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• Erosion is a moderate or severe hazard on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the bedrock because of the hazard of ground-water pollution.
• Selecting areas of the deeper Hagerstown soil as sites for septic tank absorption fields, installing absorption fields on the contour, and enlarging the absorption fields can help to overcome the limitations in absorption areas.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIs
Woodland ordination symbol: Hagerstown—5C; Opequon—3C

HgE—Hagerstown-Opequon-Rock outcrop complex, 15 to 35 percent slopes

Setting

This map unit is on moderately steep or steep hillsides in the Great Valley. The limestone rock outcrop generally occurs in parallel clusters that extend in a north-south direction. Sinkholes are common. The bedrock under the soils is steeply tilted, and soil depth may vary greatly within short distances. The two soils and the Rock outcrop occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Hagerstown soil and similar soils: 40 percent
Opequon soil and similar soils: 30 percent
Rock outcrop: 20 percent
Dissimilar inclusions: 10 percent

Representative Profile

Hagerstown

Surface layer:
0 to 3 inches—very dark grayish brown silt loam
3 to 5 inches—brown silt loam

Subsoil:
5 to 9 inches—reddish brown silty clay
9 to 36 inches—reddish brown clay
36 to 65 inches—variegated yellowish red, red, and strong brown clay

Opequon

Surface layer:
0 to 5 inches—brown silty clay loam

Subsoil:
5 to 18 inches—red clay

Bedrock:
18 inches—hard, bluish gray limestone

Rock outcrop

The Rock outcrop occurs as exposed areas of hard, nonrippable limestone.

Soil Properties and Qualities

Hagerstown

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Very severe
Stoniness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid or very rapid
Depth to bedrock: More than 60 inches
Bedrock type: Hard, nonrippable limestone

Opequon

Drainage class: Well drained
Permeability: Moderately slow or moderate (0.2 inch to 2.0 inches per hour)
Available water capacity: Low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Very severe
Stoniness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Rapid or very rapid
Depth to bedrock: 12 to 20 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
• The deep Endcav soils
• Severely eroded soils that have a surface layer of silty clay or clay
Similar soils:
• The moderately deep Carbo soils
• Soils that have slopes ranging from 8 to 15 percent
• Soils that have slopes of more than 35 percent
• Soils that have loose limestone flagstones and channers on the surface

Use and Management

Uses: Most areas of this map unit are wooded. A few small areas are used as pasture. In a few areas the acreage is idle land.

Cropland

Suitability: Not suited
Management concerns:
• This map unit is not suited to cultivated crops or fruit trees because of the slope and the rock outcrop, which limit the use of modern farm machinery and make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hay; difficult to manage for pasture
Management concerns:
• The slope and the rock outcrop limit the use of machinery to manage and improve pasture.
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.

• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution caused by applications of herbicides and fertilizers.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage.

Woodland

Potential productivity: Moderate or moderately high
Management concerns:
• The rock outcrop limits the use of logging equipment.
• The rock outcrop and the depth to bedrock should be considered when planning the location of roads and log landings.
• Operating logging equipment during wet periods when the soils are soft results in excessive rutting.
• Slippage is a hazard on the moderately steep and steep slopes when the soils are wet and soft.
• Competition from weeds may slow the growth of planted tree seedlings.
• Because of the droughtiness, seedling mortality may be a problem, especially on south aspects of the Opequon soil.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall, especially in areas of the Opequon soil.
• Erosion is a severe hazard on logging sites.
Management measures:
• Because of the sticky and plastic subsoil, logging roads should be graveled and, in some areas, log landings should be stabilized.
• Drought-tolerant species, such as Virginia pine, Scotch pine, Norway spruce, and white pine, should be selected for planting in areas of the Opequon soil.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Tree plantations should be on north-facing slopes where possible.
• Seedlings should be mulched in areas where mulching is practical.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.

Community Development

Suitability: Poorly suited
Management concerns:
• The slope is a severe limitation affecting most urban uses. Extensive land shaping is necessary in most areas.
• The depth to hard, nonrippable limestone bedrock and the rock outcrop may limit excavations, including those for roads, foundations, septic tank absorption fields, and sewer lines. The depth to bedrock may vary from less than 20 inches to more than 6 feet over a short distance. In most areas the bedrock has to be blasted before it is excavated.
• The moderate or high shrink-swell potential is a limitation affecting the construction of footings, foundations, and roads.
• Low strength is a limitation on sites for roads. Because these soils are soft when wet, pavement may crack under heavy loads.
• Slippage is a hazard on the moderately steep and steep slopes when the soils are wet and soft.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The slope, the depth to bedrock, and the restricted permeability of the Opequon soil are severe limitations on sites for septic tank absorption fields.
• Erosion is a moderate or severe hazard on construction sites.
Management measures:
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock because of the hazard of ground-water pollution.
• Selecting areas of the deeper Hagerstown soil as

sites for absorption fields, installing absorption fields on the contour, and enlarging the absorption fields can help to overcome the limitations in absorption areas.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: Hagerstown—5C; Opequon—2R on south aspects and 3R on north aspects

HkF—Hazleton-Berks channery loams, 35 to 65 percent slopes, extremely stony

Setting

These soils are on very steep hillsides on the western side of North Mountain. The Hazleton soil is generally on the less sloping middle and lower parts of the hillsides, and the Berks soil is generally on the more sloping shoulder slopes, nose slopes, and higher part of the hillsides. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Hazleton soil and similar soils: 50 percent
Berks soil and similar soils: 40 percent
Dissimilar inclusions: 10 percent

Representative Profile

Hazleton

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 4 inches—black channery loam

Subsurface layer:
4 to 11 inches—dark yellowish brown channery loam

Subsoil:
11 to 15 inches—yellowish brown very channery loam
15 to 37 inches—strong brown very channery loam
37 to 48 inches—strong brown very channery sandy loam

Underlying material:
48 to 65 inches—strong brown very channery sandy loam

Berks

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

Subsurface layer:
3 to 8 inches—brown to dark brown channery loam

Subsoil:
8 to 30 inches—strong brown very channery silt loam
30 to 36 inches—strong brown extremely channery silt loam

Bedrock:
36 inches—fractured, grayish brown shale

Soil Properties and Qualities

Hazleton

Drainage class: Well drained
Permeability: Moderately rapid or rapid (2.0 to 20.0 inches per hour)
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: 3 to 15 percent of the surface covered with stones
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.6 to 5.5)
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches
Bedrock type: Mainly acid sandstone; interbedded with shale and siltstone in some areas

Berks

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Very low to moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Slope class: Very steep
Stoniness: 3 to 15 percent of the surface covered with stones
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.6 to 5.5)
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Mainly acid shale and siltstone; interbedded with sandstone in some areas

Minor Components

Dissimilar inclusions:
- Areas of rock outcrop
- The moderately well drained Buchanan soils, which are on footslopes and benches
- The well drained Blackthorn soils that have a clayey subsoil and are underlain by limestone; on benches

Similar soils:
- Small areas of the shallow Weikert soils
- Rubbly soils that have 15 to 50 percent of their surface covered with stones and boulders
- The well drained, reddish Calvin soils
- The somewhat excessively drained Dekalb soils
- Areas where stones cover less than 3 percent of the surface
- Soils that have slopes of more than 65 percent or less than 35 percent

Use and Management

Uses: Nearly all areas of the Hazleton and Berks soils are wooded.

Cropland

Suitability: Not suited
Management concerns:
- The very steep slope, the very severe hazard of erosion, and the stones on the surface of the soils make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hay; limited suitability for pasture
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
- If pastures are overgrazed, erosion is a very severe hazard in areas where the plant cover has been destroyed.
- Because of the slope and the stones on the surface of the soils, it is difficult to safely operate conventional farm equipment.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate on south aspects; moderately high on north aspects
Management concerns:
- Erosion is a severe hazard on logging sites.
- Operating logging equipment is hazardous because of the very steep slope.
- The large stones on the surface of the soils can hinder harvesting operations and damage equipment.
- The limited rooting depth, the low natural fertility, and the droughtiness of the Berks soil result in a high seedling mortality rate, especially on south aspects.

Management measures:
- Because of the slope, special care should be taken when logging roads and log landings are laid out and logging equipment is operated. Logging roads should be designed so that they conform to the topography.
- Because of the erosion hazard, water should be removed from logging roads by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid trails, and log landings to perennial grasses and legumes after the trees are logged also help to prevent excessive erosion.
- Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
- Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
- Planting should be timed so that seedlings can take full advantage of spring rains.
- Tree plantations should be on north-facing slopes where possible.

Community Development

Suitability: Not suited
Management concerns:
- The very steep slope is a severe limitation affecting community development. A better suited soil should be selected for development.
- Erosion is a very severe hazard on construction sites.

Management measures:
- Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: Hazleton—3R on south aspects and 4R on north aspects; Berks—3R on south aspects and 4R on north aspects

HsE—Hazleton-Dekalb complex, 15 to 35 percent slopes, extremely stony

Setting

These soils are on moderately steep or steep hillsides, mainly on Third Hill and Sleepy Creek Mountains. The Hazleton soil is on the linear or concave middle and lower parts of the hillsides, and the Dekalb soil is on convex shoulder slopes, nose slopes, and the upper part of hillsides. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Hazleton soil and similar soils: 45 percent
Dekalb soil and similar soils: 40 percent
Dissimilar inclusions: 15 percent

Representative Profile

Hazleton

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 4 inches—very dark brown channery loam

Subsurface layer:
4 to 11 inches—dark yellowish brown channery sandy loam

Subsoil:
11 to 15 inches—yellowish brown very channery loam
15 to 37 inches—strong brown very channery loam
37 to 48 inches—strong brown very channery sandy loam

Underlying material:
48 to 65 inches—strong brown very channery sandy loam

Dekalb

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 2 inches—very dark brown channery sandy loam

Subsurface layer:
2 to 4 inches—brown channery sandy loam

Subsoil:
4 to 13 inches—yellowish brown very channery sandy loam
13 to 26 inches—brown very channery sandy loam

Bedrock:
26 inches—fractured, gray sandstone

Soil Properties and Qualities

Hazleton

Drainage class: Well drained
Permeability: Moderately rapid or rapid (2.0 to 20 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: 3 to 15 percent of the surface covered with stones
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches
Bedrock type: Interbedded, acid sandstone, shale, and siltstone

Dekalb

Drainage class: Somewhat excessively drained
Permeability: Rapid (6.0 to 20 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: 3 to 15 percent of the surface covered with stones
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Mainly acid sandstone; interbedded with shale and siltstone in some areas

Minor Components

Dissimilar inclusions:
• The moderately well drained Buchanan soils, which are on the less sloping benches and the lower part of hillsides
• Very rubbly soils that have more than 50 percent of their surface covered with stones and boulders

• Areas of rock outcrop
• Areas of soils that are not stony
Similar soils:
• The well drained Berks soils, which are on nose slopes and are underlain by shale
• The well drained, reddish Calvin soils, which are on convex nose slopes
• Soils that have slopes ranging from 8 to 15 percent
• Soils that have slopes of more than 35 percent
• Areas where stones cover less than 3 percent of the surface
• Rubbly soils that have 15 to 50 percent of their surface covered with stones and boulders

Use and Management

Uses: Most areas of this map unit are wooded.

Cropland

Suitability: Not suited
Management concerns:
• The slope and the stones on the surface of the soils make tillage impractical and unsafe.

Pasture and Hayland

Suitability: Not suited to hay; limited suitability for pasture
Management concerns:
• Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
• If pastures are overgrazed, erosion is a very severe hazard in areas where the plant cover has been destroyed.
• Because of the slope and the stones on the surface of the soils, it is difficult to operate conventional equipment used in clipping and in applying fertilizer.
• Water for livestock is scarce, but potential sites where ponds or springs can be developed generally are available along nearby drainageways.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate on south aspects; moderate or moderately high on north aspects
Management concerns:
• Erosion is a very severe hazard on logging sites.
• The large stones on the surface of the soils can hinder harvesting operations and damage equipment.
• The low natural fertility and the droughtiness of the Dekalb soil result in a high seedling mortality rate, especially on south aspects.
• Competition from weeds may slow the growth of planted tree seedlings in areas of the Hazleton soil.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall, especially in areas of the Dekalb soil.
Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Tree plantations should be on north-facing slopes where possible.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The slope is a severe limitation on sites for buildings, septic tank absorption fields, and local roads and streets. Extensive land shaping is necessary in most areas.
• The depth to hard bedrock is a severe limitation in areas of the Dekalb soil. In many areas the bedrock has to be blasted before it can be excavated.
• Erosion is a very severe hazard on construction sites.
Management measures:
• Selecting areas of the very deep Hazleton soil as sites for septic tank absorption fields, installing distribution lines on the contour, selecting the less sloping areas for absorption fields, and land shaping can help to overcome the limitations in absorption areas.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: Hazleton—3R on south aspects and 4R on north aspects; Dekalb—2R on south aspects and 3R on north aspects

HsF—Hazleton-Dekalb complex, 35 to 65 percent slopes, extremely stony

Setting

These soils are on very steep hillsides on Third Hill and Sleepy Creek Mountains and on the eastern aspect of North Mountain. The Hazleton soil is on the linear or concave middle and lower parts of the hillsides, and the Dekalb soil is on convex shoulder slopes, nose slopes, and the upper part of hillsides. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Hazleton soil and similar soils: 60 percent
Dekalb soil and similar soils: 25 percent
Dissimilar inclusions: 15 percent

Representative Profile

Hazleton

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 4 inches—very dark brown channery loam

Subsurface layer:
4 to 11 inches—dark yellowish brown channery loam

Subsoil:
11 to 15 inches—yellowish brown very channery loam
15 to 37 inches—strong brown very channery loam
37 to 48 inches—strong brown very channery sandy loam

Underlying material:
48 to 65 inches—strong brown very channery sandy loam

Dekalb

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 2 inches—very dark brown channery sandy loam

Subsurface layer:
2 to 4 inches—brown channery sandy loam

Subsoil:
4 to 13 inches—yellowish brown very channery sandy loam
13 to 26 inches—brown very channery sandy loam

Bedrock:
26 inches—fractured, gray sandstone

Soil Properties and Qualities

Hazleton

Drainage class: Well drained
Permeability: Moderately rapid or rapid (2.0 to 20 inches per hour)
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: 3 to 15 percent of the surface covered with stones
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Very rapid
Depth to bedrock: More than 60 inches
Bedrock type: Interbedded acid sandstone, siltstone, and shale

Dekalb

Drainage class: Somewhat excessively drained
Permeability: Rapid (6.0 to 20 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: 3 to 15 percent of the surface covered with stones
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Mainly acid sandstone; interbedded with shale and siltstone in some areas

Minor Components

Dissimilar inclusions:
• The moderately well drained Buchanan soils, which are on the less sloping benches and the lower part of the hillsides
• Very rubbly soils that have more than 50 percent of their surface covered with stones and boulders

• Areas of rock outcrop
Similar soils:
• The well drained Berks soils
• The reddish, well drained Calvin soils
• Stony areas where stones cover less than 3 percent of the surface
• Rubbly areas where stones cover 15 to 50 percent of the surface
• Soils that have slopes ranging from 25 to 35 percent
• Soils that have slopes of more than 65 percent

Use and Management

Uses: Most areas of this map unit are wooded.

Cropland

Suitability: Not suited
Management concerns:
• Because of the slope and the stones on the surface of the soils, it is difficult to safely operate conventional farm equipment.

Pasture and Hayland

Suitability: Not suited to hay; limited suitability for pasture
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
• If pastures are overgrazed, erosion is a very severe hazard in areas where the plant cover has been destroyed.
• Because of the very steep slope and the stones on the surface of the soils, it is difficult to safely operate conventional equipment used in clipping and in applying fertilizer.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.

Woodland

Potential productivity: Moderate on south aspects; moderate or moderately high on north aspects
Management concerns:
• Erosion is a severe hazard on logging sites.
• Operating logging equipment is hazardous because of the very steep slope.
• The large stones on the surface of the soils can hinder harvesting operations and damage equipment.
• The limited depth to bedrock, the low natural fertility, and the droughtiness of the Dekalb soil result in a high seedling mortality rate, especially on south aspects.
• Because the bedrock restricts the growth of roots, trees may be uprooted during periods of strong winds or heavy snowfall, especially in areas of the Dekalb soil.
Management measures:
• Because of the slope, special care should be taken when logging roads and log landings are laid out and logging equipment is operated. Logging roads should be designed so that they conform to the topography.
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Tree plantations should be on north-facing slopes where possible.

Community Development

Suitability: Not suited
Management concerns:
• Because of the very steep slope, these soils are not suited to building site development, septic tank absorption fields, or local roads and streets. A better suited soil should be selected for development.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: Hazleton—3R on south aspects and 4R on north aspects; Dekalb—2R on south aspects and 3R on north aspects

Hu—Huntington silt loam

Setting

This soil is on nearly level flood plains, mainly along Opequon Creek and its tributaries.

Composition

Huntington soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 11 inches—dark brown silt loam

Subsoil:
11 to 21 inches—dark grayish brown silt loam
21 to 42 inches—dark yellowish brown silt loam
42 to 58 inches—yellowish brown silt loam

58 to 65 inches—dark yellowish brown silt loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year) for brief periods
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
- The moderately well drained Lindside soils
- The poorly drained Dunning soils
- The well drained Combs soils, which have a higher content of sand than the Huntington soil
- Soils that do not have the thick, dark surface layer that is typical of the Huntington soil

Similar soils:
- The well drained Lappans soils
- Soils that have slopes of more than 3 percent

Use and Management

Uses: Most areas of the Huntington soil are used for cultivated crops or hay. Some areas are used as pasture. A few areas are wooded.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
- This soil must be properly protected if cultivated crops are grown year after year.
- The flooding occasionally damages crops or delays fieldwork.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of surface water by nutrients.
- This soil is poorly suited to orchards because of the poor air drainage, which increases the chance for frost damage.
- This soil is subject to streambank erosion in many areas.

Management measures:
- Conservation tillage, winter cover crops, and crop residue management help to maintain soil tilth and fertility and to control erosion.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Leaving a border of trees along streams helps to prevent excessive erosion on streambanks.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.
- The flooding occasionally deposits debris on the grassland.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
- Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
- Because of the flooding, this soil is not suited to building site development or septic tank absorption fields.
- The flooding is a severe limitation on sites for local roads and streets.

Management measures:
• Soils that are better suited to buildings and septic tank absorption fields than the Huntington soil should be selected for development.
• Constructing roads on raised fill material helps to prevent the damage caused by flooding.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 5A

La—Lappans (marl) loam

Setting

This soil is on nearly level flood plains along streams fed by springs flowing from limestone bedrock in the Great Valley.

Composition

Lappans soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Surface layer:
0 to 7 inches—very dark brown marly loam

Subsurface layer:
7 to 13 inches—light olive brown marly sandy loam
13 to 20 inches—dark grayish brown marly sandy loam

Subsoil:
20 to 26 inches—light yellowish brown marly sandy loam
26 to 42 inches—gray marly loam that has pale brown and white mottles
42 to 47 inches—white marly clay loam that has gray and pale brown mottles
47 to 54 inches—light brownish gray marly clay loam that has yellowish brown mottles
54 to 64 inches—light gray marly clay loam that has very pale brown mottles
64 to 71 inches—light gray marly sandy loam that has very pale brown mottles
71 to 78 inches—gray marly clay loam that has dark yellowish brown mottles
78 to 85 inches—light brownish gray marly clay loam that has light yellowish brown and white mottles

Underlying material:
85 to 99 inches—light gray marly loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid or rapid (2.0 to 20 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year) for brief periods
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, slightly alkaline or moderately alkaline (pH 7.4 to 8.4)
Surface runoff: Slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The very poorly drained Fairplay soils
• The poorly drained Dunning soils
Similar soils:
• Moderately well drained soils

Use and Management

Uses: Most areas of the Lappans soil are used as pasture. Some are used for cultivated crops or hay (fig. 8). A few small areas are forested. In some areas marl from this soil has been quarried and used as a source of agricultural lime.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• This soil must be properly protected if cultivated crops are grown year after year.
• The flooding occasionally damages crops or delays fieldwork.
• This soil is poorly suited to orchards because of the poor air drainage, which increases the risk of frost damage.
• This soil is subject to streambank erosion in some areas.
• Some crops may suffer deficiencies of certain micronutrients, such as iron and manganese, because this soil is alkaline.
Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to maintain soil tilth and fertility and to control erosion.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Timing fertilizer applications to meet crop nutrient needs, using split fertilizer applications, and applying

Figure 8.—An area of Lappans (marl) loam used for hay.

fertilizer in bands may reduce the risk of nutrient leaching.
- Crops respond well to fertilizer. Applications of lime are not needed.
- Leaving a border of trees along streams helps to prevent excessive erosion on streambanks.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- Because this soil is soft when wet, grazing early in spring damages the sod.
- Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.

Management measures:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
- Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.
- Applications of fertilizer generally are necessary to

increase the amount of available nutrients in the soil. Applications of lime generally are not needed.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
• Because of the flooding, this soil is not suited to building site development or septic tank absorption fields.
• Because of the flooding, low strength, and the potential for frost action, this soil is severely limited as a site for local roads and streets.
Management measures:
• Soils that are better suited to buildings and septic tank absorption fields than the Lappans soil should be selected for development.
• Constructing local roads and streets on raised fill material and installing a drainage system help to overcome the limitations.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 5A

Ln—Lindside silt loam

Setting

This soil is on nearly level flood plains, mainly along Opequon Creek and its tributaries.

Composition

Lindside soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 12 inches—dark yellowish brown silt loam

Subsoil:
12 to 28 inches—dark yellowish brown silt loam
28 to 34 inches—brown silt loam
34 to 40 inches—very dark gray silt loam that has dark gray mottles
40 to 46 inches—dark gray silt loam that has strong brown and yellowish brown mottles

Underlying material:
46 to 66 inches—variegated dark yellowish brown and grayish brown silt loam that has strong brown and white mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderately slow or moderate (0.2 inch to 2.0 inches per hour).
Available water capacity: High
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: Frequently flooded (more than a 50 percent chance in any year) for brief periods
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, strongly acid to slightly alkaline (pH 5.1 to 7.8)
Surface runoff: Slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The poorly drained Dunning soils
• The well drained Huntington and Lappans soils
• The moderately well drained Monongahela soils and the somewhat poorly drained Tygart soils, which are on small terraces and are not subject to flooding
Similar soils:
• Soils that have a clayey subsoil
• Soils that have slopes ranging from 3 to 8 percent
• Soils that have a gravelly surface layer

Use and Management

Uses: Most areas of the Lindside soil are used for pasture, hay, or cultivated crops. A few areas are used as woodland. The trees in the wooded areas are mixed hardwoods.

Cropland

Suitability: Suited
Management concerns:
• This soil must be properly protected if cultivated crops are grown year after year.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of surface water by nutrients.
• The flooding occasionally delays fieldwork or damages crops.
• This soil is subject to streambank erosion in a few areas.

Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Leaving a border of trees along streams helps to prevent excessive erosion on streambanks.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• Grazing during wet periods causes surface compaction and poor tilth and damages the sod.
• Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.
• The flooding occasionally deposits debris on the grassland.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
• Because of the flooding and the wetness, this soil is not suited to building site development or septic tank absorption fields.
• The flooding is a severe limitation on sites for local roads and streets.
Management measures:
• Soils that are better suited to buildings and septic tank absorption fields than the Lindside soil should be selected for development.
• Constructing roads on raised fill material and installing a drainage system help to overcome the limitations.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 5A

MhA—Monongahela silt loam, 0 to 3 percent slopes

Setting

This soil is on nearly level, slightly convex, low stream terraces (fig. 9).

Composition

Monongahela soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 10 inches—dark yellowish brown silt loam

Subsoil:
10 to 21 inches—yellowish brown silt loam
21 to 27 inches—dark yellowish brown silt loam that has yellowish brown and gray mottles
27 to 45 inches—light olive brown, very firm and brittle silt loam that has yellowish brown and gray mottles
45 to 53 inches—yellowish brown, firm and brittle clay loam that has gray mottles

Underlying material:
53 to 65 inches—yellowish brown sandy loam that has gray mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour) above the very firm and brittle layer in the subsoil and moderately slow or slow (0.06 to 0.6 inch per hour) in the layer
Available water capacity: Moderate
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Slight

Figure 9.—A typical area of Monongahela silt loam, 0 to 3 percent slopes. The Monongahela silt loam is the officially designated state soil of West Virginia.

Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The somewhat poorly drained Tygart soils and areas of poorly drained soils, which are in depressions or swales
• Soils that are flooded along narrow, dissecting drainageways
• Soils that do not have a very firm and brittle layer in the subsoil
Similar soils:
• Well drained soils
• Soils that have a gravelly surface layer
• Soils that have slopes of more than 3 percent

Use and Management

Uses: Most areas of the Monongahela soil have been cleared and are used for crops, hay, or pasture.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• The seasonal water table and the firm layer in the subsoil may restrict the rooting depth of some crops.
• The wetness commonly delays spring planting.
• Because of the restricted rooting depth, crops may be adversely affected by a shortage of water as the soil dries out in summer.
Management measures:
• Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and maintain fertility and tilth.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• Because this soil is soft when wet, grazing early in spring damages the sod.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• The use of equipment is restricted during wet periods because this soil is soft when wet.
• Competition from undesirable plants may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The seasonal high water table is the main limitation affecting building site development and septic tank absorption fields.
• The seasonal high water table and the potential for frost action are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in the winter and spring.
• Erosion is a slight hazard on construction sites.
Management measures:
• The included well drained soils, which are better suited to buildings and septic tank absorption fields than the Monongahela soil, should be selected for development.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Installing tile drainage lines upslope from absorption fields can be effective in lowering the seasonal high water table.
• Installing large absorption fields on the contour helps to overcome the restricted permeability in the lower part of the subsoil.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness and frost action.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation of streams.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 4A

MhB—Monongahela silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, slightly convex, low stream terraces.

Composition

Monongahela soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 8 inches—brown silt loam

Subsoil:
8 to 13 inches—yellowish brown silt loam
13 to 25 inches—yellowish brown silt loam
25 to 30 inches—yellowish brown loam that has strong brown and light brownish gray mottles
30 to 51 inches—yellowish brown, very firm and brittle loam that has strong brown and light brownish gray mottles

Underlying material:
51 to 65 inches—yellowish brown loam that has strong brown and gray mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour) above the very firm and brittle layer in the

subsoil and moderately slow or slow (0.06 to 0.6 inch per hour) in the layer
Available water capacity: Moderate
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The well drained Berks soils, which are along upland margins in some areas
• The somewhat poorly drained Tygart soils, which are in depressions and swales
• Soils that do not have a very firm and brittle layer in the subsoil
• Severely eroded soils
Similar soils:
• Well drained soils
• Soils that have a gravelly surface layer
• Soils that have slopes of less than 3 percent or more than 8 percent

Use and Management

Uses: Most areas of the Monongahela soil have been cleared and are used for crops, hay, or pasture. Some areas are used as sites for community development or are wooded. In some areas the acreage is idle land.

Cropland

Suitability: Suited
Management concerns:
• The seasonal high water table and the firm layer in the subsoil may restrict the rooting depth of some crops.
• Erosion is a moderate hazard in unprotected areas.
• The wetness commonly delays spring planting.
• Because of the restrictive rooting depth, crops may be adversely affected by a shortage of water as the soil dries out in summer.
Management measures:
• Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and maintain fertility and tilth.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.
• Because this soil is soft when wet, grazing early in spring damages the sod.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The use of equipment is restricted during wet periods because this soil is soft when wet.
• Competition from undesirable plants may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The seasonal high water table is the main limitation affecting building site development and septic tank absorption fields.
• The seasonal high water table and the potential for frost action are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in winter and spring.

• Erosion is a moderate hazard on construction sites.
Management measures:
• The included well drained soils, which are better suited to buildings and septic tank absorption fields than the Monongahela soil, should be selected for development.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Installing tile drainage lines upslope from absorption fields can be effective in lowering the seasonal high water table.
• Installing large absorption fields on the contour helps to overcome the restricted permeability in the lower part of the subsoil.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness and frost action.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation of streams.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 4A

MhC—Monongahela silt loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex, low stream terraces.

Composition

Monongahela soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 6 inches—brown silt loam

Subsoil:
6 to 8 inches—yellowish brown silt loam
8 to 23 inches—yellowish brown silt loam
23 to 28 inches—yellowish brown loam that has strong brown and light brownish gray mottles
28 to 49 inches—yellowish brown, very firm and brittle loam that has strong brown and light brownish gray mottles

Underlying material:
49 to 65 inches—yellowish brown loam that has strong brown and gray mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour) above the very firm and brittle layer in the subsoil and moderately slow or slow (0.06 to 0.6 inch per hour) in the layer
Available water capacity: Moderate
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The well drained Berks soils, which are along upland margins in some areas
• The somewhat poorly drained Tygart soils, which are in depressions
• Soils that do not have a very firm and brittle layer in the subsoil
• Severely eroded soils
Similar soils:
• Well drained soils
• Soils that have slopes of less than 8 percent or more than 15 percent
• Soils that have a gravelly surface layer

Use and Management

Uses: Most areas of the Monongahela soil have been cleared and are used for hay or pasture. In some areas, the soil is used as cropland or the acreage is idle land. A few small areas are used as sites for community development or are wooded.

Cropland

Suitability: Suited
Management concerns:
• The seasonal high water table and the firm layer in the subsoil may restrict the rooting depth of some crops.
• Erosion is a severe hazard in unprotected areas.
• The wetness commonly delays spring planting.

• Because of the restrictive rooting depth, crops may be adversely affected by a shortage of water as the soil dries out in summer.
Management measures:
• Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and maintain fertility and tilth.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• Because this soil is soft when wet, grazing early in spring damages the sod.
Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Grazing should be deferred in the spring until the soil is firm.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The use of equipment is restricted during wet periods because this soil is soft when wet.
• Competition from undesirable plants may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour helps to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The seasonal high water table is the main limitation affecting building site development and septic tank absorption fields.
• The seasonal high water table and the potential for frost action are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in the winter and spring.
• The slope increases the extent of excavation required during the construction of roads and buildings.
• Erosion is a severe hazard on construction sites.
Management measures:
• The included well drained soils, which are better suited to buildings and septic tank absorption fields than the Monongahela soil, should be selected for development.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Buildings should be designed so that they conform to the natural slope of the land.
• Installing tile drainage lines upslope from absorption fields can be effective in lowering the seasonal high water table.
• Installing large absorption fields on the contour helps to overcome the restricted permeability in the lower part of the subsoil.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness and frost action.
• Roads and streets should be built on the contour.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 4A

MoB—Monongahela gravelly loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, slightly convex, low stream terraces.

Composition

Monongahela soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 8 inches—brown gravelly loam

Subsoil:
8 to 13 inches—yellowish brown gravelly silt loam
13 to 25 inches—yellowish brown silt loam
25 to 30 inches—yellowish brown loam that has strong brown and light brownish gray mottles
30 to 51 inches—yellowish brown, very firm and brittle loam that has strong brown and light brownish gray mottles

Underlying material:
51 to 65 inches—yellowish brown loam that has strong brown and gray mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour) above the very firm and brittle layer in the subsoil and moderately slow or slow (0.06 to 0.6 inch per hour) in the layer
Available water capacity: Moderate or high
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Medium
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• Berks soils, which are along upland margins in some areas
• Somewhat poorly drained Tygart soils and areas of poorly drained soils, which are in depressions or swales
• Soils that are flooded and are along narrow, dissecting drainageways
• Soils that do not have a very firm and brittle layer in the subsoil
Similar soils:
• Well drained soils
• Soils that have slopes of less than 3 percent or more than 8 percent
• Soils that do not have a gravelly surface layer

Use and Management

Uses: Most areas of the Monongahela soil have been cleared and are used for crops, hay, or pasture. Some areas are used as sites for community development. In a few small areas, the soil is wooded or the acreage is idle land.

Cropland

Suitability: Suited
Management concerns:
• The seasonal water table and the firm layer in the subsoil may restrict the rooting depth of some crops.
• Erosion is a moderate hazard in unprotected areas.
• The wetness commonly delays spring planting.
• Because of the restricted rooting depth, crops may be adversely affected by a shortage of water as the soil dries out in summer.
• In some areas gravel in the surface layer may interfere with tillage and planting.
Management measures:
• Conservation tillage, contour farming, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.
• Because this soil is soft when wet, grazing early in spring damages the sod.
Management measures:
• Proper stocking rates, a planned grazing system,

and deferred grazing during wet periods help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The use of equipment is restricted during wet periods because this soil is soft when wet.
• Competition from undesirable plants may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The seasonal high water table is the main limitation affecting building site development and septic tank absorption fields.
• The seasonal high water table and the potential for frost action are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in the winter and spring.
• Gravel in the surface layer may interfere with the establishment of lawns and with landscaping.
• Erosion is a moderate hazard on construction sites.
Management measures:
• The included well drained soils, which are better suited to buildings and septic tank absorption fields than the Monongahela soil, should be selected for development.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Installing tile drainage lines upslope from absorption fields can be effective in lowering the seasonal high water table.
• Installing large absorption fields on the contour helps to overcome the restricted permeability in the lower part of the subsoil.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness and frost action.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation of streams.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 4A

MrB—Murrill gravelly loam, 3 to 8 percent slopes

Setting

This soil is on broad, gently sloping, slightly concave to slightly convex footslopes and valley sides. It is underlain by limestone. Sinkholes occur in some areas.

Composition

Murrill soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

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

Subsoil:
9 to 14 inches—yellowish brown loam
14 to 24 inches—brown gravelly clay loam
24 to 55 inches—strong brown gravelly clay loam
55 to 72 inches—yellowish red silty clay loam that has red mottles

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low in the surface layer and upper part of the subsoil and moderate in the lower part of the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Medium

Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
• The somewhat poorly drained Poorhouse soils, which are in depressions and along drainageways
• The moderately well drained Buchanan soils
• The moderately deep Ryder soils and the deep Nollville soils, which are in small convex areas of the unit
• Areas of limestone rock outcrop
Similar soils:
• The well drained Hagerstown soils
• Stony soils
• Soils that have slopes of less than 3 percent or more than 8 percent

Use and Management

Uses: Most areas of the Murrill soil have been cleared and are used for cultivated crops, orchards, hay, or pasture or as sites for community development. A few small areas are wooded.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• The hazard of erosion is moderate.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• In some areas rock fragments in the surface layer may interfere with tillage and planting.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
• Ponds constructed for livestock water are susceptible to seepage.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Installing a plastic or bentonite liner helps to prevent seepage from constructed ponds.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.

Community Development

Suitability: Well suited
Management concerns:
• Erosion is a moderate hazard on construction sites.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• The moderate shrink-swell potential is a limitation on sites for dwellings with basements.
• The rock fragments in the surface layer may interfere with the establishment of lawns.
• The wetness in the included Poorhouse soils is a severe limitation affecting development.
• The included Nollville and Ryder soils are moderately or severely limited as sites for septic

tank absorption fields because of the depth to bedrock.

Management measures:

- Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation and to protect the ground water from pollution.
- Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 4A

MrC—Murrill gravelly loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping, convex toeslopes on the eastern side of North Mountain. It is underlain by limestone. Sinkholes occur in some areas.

Composition

Murrill soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

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

Subsoil:
9 to 14 inches—yellowish brown gravelly loam
14 to 24 inches—brown gravelly loam
24 to 55 inches—strong brown gravelly clay loam
55 to 72 inches—yellowish red silty clay loam that has red mottles

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low in the surface layer and the upper part of the subsoil and moderate in the lower part of the subsoil
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:

- The moderately well drained Buchanan soils
- Areas of limestone rock outcrop
- The moderately deep Ryder soils and the deep Nollville soils

Similar soils:

- The well drained Hagerstown soils
- Stony soils
- Soils that have slopes of less than 8 percent or more than 15 percent

Use and Management

Uses: Most areas of the Murrill soil are wooded. A few areas have been cleared and are used for cultivated crops, orchards, hay, or pasture.

Cropland

Suitability: Suited

Management concerns:

- Erosion is a severe hazard in unprotected areas.
- Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
- In some areas rock fragments in the surface layer may interfere with tillage and planting.

Management measures:

- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The slope is a moderate limitation affecting development.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• The moderate shrink-swell potential is a limitation on sites for dwellings with basements.
• The rock fragments in the surface layer may interfere with the establishment of lawns.
• Erosion is a severe hazard on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 4A

PeB—Pecktonville gravelly loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping hillsides in the small limestone valleys associated with Ferrel Ridge in the western part of the county.

Composition

Pecktonville soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

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

Subsoil:
7 to 11 inches—yellowish brown gravelly loam
11 to 48 inches—yellowish red clay
48 to 65 inches—yellowish red clay that has very pale brown mottles

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Slow or moderately slow in the subsoil (0.06 to 0.6 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: 3.5 to 6.0 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Moderate

Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Siliceous limestone that contains fairly high amounts of chert and sandstone

Minor Components

Dissimilar inclusions:
• The well drained Blackthorn soils
• Soils that are less than 60 inches deep over bedrock
Similar soils:
• Stony soils
• Soils that have a very gravelly or very cobbly surface layer
• Soils that have slopes of less than 3 percent or more than 8 percent
• Soils that are not seasonally wet in the lower part of the subsoil

Use and Management

Uses: About one-half of the acreage of the Pecktonville soil is used as woodland. Most of the rest is used for pasture or hay. A small acreage is used for orchards.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• Erosion is a moderate hazard in unprotected areas.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Chert in the surface layer may interfere with tillage in some areas.
Management measures:
• Conservation tillage, contour farming, winter cover crops, a crop rotation that includes hay, and good crop residue management help to control erosion and to maintain fertility and tilth.
• Crop rotations that include grasses, legumes, and small grain help to control runoff and erosion.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The high shrink-swell potential in the subsoil is a limitation affecting building site development.
• The slow or moderately slow permeability and the wetness in the subsoil are limitations on sites for septic tank absorption fields.
• The high shrink-swell potential and low strength are limitations affecting the construction of local roads and streets. These limitations may cause pavement to buckle under heavy loads.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• Erosion is a moderate hazard on construction sites.
Management measures:
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.

• Enlarging or pressurizing septic tank absorption fields or installing alternating drainfields helps to overcome the restricted permeability.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 4A

PeC—Pecktonville gravelly loam, 8 to 15 percent slopes

Setting

This soil is on strongly sloping hillsides in the small limestone valleys associated with Ferrel Ridge in the western part of the county.

Composition

Pecktonville soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

Surface layer:
0 to 6 inches—brown gravelly loam

Subsoil:
6 to 12 inches—yellowish brown gravelly loam
12 to 18 inches—yellowish red silty clay loam
18 to 43 inches—yellowish red and strong brown silty clay
43 to 57 inches—yellowish red, strong brown, and red clay that has very pale brown mottles
57 to 65 inches—red clay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Slow or moderately slow in the subsoil (0.06 to 0.6 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: 3.5 to 6.0 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Siliceous limestone that contains fairly high amounts of chert and sandstone

Minor Components

Dissimilar inclusions:
• The well drained Blackthorn soils
• Soils that are less than 60 inches deep over bedrock
Similar soils:
• Stony soils
• Soils that have a very gravelly or very cobbly surface layer
• Soils that have slopes of less than 8 percent or more than 15 percent
• Soils that are not seasonally wet in the lower part of the subsoil

Use and Management

Uses: About two-thirds of the acreage of the Pecktonville soil is wooded. Most of the remaining acreage is used for pasture or hay. A small acreage is used for orchards.

Cropland

Suitability: Suited
Management concerns:
• Erosion is a severe hazard in unprotected areas.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Chert in the surface layer may interfere with tillage in some areas.
Management measures:
• Conservation tillage, contour farming, winter cover crops, a crop rotation that includes hay, and good crop residue management help to control erosion and to maintain fertility and tilth.
• Crop rotations that include grasses, legumes, and small grain help to control runoff and erosion.
• Grassed waterways, diversions, and grade stabilization structures help to prevent gully erosion.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The high shrink-swell potential in the subsoil and the slope are limitations affecting building site development.
• The slow or moderately slow permeability, the wetness in the subsoil, and the slope are limitations on sites for septic tank absorption fields.
• The high shrink-swell potential and low strength are limitations affecting the construction of local roads and streets. These limitations may cause pavement to buckle under heavy loads.
• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• Erosion is a severe hazard on construction sites.
Management measures:
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Enlarging or pressurizing septic tank absorption fields or installing alternating drainfields helps to overcome the restricted permeability.
• Land shaping and installing the distribution lines on the contour help to overcome the slope in absorption areas.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: 4A

PeD—Pecktonville gravelly loam, 15 to 25 percent slopes

Setting

This soil is on moderately steep hillsides on Ferrel Ridge in the western part of the county.

Composition

Pecktonville soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

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

Subsurface layer:
3 to 7 inches—yellowish brown gravelly loam

Subsoil:
7 to 16 inches—yellowish brown gravelly loam
16 to 22 inches—yellowish red silty clay loam
22 to 47 inches—yellowish red and strong brown silty clay
47 to 61 inches—yellowish red, strong brown, and red clay that has very pale brown mottles
61 to 65 inches—red clay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Slow or moderately slow in the subsoil (0.06 to 0.6 inch per hour)

Available water capacity: Moderate or high
Depth to the seasonal high water table: 3.5 to 6.0 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Rapid
Depth to bedrock: More than 60 inches
Bedrock type: Siliceous limestone that contains fairly high amounts of chert and sandstone

Minor Components

Dissimilar inclusions:
• The well drained Blackthorn soils
• Soils that are less than 60 inches deep over bedrock
Similar soils:
• Stony soils
• Soils that have a very gravelly or very cobbly surface layer
• Soils that have slopes of less than 15 percent or more than 25 percent
• Soils that are not seasonally wet in the lower part of the subsoil

Use and Management

Uses: Most of the acreage of the Pecktonville soil is wooded. The rest is used for pasture or hay.

Cropland

Suitability: Poorly suited; better suited to hay and pasture because of the hazard of erosion
Management concerns:
• Erosion is a severe hazard in unprotected areas.
• Solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
• Chert in the surface layer may interfere with tillage in some areas.
Management measures:
• Conservation tillage, contour farming, contour stripcropping, winter cover crops, a crop rotation that includes hay, and good crop residue management help to control erosion and to maintain fertility and tilth.
• Grassed waterways and diversions help to prevent gully erosion.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
• Seedling mortality may be a problem on south-facing slopes because of droughtiness during the summer.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Drought-tolerant species, such as white pine, Scotch pine, and Norway spruce, should be selected for planting on south aspects.

Community Development

Suitability: Poorly suited
Management concerns:
• The high shrink-swell potential in the subsoil and the slope are limitations affecting building site development.
• The slow or moderately slow permeability, the wetness in the subsoil, and the slope are limitations affecting septic tank absorption fields.
• The high shrink-swell potential, low strength, and the slope are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.

• The rock fragments in the surface layer may interfere with the establishment of lawns and with landscaping.
• Erosion is a severe hazard on construction sites.

Management measures:

• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Buildings should be designed so that they conform to the natural slope of the land.
• Enlarging or pressurizing septic tank absorption fields or installing alternating drainfields helps to overcome the restricted permeability. Land shaping and installing the distribution lines on the contour help to overcome the slope.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Roads should be built on the contour. Seeding roadbanks after construction helps to prevent erosion.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: 4R

PgC—Pecktonville very gravelly loam, 3 to 15 percent slopes, extremely stony

Setting

This soil is on gently sloping or strongly sloping, convex ridgetops on Ferrell and Wilson Ridges in the western part of the county.

Composition

Pecktonville soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 1 inch—organic duff from hardwood leaf litter
1 to 3 inches—very dark grayish brown very gravelly loam

Subsurface layer:
3 to 7 inches—yellowish brown gravelly loam

Subsoil:
7 to 12 inches—strong brown silt loam
12 to 17 inches—yellowish red gravelly silty clay loam
17 to 32 inches—yellowish red, strong brown, and brownish yellow gravelly clay
32 to 48 inches—yellowish red, red, and brownish yellow gravelly clay
48 to 62 inches—yellowish red, red, and brownish yellow gravelly clay that has pinkish gray mottles
62 to 65 inches—red clay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Slow or moderately slow (0.06 to 0.6 inch per hour) in the subsoil
Available water capacity: Moderate or high
Depth to the seasonal high water table: 3.5 to 6.0 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Moderate or severe
Stoniness: 3 to 15 percent of the surface covered with stones and boulders
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Medium or rapid
Depth to bedrock: More than 60 inches
Bedrock type: Siliceous limestone that contains fairly high amounts of chert and sandstone

Minor Components

Dissimilar inclusions:

• The moderately deep Dekalb and Caneyville soils
• The very deep Blackthorn soils
• Areas of rock outcrop

Similar soils:

• Small areas of rubbly or extremely bouldery soils
• Soils that have slopes of less than 3 percent or more than 15 percent
• Soils that have less than 3 percent of their surface covered with stones

Use and Management

Uses: Most areas of the Pecktonville soil are wooded. A few small areas have been cleared and are used as pasture. A few areas have been developed as homesites.

Cropland

Suitability: Not suited
Management concerns:

• The stones on the surface of the soil make cultivation impractical.

Pasture and Hayland

Suitability: Not suited for hay; difficult to manage for pasture
Management concerns:
• Because of the stones and boulders on the surface of the soil, it is difficult to operate conventional equipment used in clipping and in applying fertilizer.
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The large stones on the surface of the soil can hinder harvesting operations and damage equipment.
• Competition from weeds may slow the growth of planted tree seedlings.
• Seedling mortality may be a problem on south aspects because of droughtiness during the summer.
• The stones and chert fragments in the surface layer may interfere with the planting of tree seedlings.
Management measures:
• The hazard of erosion can be reduced by seeding logging roads, log landings, and areas that have been cut and filled and by installing water bars and culverts.
• Logging roads should be designed so that they conform to the topography.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• Erosion is a moderate or severe hazard on construction sites.
• The high shrink-swell potential and the wetness in the subsoil are limitations affecting building site development.
• The stones and boulders may interfere with construction, with the establishment of lawns, and with landscaping.
• The slope, the slow or moderately slow permeability in the clayey layer of the subsoil, and the wetness are limitations on sites for septic tank absorption fields.
• The high shrink-swell potential and the low strength are limitations affecting the construction of roads and streets.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Enlarging or pressurizing septic tank absorption fields or installing alternating drainfields helps to overcome the restricted permeability.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Seeding and mulching roadbanks after construction is completed helps to control erosion.

Interpretive Groups

Land capability classification: VIIs
Woodland ordination symbol: 4X

Ph—Philo silt loam

Setting

This soil is on nearly level flood plains, mostly along Back Creek and its tributaries in the western part of the county.

Composition

Philo soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

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

Subsoil:
3 to 9 inches—dark brown silt loam
9 to 17 inches—yellowish brown silt loam
17 to 29 inches—yellowish brown silt loam that has light brownish gray and dark yellowish brown mottles

Underlying material:
29 to 48 inches—dark grayish brown fine sandy loam that has light brownish gray and yellowish brown mottles
48 to 65 inches—dark grayish brown, stratified gravelly sand and loam

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: 1.5 to 3.0 feet
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year) for brief periods
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
- The poorly drained Atkins soils
- The well drained Pope soils

Similar soils:
- Soils that are gravelly throughout
- Soils that are frequently flooded
- Soils that have a surface layer of fine sandy loam
- Soils that have slopes of more than 3 percent

Use and Management

Uses: Most areas of the Philo soil are used for pasture or hay. Some areas are used for cultivated crops. A few areas are wooded.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
- This soil must be properly protected if crops are grown year after year.
- The flooding may occasionally damage crops and delay fieldwork.
- The wetness may delay tillage and planting in the spring.
- This soil is subject to streambank erosion in many areas.

Management measures:
- Conservation tillage, a crop rotation that includes hay, winter cover crops, and good crop residue management help to control erosion and maintain fertility and tilth.
- Leaving a border of trees along streams helps to prevent excessive erosion on streambanks.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
- Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.
- Debris may be deposited on the grassland during periods of flooding.
- Grazing when the soil is too wet may damage the sod.

Management measures:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
- Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
- The use of equipment is restricted during wet periods because this soil is soft when wet.
- Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
- The tree species that can withstand the wetness should be selected for planting.
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
- Year-round logging roads require additions of roadfill and gravel.

Community Development

Suitability: Not suited
Management concerns:
- Because of the flooding and the wetness, this soil is not suited to buildings and septic tank absorption

fields and is severely limited as a site for local roads and streets.
• Excavations are unstable and are subject to caving.
Management measures:
• Soils that are better suited to buildings and septic tank absorption fields than the Philo soil should be selected for development.
• Constructing roads on raised fill material and installing a drainage system help to overcome the wetness and prevent the damage caused by flooding.
• Trench walls should be reinforced to prevent caving.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 5A

PoA—Poorhouse silt loam, 0 to 3 percent slopes

Setting

This soil is on nearly level, slightly concave uplands, mainly on the eastern toeslope of North Mountain. A smaller acreage of the soil is in slight depressions scattered throughout the Great Valley. The soil is underlain by limestone.

Composition

Poorhouse soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 12 inches—light olive brown silt loam that has yellowish brown pockets

Subsoil:
12 to 18 inches—yellowish brown silty clay that has light brownish gray and strong brown mottles
18 to 26 inches—yellowish brown clay that has gray and strong brown mottles
26 to 54 inches—brown clay that has gray and strong brown mottles
54 to 65 inches—gray silty clay that has dark grayish brown and strong brown mottles

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: High
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, very strongly acid to neutral (pH 4.5 to 7.3) in the surface layer and upper part of the subsoil and moderately acid to slightly alkaline (pH 5.6 to 7.8) in the lower part of the subsoil
Surface runoff: Slow or medium
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
• The poorly drained Dunning soils, which are subject to flooding and ponding; along concave drainageways and in depressions
• The moderately well drained Swanpond soils
• The well drained Murrill soils
• Areas of rock outcrop
Similar soils:
• Soils that are 40 to 60 inches deep over bedrock
• Soils that have a surface layer of loam or silty clay loam
• Soils that have a gravelly surface layer

Use and Management

Uses: Most areas of the Poorhouse soil have been cleared. About half of the cleared acreage has been drained and is used for cultivated crops or hay. The rest of the cleared acreage is in pasture. Some areas are wooded.

Cropland

Suitability: Suited if the soil is drained
Management concerns:
• This soil must be properly protected if cultivated crops are grown year after year.
• Draining this soil is difficult because of the slow permeability in the clayey subsoil, and draining some areas is difficult because adequate subsurface outlets are not available.
• The wetness commonly delays spring planting.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
Management measures:
• Using crop rotations that include grasses and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and

applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Applying a system of conservation tillage and deferring tillage when the soil is wet help to prevent deterioration of tilth.
- Deep tillage may help to increase the rate of water infiltration and to overcome the restricted permeability if performed when the soil is dry.
- Because of the slow permeability, subsurface drains should be narrowly spaced.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the wetness
Management concerns:
- Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
- Grazing during wet periods causes surface compaction and poor tilth and damages the sod.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Restricted grazing during wet periods helps to minimize compaction and maintain tilth.
- Water-tolerant species should be selected for planting.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants.

Woodland

Potential productivity: Moderately high
Management concerns:
- Because this soil is soft when wet, the use of logging equipment is limited during wet periods.
- Plant competition is severe. Competition from undesirable plants may slow the growth of planted tree seedlings.

Management measures:
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
- The tree species that can withstand the wetness should be selected for planting.

Community Development

Suitability: Poorly suited
Management concerns:
- The wetness and the high shrink-swell potential are limitations on sites for dwellings.
- The wetness and the slow permeability are severe limitations affecting septic tank absorption fields.
- The wetness, the high shrink-swell potential, and the low strength are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.
- The wetness is a limitation affecting excavation and trafficability and may delay construction in the winter and spring.

Management measures:
- A surface or subsurface drainage system helps to lower the water table around buildings.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
- Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness, shrinking and swelling, and low strength.
- Because a conventional septic tank absorption field will not function properly in this soil, an alternative system, such as a mound system, or a better suited soil should be considered.

Interpretive Groups

Land capability classification: IIIw
Woodland ordination symbol: 5w

PoB—Poorhouse silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, slightly concave uplands, mainly on the eastern toeslopes of North Mountain. It is underlain by limestone bedrock.

Composition

Poorhouse soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 11 inches—dark grayish brown silt loam

Subsoil:
11 to 29 inches—yellowish brown silty clay that has light brownish gray and strong brown mottles
29 to 40 inches—light brownish gray clay that has yellowish brown mottles
40 to 65 inches—yellowish brown silty clay that has light brownish gray and strong brown mottles

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: High
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, very strongly acid to neutral in the surface layer and upper part of the subsoil (pH 5.1 to 7.3) and moderately acid to slightly alkaline in the lower part of the subsoil (pH 5.6 to 7.8)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Limestone

Minor Components

Dissimilar inclusions:
• The poorly drained Dunning soils that are subject to flooding and ponding; along concave drainageways and in depressions
• The moderately well drained Swanpond soils
• The well drained Murrill soils
• Areas of rock outcrop
Similar soils:
• Soils that are 40 to 60 inches deep over bedrock
• Soils that have a surface layer of loam or silty clay loam
• Soils that have a gravelly or cobbly surface layer

Use and Management

Uses: Most areas of the Poorhouse soil have been cleared and are used as pasture. Some areas have been drained and are used for cultivated crops, orchards, or hay. A few small areas are wooded.

Cropland

Suitability: Suited if the soil is drained
Management concerns:
• The hazard of erosion is moderate.
• Draining this soil is difficult because of the slow permeability in the clayey subsoil, and draining some areas is difficult because adequate subsurface outlets are not available.
• The wetness commonly delays spring planting.
• Sinkholes and solution channels in the limestone bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.
Management measures:
• Using crop rotations that include grasses and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Applying a system of conservation tillage and deferring tillage when the soil is wet help to prevent deterioration of tilth.
• Deep tillage may help to increase the rate of water infiltration and to overcome the restricted permeability if performed when the soil is dry.
• Because of the slow permeability, subsurface drains should be narrowly spaced.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the wetness
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Grazing during wet periods causes surface compaction and poor tilth and damages the sod.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Restricted grazing during wet periods helps to

minimize compaction and maintain tilth.
• Water-tolerant species should be selected for planting.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• The operation of logging equipment is limited during wet periods.
• Erosion is a management concern on logging roads and skid trails.
• Plant competition is severe. Competition from undesirable plants may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• The tree species that can withstand the wetness should be selected for planting.

Community Development

Suitability: Poorly suited
Management concerns:
• The wetness and the high shrink-swell potential are limitations on sites for dwellings.
• The wetness, the high shrink-swell potential, and the low strength are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement may crack under heavy loads.
• The wetness and the slow permeability are severe limitations affecting septic tank absorption fields.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in the winter and spring.
• Erosion is a moderate hazard on construction sites.
Management measures:
• A surface or subsurface drainage system helps to lower the water table around buildings.
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by wetness, shrinking and swelling, and low strength.
• Because a conventional septic tank absorption field will not function properly in this soil, an alternative system, such as a mound system, or a better suited soil should be considered.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIw
Woodland ordination symbol: 5w

Ps—Pope fine sandy loam

Setting

This soil is on nearly level, first bottom flood plains, mainly along Back Creek and its tributaries in the western part of the county.

Composition

Pope soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Surface layer:
0 to 10 inches—dark yellowish brown fine sandy loam

Subsoil:
10 to 42 inches—dark yellowish brown fine sandy loam

Underlying material:
42 to 65 inches—strong brown sandy loam

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: Frequently flooded (more than a 50 percent chance of flooding in any year) for brief periods
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: Medium

Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.6 to 5.5)
Surface runoff: Slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The poorly drained Atkins soils and the moderately well drained Philo soils, which are in sloughs and depressions
• Sand and gravel bars directly adjacent to streams
Similar soils:
• The Pope soils that have a texture of silt loam
• Soils that are gravelly throughout
• Soils that have a texture of loamy sand and are somewhat excessively drained or excessively drained
• Soils that have slopes of more than 3 percent

Use and Management

Uses: Most areas of this Pope soil are wooded. Some areas have been cleared and are used for crops, hay, or pasture.

Cropland

Suitability: Suited
Management concerns:
• This soil must be properly protected if cultivated crops are grown year after year.
• The flooding frequently delays fieldwork or damages crops.
• This soil is subject to streambank erosion in many areas.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and nearby streams by nutrients.
• This soil is sometimes droughty during the growing season.
Management measures:
• Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
• Including grasses and legumes in crop rotations helps to minimize the loss of nutrients, improve soil structure, and provide nitrogen for use by succeeding crops.
• Leaving a border of trees along streams helps to prevent excessive erosion on streambanks.
• Timing fertilizer applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• The flooding frequently deposits debris on the grassland.
• Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
• Because of the flooding, this soil is generally unsuited to buildings and septic tank absorption fields and is severely limited as a site for local roads and streets.
• Excavations are commonly unstable and are subject to caving.
Management measures:
• Soils that are better suited to buildings and septic tank absorption fields than this Pope soil should be selected for development.
• Constructing roads on raised fill material helps to prevent the damage caused by flooding.
• Trench walls should be reinforced to prevent caving.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 4A

Px—Pope silt loam

Setting

This soil is on nearly level flood plains, mainly along Back Creek and its tributaries in the western part of the county.

Composition

Pope soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Surface layer:
0 to 10 inches—dark brown silt loam

Subsoil:
10 to 20 inches—yellowish brown loam
20 to 40 inches—brown sandy loam

Underlying material:
40 to 65 inches—strong brown loamy sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year) for very brief periods
Shrink-swell potential: Low
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Surface runoff: Slow
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
- The poorly drained Atkins soils and the moderately well drained Philo soils, which are in sloughs or depressions
- Sand and gravel bars directly adjacent to streams

Similar soils:
- The Pope soils that have a texture of fine sandy loam
- Soils that have slopes of more than 3 percent

Use and Management

Uses: Most areas of this Pope soil are wooded. Some areas have been cleared and are used for crops, hay, or pasture.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
- This soil must be properly protected if cultivated crops are grown year after year.
- The flooding occasionally delays fieldwork or damages crops.
- This soil is subject to streambank erosion in some areas.
- Nutrients in manure and fertilizer applications can result in the pollution of ground water and nearby streams.

Management measures:
- Conservation tillage, winter cover crops, and crop residue management help to control erosion and to maintain fertility and tilth.
- Including grasses and legumes in crop rotations helps to minimize the loss of nutrients, improve soil structure, and provide nitrogen for use by succeeding crops.
- Leaving a border of trees along streams helps to prevent excessive erosion on streambanks.
- Timing fertilizer applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- The flooding occasionally deposits debris on the grassland.
- Unrestricted access to streams by livestock increases the hazards of streambank erosion and water pollution.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Streambanks should be fenced. Access to streams by livestock should be limited to protected crossings.

• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Not suited
Management concerns:
• Because of the flooding, this soil is generally unsuited to buildings and septic tank absorption fields and is severely limited as a site for local roads and streets.
• Excavations are commonly unstable and are subject to caving.
Management measures:
• Soils that are better suited to buildings and septic tank absorption fields than this Pope soil should be selected for development.
• Constructing roads on raised fill material helps to prevent the damage caused by flooding.
• Trench walls should be reinforced to prevent caving.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 4A

Qm—Quarry, limestone

Setting

This map unit consists of open excavations from which limestone has been quarried. Surrounding the excavations are dump areas consisting of a mixture of rock fragments and soil material that were removed during the quarrying operation. These areas are mainly in the central and eastern parts of the Great Valley, overlying the Chambersburg and New Market Limestones.

Composition

Quarry, limestone: 95 percent
Dissimilar inclusions: 5 percent

Representative Profile

This map unit is considered to be a nonsoil area; therefore, a representative profile is not given.

Properties and Qualities

The quarries generally have vertical walls ranging from 15 to 100 feet or more in height. Many of the quarries are inactive and are partially filled with water. The soil material in the dump areas generally has an extremely bouldery surface. The fine-earth fraction of the soil generally has a high content of clay and is slightly alkaline.

Some areas of the map unit are sparsely wooded with a mixture of red cedar, black locust, tree-of-heaven, and red maple. Many areas are barren. Slopes are gently sloping to very steep.

Minor Components

Dissimilar inclusions:
• The moderately deep Carbo soils and the shallow Opequon soils, which are along the margins of this map unit and in small, undisturbed areas within the unit

Use and Management

Uses: Limestone excavated from areas of this map unit is used for road construction, for the manufacture of cement, as a source of agricultural lime, and as a source of flux in the steel-making process. Onsite investigation is necessary to determine the suitability of the map unit for most uses.

Interpretive Groups

Land capability classification: Not assigned
Woodland ordination symbol: Not assigned

Qs—Quarry, shale

Setting

This map unit consists of open pits from which shale has been excavated. The pits are in areas throughout the county.

Composition

Quarry, shale: 95 percent
Dissimilar inclusions: 5 percent

Representative Profile

This map unit is considered to be a nonsoil area; therefore, a representative profile is not given.

Properties and Qualities

Some areas of this unit have nearly vertical highwalls ranging from 5 to 30 feet in height. Shale bedrock is exposed throughout the unit. The reaction of the shale material ranges from extremely acid to strongly acid (pH 3.5 to 5.5). Most areas of the unit are barren or support a limited amount of vegetation.

Minor Components

Dissimilar inclusions:
- The shallow Weikert soils and the moderately deep Berks and Clearbrook soils, which are along the margins of this map unit and in small, undisturbed areas within the unit

Use and Management

Uses: Shale excavated from areas of this map unit is used as a road base and for fill on construction sites. Onsite investigation is needed to determine the suitability of the map unit for most uses.

Interpretive Groups

Land capability classification: Not assigned
Woodland ordination symbol: Not assigned

ReF—Rock outcrop-Opequon complex, 25 to 60 percent slopes

Setting

This map unit is on very steep limestone bluffs and hillsides along the Potomac River. The Opequon soil and the Rock outcrop occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Rock outcrop: 50 percent
Opequon soil and similar soils: 40 percent
Dissimilar inclusions: 10 percent

Representative Profile

Rock outcrop

In most areas the Rock outcrop occurs as nearly vertical limestone bluffs ranging from 10 to 80 feet in height.

Opequon

Surface layer:
0 to 2 inches—dark brown silty clay loam

Subsoil:
2 to 7 inches—brown silty clay
7 to 18 inches—yellowish red clay

Bedrock:
18 inches—limestone

Soil Properties and Qualities

Opequon

Drainage class: Well drained
Permeability: Moderately slow or moderate (0.2 inch to 2.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High
Erosion hazard: Very severe
Stoniness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 6.1 to 7.8)
Surface runoff: Very rapid
Depth to bedrock: 12 to 20 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
- The deep Endcav soils
- The very deep Hagerstown soils

Similar soils:
- The moderately deep Carbo soils
- Soils that have slopes of more than 60 percent

Use and Management

Uses: Most areas of this map unit are wooded. Because of the very steep slope and the very severe hazard of erosion, the unit is only suited to woodland.

Cropland

Suitability: Not suited

Pasture and Hayland

Suitability: Not suited

Woodland

Potential productivity: Moderate on south aspects; moderately high on north aspects
Management concerns:
- Erosion is a very severe hazard on logging sites.
- Operating logging equipment is hazardous because of the very steep slope.
- Low strength and the high shrink-swell potential increase the hazard of slippage.
- Limestone bluffs in the unit may interfere with the use of harvesting equipment.

• Droughtiness results in a high seedling mortality rate, especially on south aspects.
• Windthrow is a hazard because of the depth to bedrock in areas of the Opequon soil.
Management measures:
• Because of the very steep slope and the hazard of slippage, special logging methods, such as cable yarding, should be considered.
• Drought-tolerant species, such as Virginia pine, Scotch pine, Norway spruce, and white pine, should be selected for planting in areas of the Opequon soil.
• Tree plantations should be on north-facing slopes where possible.

Community Development

Suitability: Not suited
Management concerns:
• Because of the very steep slope, the depth to bedrock, the Rock outcrop, and a hazard of slippage, this map unit is unsuited to community development.

Interpretive Groups

Land capability classification: VIIIs
Woodland ordination symbol: Opequon—2R on south aspects and 3R on north aspects

RnB—Ryder-Nollville channery silt loams, 3 to 8 percent slopes

Setting

These soils are on gently sloping, convex upland ridges that are characterized by low relief. They are in the western part of the Great Valley. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Ryder soil and similar soils: 45 percent
Nollville soil and similar soils: 45 percent
Dissimilar inclusions: 10 percent

Representative Profile

Ryder

Surface layer:
0 to 8 inches—yellowish brown channery silt loam

Subsoil:
8 to 19 inches—yellowish brown silt loam
19 to 30 inches—light yellowish brown channery silty clay loam

Underlying material:
30 to 35 inches—yellowish brown and brown very channery silt loam

Bedrock:
35 inches—slightly weathered, fractured and tilted, interbedded limestone and limy shale

Nollville

Surface layer:
0 to 10 inches—dark yellowish brown channery silt loam

Subsoil:
10 to 20 inches—yellowish brown channery silty clay loam
20 to 29 inches—yellowish brown silty clay loam
29 to 41 inches—strong brown silty clay

Underlying material:
41 to 57 inches—strong brown very channery silty clay loam

Bedrock:
57 inches—slightly weathered, fractured and tilted, interbedded limestone and limy shale

Soil Properties and Qualities

Ryder

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: 24 to 40 inches
Bedrock type: Interbedded limestone and limy shales; mainly members of the Elbrook Formation

Nollville

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: None

Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Bedrock type: Interbedded limestone and limy shales; mainly members of the Elbrook Formation

Minor Components

Dissimilar inclusions:
- The very deep Hagerstown soils
- The moderately deep Carbo soils
- The very deep Funkstown soils that are subject to flooding and ponding; along concave, intermittent drainageways
- Severely eroded soils
- Areas of limestone rock outcrop that occur singly or in parallel ridges

Similar soils:
- The very deep Duffield soils
- Soils that are 10 to 20 inches deep over bedrock
- Soils that have slopes of less than 3 percent
- Soils that have slopes ranging from 8 to 15 percent

Use and Management

Uses: Most areas of this map unit have been cleared and are used for crop, orchards, hay, or pasture. A few areas are used as sites for community development.

Cropland

Suitability: Suited. These soils are prime farmland.
Management concerns:
- The moderate hazard of erosion is a management concern.
- Solution channels and fractures in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
- Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
- Solution channels and fractures in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.

• The depth to bedrock is a limitation affecting septic tank absorption fields, excavations, and dwellings with basements.
• The moderate shrink-swell potential in areas of the Nollville soil may be a limitation affecting the construction of buildings.
• Low strength is a limitation affecting the construction of roads in areas of the Nollville soil. Because the soil is soft when wet, pavement cracks and buckles under heavy loads.
• Erosion is a moderate hazard on construction sites.
Management measures:
• Selecting the deepest areas of this map unit as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the limestone bedrock because of the hazard of ground-water pollution.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by the low strength of the Nollville soil.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation and to protect the ground water from pollution.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: Ryder—4A; Nollville—5A

RnC—Ryder-Nollville channery silt loams, 8 to 15 percent slopes

Setting

These soils are on strongly sloping, convex upland ridges that are characterized by low relief. They are in the western part of the Great Valley. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Ryder soil and similar soils: 50 percent
Nollville soil and similar soils: 40 percent
Dissimilar inclusions: 10 percent

Representative Profile

Ryder

Surface layer:
0 to 8 inches—dark yellowish brown channery silt loam

Subsoil:
8 to 19 inches—yellowish brown silt loam
19 to 30 inches—light yellowish brown channery silty clay loam

Underlying material:
30 to 35 inches—yellowish brown and brown very channery silt loam

Bedrock:
35 inches—slightly weathered, fractured and tilted, interbedded limestone and limy shale

Nollville

Surface layer:
0 to 10 inches—dark yellowish brown channery silt loam

Subsoil:
10 to 20 inches—yellowish brown channery silty clay loam
20 to 29 inches—yellowish brown silty clay loam
29 to 41 inches—strong brown silty clay

Underlying material:
41 to 57 inches—strong brown very channery silty clay loam

Bedrock:
57 inches—slightly weathered, fractured and tilted, interbedded limestone and limy shale

Soil Properties and Qualities

Ryder

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid

Depth to bedrock: 24 to 40 inches
Bedrock type: Interbedded limestone and limy shales; mainly members of the Elbrook Formation

Nollville

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Bedrock type: Interbedded limestone and limy shales; mainly members of the Elbrook Formation

Minor Components

Dissimilar inclusions:
- The very deep Hagerstown soils
- The moderately deep Carbo soils
- The very deep Funkstown soils that are subject to flooding and ponding; along concave, intermittent drainageways
- Severely eroded soils
- Areas of limestone rock outcrop that occur singly or in parallel ridges

Similar soils:
- The very deep Duffield soils
- Soils that are 10 to 20 inches deep over bedrock
- Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent

Use and Management

Uses: Most areas of this map unit have been cleared and are used for crops, orchards, hay, or pasture. A few areas are used as sites for community development.

Cropland

Suitability: Suited
Management concerns:
- The severe hazard of erosion is a major management concern.
- Solution channels and fractures in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Grassed waterways, diversions, and grade stabilization structures help to prevent gully erosion.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- Competition from weeds may slow the growth of planted tree seedlings.

Management measures:
- Building logging roads and skid trails on the contour

and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Limited
Management concerns:
• The slope is a moderate limitation affecting building site development.
• Solution channels and fractures in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The depth to bedrock is a limitation affecting septic tank absorption fields, excavations, and dwellings with basements.
• The moderate shrink-swell potential of the Nollville soil may be a limitation affecting the construction of buildings.
• Low strength is a limitation affecting the construction of roads in areas of the Nollville soil. Because the soil is soft when wet, pavement cracks and buckles under heavy loads.
• Erosion is a severe hazard on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Selecting the deepest areas of this map unit as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the limestone bedrock because of the hazard of ground-water pollution.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by the low strength of the Nollville soil.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation and to protect the ground water from pollution.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: Ryder—4A; Nollville—5A

RnD—Ryder-Nollville channery silt loams, 15 to 25 percent slopes

Setting

These soils are on moderately steep, convex upland ridges and hillsides that are characterized by low relief. They are in the western part of the Great Valley. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Ryder soil and similar soils: 60 percent
Nollville soil and similar soils: 30 percent
Dissimilar inclusions: 10 percent

Representative Profile

Ryder

Surface layer:
0 to 8 inches—yellowish brown channery silt loam

Subsoil:
8 to 19 inches—yellowish brown silt loam
19 to 30 inches—light yellowish brown channery silty clay loam

Underlying material:
30 to 35 inches—yellowish brown and brown very channery silty clay loam

Bedrock:
35 inches—slightly weathered, fractured and tilted, interbedded limestone and limy shale

Nollville

Surface layer:
0 to 8 inches—dark yellowish brown channery silt loam

Subsoil:
8 to 18 inches—yellowish brown channery silty clay loam
18 to 27 inches—yellowish brown silty clay loam
27 to 39 inches—strong brown silty clay

Underlying material:
39 to 55 inches—strong brown very channery silty clay loam

Bedrock:
55 inches—slightly weathered, fractured and tilted, interbedded limestone and limy shale

Soil Properties and Qualities

Ryder

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: 24 to 40 inches
Bedrock type: Interbedded limestone and limy shales; mainly members of the Elbrook Formation

Nollville

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Medium
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Bedrock type: Interbedded limestone and limy shales; mainly members of the Elbrook Formation

Minor Components

Dissimilar inclusions:
- The very deep Hagerstown soils
- The moderately deep Carbo soils
- Severely eroded soils
- Areas of limestone rock outcrop that occur singly or in parallel ridges

Similar soils:
- The very deep Duffield soils
- Soils that are 10 to 20 inches deep over bedrock
- Soils that have slopes ranging from 8 to 15 percent or from 25 to 35 percent

Use and Management

Uses: Most areas of this map unit have been cleared and are used for orchards or pasture. A few areas are used for hay or crops or as sites for community development.

Cropland

Suitability: Poorly suited; better suited to hay and pasture because of the severe hazard of erosion
Management concerns:
- The severe hazard of erosion is a major management concern.
- Solution channels and fractures in the bedrock increase the hazard of ground-water pollution caused by applications of pesticides, fertilizers, and manure; runoff from feedlots; and seepage from manure pits.
- An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water and surface water by nutrients.

Management measures:
- Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
- Grassed waterways and diversions help to prevent gully erosion.
- Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
- Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.

• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The slope is a moderate limitation affecting the operation of equipment.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Because of the slope, special care should be taken when logging roads and log landings are laid out and logging equipment is operated. Logging roads should be designed so that they conform to the topography.
• The hazard of erosion can be reduced by seeding logging roads, log landings, and areas that have been cut and filled and by installing water bars and culverts.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The slope is a severe limitation affecting community development.
• Solution channels and fractures in the bedrock increase the hazard of ground-water pollution by surface runoff and by seepage from septic tank absorption fields.
• The depth to bedrock is a limitation affecting septic tank absorption fields, excavations, and dwellings with basements.
• The moderate shrink-swell potential in areas of the Nollville soil may be a limitation affecting the construction of buildings.
• Low strength is a limitation affecting the construction of roads in areas of the Nollville soil. Because the soil is soft when wet, pavement cracks and buckles under heavy loads.
• Erosion is a severe hazard on construction sites.
Management measures:
• Buildings and roads should be designed so that they conform to the natural slope of the land. Extensive land shaping is necessary in most areas.
• Selecting the deepest areas of this map unit as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock and the slope.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the limestone bedrock because of the hazard of ground-water pollution.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by the low strength of the Nollville soil.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation and to protect the ground water from pollution.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: Ryder—4R; Nollville—5R

RvC—Ryder-Nollville channery silt loams, 8 to 15 percent slopes, very rocky

Setting

These soils are on strongly sloping, convex upland ridges and hillsides that are characterized by low relief. They are in the Great Valley. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Ryder soil and similar soils: 50 percent
Nollville soil and similar soils: 40 percent
Dissimilar inclusions: 10 percent

Representative Profile

Ryder

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

Subsoil:
9 to 25 inches—strong brown channery silty clay loam

Underlying material:
25 to 33 inches—yellowish brown extremely channery silty clay loam

Bedrock:
33 inches—slightly weathered, fractured and tilted, interbedded limestone and limy shale

Nollville

Surface layer:
0 to 10 inches—dark yellowish brown channery silt loam

Subsoil:
10 to 20 inches—yellowish brown channery silty clay loam
20 to 29 inches—yellowish brown silty clay loam
29 to 41 inches—strong brown silty clay

Underlying material:
41 to 57 inches—strong brown very channery silty clay loam

Bedrock:
57 inches—slightly weathered, fractured and tilted, interbedded limestone and limy shale

Soil Properties and Qualities

Ryder

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: 2 to 10 percent limestone rock outcrop
Natural fertility: Medium
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: 24 to 40 inches
Bedrock type: Interbedded limestone and limy shales; mainly members of the Elbrook Formation

Nollville

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: 2 to 10 percent limestone rock outcrop
Natural fertility: Medium
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Rapid
Depth to bedrock: 40 to 60 inches
Bedrock type: Interbedded limestone and limy shales; mainly members of the Elbrook Formation

Minor Components

Dissimilar inclusions:
- The very deep Hagerstown soils
- The moderately deep Carbo soils
- The shallow Opequon soils
- Severely eroded soils

Similar soils:
- The very deep Duffield soils
- Soils that have slopes ranging from 3 to 8 percent or from 15 to 25 percent

Use and Management

Uses: Most areas of the Ryder and Nollville soils have been cleared and are used as pasture. Many areas are wooded. A few areas are used as sites for community development.

Cropland

Suitability: Not suited
Management concerns:
- The rock outcrop makes tillage impractical.

Pasture and Hayland

Suitability: Not suited for hay; limited suitability for pasture
Management concerns:
- These soils are difficult to manage for pasture. The rock outcrop limits the use of farm machinery to manage and improve pasture.
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction and increases the runoff rate and the hazard of erosion.
- Solution channels and fractures in the bedrock increase the hazard of ground-water pollution caused by applications of herbicides and fertilizers.
- Ponds constructed for livestock water are susceptible to seepage and have a high failure rate.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.
- To protect the ground water from pollution, nutrients in fertilizer and manure applications should not exceed the plant requirements.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• Competition from weeds may slow the growth of planted tree seedlings.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The slope is a moderate limitation affecting community development.
• The limestone rock outcrop may interfere with excavations, including those for roads, foundations, and septic tank absorption fields.
• Solution channels and fractures in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• The depth to bedrock is a limitation affecting septic tank absorption fields, excavations, and dwellings with basements.
• The moderate shrink-swell potential in areas of the Nollville soil may be a limitation on sites for buildings.
• Low strength is a limitation affecting the construction of roads in areas of the Nollville soil. Because the soil is soft when wet, pavement cracks and buckles under heavy loads.
• Erosion is a severe hazard on construction sites.
Management measures:
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Selecting the deepest areas of this map unit as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or in areas where excavation exposes the bedrock because of the hazard of ground-water pollution.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by the low strength of the Nollville soil.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation and to protect the ground water from pollution.

Interpretive Groups

Land capability classification: VIs
Woodland ordination symbol: Ryder—4A; Nollville—5A

SwA—Swanpond silt loam, 0 to 3 percent slopes

Setting

This soil is on nearly level, linear to slightly convex uplands in the Great Valley. It is in areas dissected by shallow, intermittent drainageways. Sinkholes occur in some areas.

Composition

Swanpond soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 7 inches—brown silt loam

Subsoil:
7 to 32 inches—yellowish brown clay
32 to 65 inches—yellowish brown and strong brown clay that has gray mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: 2.5 to 3.5 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to slightly alkaline (pH 5.1 to 7.8)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
• The well drained Hagerstown and Endcav soils,

which are in the slightly higher positions on the landscape
• The moderately deep Carbo soils, which are near limestone rock outcrop and in the slightly higher positions on the landscape
• The somewhat poorly drained Poorhouse soils, which are in depressions
• The Funkstown soils that are subject to flooding and ponding; along concave drainageways and in sinkholes
• Areas of limestone rock outcrop, which can occur singly or in parallel ridges

Similar soils:
• The moderately well drained Funkstown soils that are not flooded
• Soils that have a channery surface layer
• Soils that have slopes ranging from 3 to 8 percent

Use and Management

Uses: Most areas of the Swanpond soil have been cleared and are used for cultivated crops, hay, or pasture (fig. 10).

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• The hazard of erosion is slight.
• Sinkholes and solution channels in the bedrock increase the hazard of pollution caused by applications of pesticides, manure, and fertilizers; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water by nutrients.
• The limestone rock outcrop may limit the direction of cultivation in some areas.
• Poor air drainage limits the use of this soil for orchards.

Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to control erosion and to maintain fertility and tilth.

Figure 10.—A cultivated area of Swanpond silt loam, 0 to 3 percent slopes. This soil is prime farmland.

• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Manure should be stored in a properly designed storage facility.
• Including grasses and legumes in crop rotations helps to minimize the loss of nutrients, improve soil structure, and provide nitrogen for use by succeeding crops.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.
• Competition from undesirable plants may slow the growth of planted tree seedlings.
Management measures:
• Logging should be deferred during wet periods.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.

Community Development

Suitability: Poorly suited
Management concerns:
• The slow permeability in the subsoil and the wetness limit the proper functioning of septic tank absorption fields.
• The wetness is a limitation on sites for dwellings with basements.
• The high shrink-swell potential in the subsoil is a limitation affecting foundations and footings.
• Low strength and the high shrink-swell potential are limitations affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas the nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines.
• Erosion on construction sites is a management concern.
Management measures:
• Enlarging or pressurizing septic tank absorption fields or installing alternating drainfields helps to overcome the restricted permeability.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIw
Woodland ordination symbol: 4C

SwB—Swanpond silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping limestone uplands in the Great Valley. It is in areas dissected by shallow, intermittent drainageways. Sinkholes occur in some areas.

Composition

Swanpond soil and similar soils: 75 percent
Dissimilar inclusions: 25 percent

Representative Profile

Surface layer:
0 to 7 inches—brown silt loam

Subsoil:
7 to 35 inches—yellowish brown clay
35 to 65 inches—yellowish brown clay that has gray mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: High
Depth to the seasonal high water table: 2.5 to 3.5 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to slightly alkaline (pH 5.1 to 7.8)
Surface runoff: Medium
Depth to bedrock: More than 60 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
• The well drained Hagerstown and Endcav soils, which are in the slightly higher positions on the landscape
• The moderately deep Carbo soils, which are near limestone rock outcrop and in the slightly higher positions on the landscape
• The Funkstown soils that are subject to flooding and ponding; along concave drainageways and in sinkholes
• Areas of limestone rock outcrop, which can occur singly or in parallel ridges
Similar soils:
• The moderately well drained Funkstown soils that are not subject to flooding
• Soils that have slopes ranging from 8 to 15 percent
• Soils that have slopes of less than 3 percent

Use and Management

Uses: Most areas of the Swanpond soil have been cleared and are used for cultivated crops, hay, or pasture.

Cropland

Suitability: Suited. This soil is prime farmland.
Management concerns:
• The hazard of erosion is moderate in unprotected areas.
• Sinkholes and solution channels in the bedrock increase the hazard of pollution caused by applications of pesticides, manure, and fertilizers; runoff from feedlots; and seepage from manure pits.
• An excessive amount of nutrients in manure and fertilizer applications can result in the pollution of ground water by nutrients.
• The limestone rock outcrop may limit the direction of cultivation in some areas.
Management measures:
• Using crop rotations that include grasses, legumes, and small grain, applying a system of conservation tillage, growing cover crops and green manure crops, and applying good crop residue management help to prevent excessive erosion and to maintain fertility and tilth.
• Designing fertilizer and manure applications to meet crop nutrient needs, using split fertilizer applications, and applying fertilizer in bands may reduce the risk of nutrient leaching.
• Maintaining sod filter strips around sinkholes reduces the hazard of ground-water pollution.
• Including grasses and legumes in crop rotations helps to minimize the loss of nutrients, improve soil structure, and provide nitrogen for use by succeeding crops.
• Manure should be stored in a properly designed storage facility.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of plants, especially legumes.

Woodland

Potential productivity: Moderately high
Management concerns:
• Operating logging equipment during wet periods when the soil is soft results in excessive rutting.

• Competition from undesirable plants may slow the growth of planted tree seedlings.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Logging should be deferred during wet periods.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.

Community Development

Suitability: Poorly suited
Management concerns:
• The slow permeability in the subsoil and the wetness limit the proper functioning of septic tank absorption fields.
• The wetness is a limitation on sites for dwellings with basements.
• The high shrink-swell potential in the subsoil is a limitation affecting foundations and footings.
• Low strength and the high shrink-swell potential are limitations affecting the construction of roads. Because this soil is soft when wet, pavement cracks and buckles under heavy loads.
• Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields.
• In some areas the nonrippable limestone bedrock may interfere with excavations, including those for roads, septic tank absorption fields, foundations, and sewer lines.
• Erosion is a moderate hazard on construction sites.
Management measures:
• Enlarging or pressurizing septic tank absorption fields or installing alternating drainfields helps to overcome the restricted permeability.
• Septic tank absorption fields should not be installed in areas that are near limestone rock outcrop or sinkholes or in areas where excavation exposes the limestone bedrock.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
• Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIe
Woodland ordination symbol: 4C

TyA—Tygart silt loam, 0 to 3 percent slopes

Setting

This soil is on nearly level, low stream terraces, mainly along Back Creek and, to a lesser extent, along Opequon Creek and the Potomac River.

Composition

Tygart soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Representative Profile

Surface layer:
0 to 10 inches—brown silt loam

Subsoil:
10 to 15 inches—light yellowish brown silt loam that has strong brown and brownish gray mottles
15 to 24 inches—yellowish brown silty clay loam that has gray and strong brown mottles
24 to 47 inches—gray clay that has yellowish brown and yellowish red mottles
47 to 59 inches—50 percent gray and 50 percent yellowish brown silty clay that has yellowish red mottles

Underlying material:
59 to 65 inches—gray silty clay that has yellowish brown and yellowish red mottles

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Slight
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Slow

Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
- The poorly drained Atkins soils, which are along drainageways
- The moderately well drained Monongahela soils

Similar soils:
- Poorly drained soils
- Soils that have a gravelly surface layer
- Soils that slopes of more than 3 percent
- Soils that are not as clayey in the subsoil as the Tygart soil

Use and Management

Uses: Most areas of the Tygart soil are used for pasture or hay. Some areas are used for cultivated crops. A few areas are forested.

Cropland

Suitability: Suited if the soil is adequately drained
Management concerns:
- This soil must be properly protected if cultivated crops are grown year after year.
- The wetness may delay tillage and planting in the spring.
- Draining this soil is difficult because of the slow permeability in the subsoil.

Management measures:
- Conservation tillage, deferred tillage during wet periods, winter cover crops, a crop rotation that includes hay, and good crop residue management help to maintain soil tilth and fertility and to control erosion.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
- Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- Because this soil is soft when wet, grazing early in spring damages the sod.

Management measures:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
- Grazing should be deferred in the spring until the soil is firm.
- Water-tolerant species should be selected for planting.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
- The use of equipment is restricted during wet periods because this soil is soft when wet.
- Competition from weeds may slow the growth of planted tree seedlings.
- Trees are susceptible to windthrow when the soil is wet.

Management measures:
- The tree species that can withstand the wetness should be selected for planting.
- Year-round logging roads require additions of roadfill and gravel.
- Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
- Harvest methods that do not leave the remaining trees widely spaced reduce the hazard of windthrow.

Community Development

Suitability: Poorly suited
Management concerns:
- The wetness is the main limitation on sites for buildings, especially buildings with basements.
- The wetness is a limitation affecting excavation and trafficability and may delay construction in the winter and spring.
- The wetness and the slow permeability are severe limitations on sites for septic tank absorption fields.
- Low strength and the wetness are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement cracks under heavy loads.

Management measures:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
- An alternative to a septic tank absorption field or a better suited soil should be considered for onsite sewage disposal.
- Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by low strength and wetness.

• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIw
Woodland ordination symbol: 4W

TyB—Tygart silt loam, 3 to 8 percent slopes

Setting

This soil is on gently sloping, low stream terraces, mainly along Back Creek and, to a lesser extent, along Opequon Creek.

Composition

Tygart soil and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Representative Profile

Surface layer:
0 to 10 inches—brown silt loam

Subsoil:
10 to 17 inches—yellowish brown silty clay that has gray, light yellowish brown, and strong brown mottles
17 to 35 inches—gray silty clay that has yellowish brown and grayish brown mottles
35 to 55 inches—dark gray silty clay that has strong brown mottles

Underlying material:
55 to 59 inches—light brownish gray clay that has strong brown and gray mottles
59 to 65 inches—gray clay that has brown, yellowish brown, and yellowish red mottles

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Surface runoff: Medium
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar inclusions:
• The moderately deep Clearbrook soils
• The moderately well drained Monongahela soils
• The poorly drained Atkins soils, which are along drainageways

Similar soils:
• Poorly drained soils
• Soils that have a gravelly surface layer
• Soils that are not as clayey in the subsoil as the Tygart soil
• Soils that have slopes of less than 3 percent or more than 8 percent

Use and Management

Uses: Most areas of the Tygart soil are used for pasture or hay. Some areas are used for cultivated crops. A few areas are forested.

Cropland

Suitability: Suited if the soil is adequately drained
Management concerns:
• Erosion is a moderate hazard in unprotected areas.
• The wetness may delay tillage and planting in the spring.
• Draining this soil is difficult because of the slow permeability in the subsoil.

Management measures:
• Conservation tillage, contour farming, deferred tillage when the soil is wet, winter cover crops, a crop rotation that includes hay, and good crop residue management help to maintain soil tilth and fertility and to control erosion.

Pasture and Hayland

Suitability: Suited; better suited to grasses than to legumes because of the seasonal high water table
Management concerns:
• Establishing and maintaining a healthy cover of sod and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a moderate hazard in areas where the plant cover has been destroyed.
• Because this soil is soft when wet, grazing early in spring damages the sod.

Management measures:
• Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep pastures in good condition.
• Grazing should be deferred in the spring until the soil is firm.
• Water-tolerant species should be selected for planting.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage plants.

Woodland

Potential productivity: Moderately high
Management concerns:
• Erosion is a management concern on logging roads and skid trails.
• The use of equipment is restricted during wet periods because this soil is soft when wet.
• Competition from weeds may slow the growth of planted tree seedlings.
• Trees are susceptible to windthrow when this soil is wet.
Management measures:
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.
• Year-round logging roads require additions of roadfill and gravel.
• Adequately preparing the site helps to control the initial plant competition in tree plantations, and spraying helps to control subsequent competition.
• Harvest methods that do not leave the remaining trees widely spaced reduce the hazard of windthrow.
• The tree species that can withstand the wetness should be selected for planting.

Community Development

Suitability: Poorly suited
Management concerns:
• The wetness is the main limitation on sites for buildings, especially buildings with basements.
• The wetness is a limitation affecting excavation and trafficability and may delay construction in the winter and spring.
• The wetness and the slow permeability are severe limitations on sites for septic tank absorption fields.
• Low strength and the wetness are limitations on sites for local roads and streets. Because this soil is soft when wet, pavement cracks under heavy loads.
• The hazard of erosion is moderate on construction sites.
Management measures:
• Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
• Installing a drainage system around structures that have basements or crawl spaces helps to overcome the wetness.
• An alternative to a septic tank absorption field or a better suited soil should be considered for onsite sewage disposal.
• Installing a drainage system and providing a suitable road base that includes the installation of properly designed geotextiles help to prevent the road damage caused by low strength and wetness.
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: IIIw
Woodland ordination symbol: 4W

Ua—Udorthents, smoothed

Setting

These soils are in nearly level to very steep areas that have been drastically disturbed by excavating, grading, filling, or a combination of these practices. Most areas of the soils are the result of road construction, such as those along Interstate 81, or construction of commercial or industrial buildings, schools, or recreational sites, such as ball fields.

Composition

Udorthents: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Because the characteristics of these soils vary so much, a representative profile is not given. The surface layer of these soils ranges from sandy loam to clay with a wide range in size, amount, and kind of rock fragments. Generally, the soils derived from materials excavated from areas underlain by limestone are clayey in texture, while the soils derived from materials excavated from areas underlain by shale or sandstone are loamy in texture.

Soil Properties and Qualities

Drainage class: Varies
Permeability: Varies; commonly slow or very slow because the soils have been compacted by heavy equipment
Available water capacity: Varies

Seasonal high water table: Varies
Flooding: Varies
Shrink-swell potential: Varies
Erosion hazard: Varies
Stoniness: Varies
Rockiness: Varies
Natural fertility: Varies
Reaction: In unlimed areas, varies
Surface runoff: Varies
Depth to bedrock: Varies from very shallow in excavated areas to very deep in filled areas
Bedrock type: Varies; bedrock exposed in some of the excavated areas

Minor Components

Dissimilar inclusions:
- The very deep Hagerstown, Duffield, Funkstown, and Swanpond soils
- The deep Nollville soils
- The moderately deep Berks, Carbo, and Ryder soils
- The shallow Opequon and Weikert soils
- Wet soils
- Areas of rock outcrop
- Areas of urban land
- Areas that are subject to flooding

Use and Management

Uses: Most areas of these soils are used as interstate rights-of-way, for commercial or industrial purposes, as school grounds, or for recreation.

Cropland

Suitability: Generally not suited

Pasture and Hayland

Suitability: Generally not suited

Woodland

Potential productivity: Varies, but generally low
Management concerns: Because these soils commonly are compacted and have a low content of organic matter, it may be necessary to add organic matter, in the form of compost or peat moss, to the soils when trees are planted.

Community Development

Suitability: Varies too much to rate. An onsite investigation is necessary to determine the suitability of these soils as sites for sanitary facilities, buildings, and other development.

Interpretive Groups

Land capability classification: Not assigned
Woodland ordination symbol: Not assigned

Ub—Urban land

Setting

This map unit consists of highly developed areas, mostly in Martinsburg and along Interstate 81.

Composition

Urban land: 90 percent
Dissimilar inclusions: 10 percent

Representative Profile

Because the original soil has been disturbed, a representative pedon is not given.

Soil Properties and Qualities

Most areas of this unit have been smoothed, and the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. The unit consist of areas where at least 90 percent of the surface is covered by asphalt, concrete, or other impervious material (fig. 11). Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Minor Components

Dissimilar inclusions:
- The well drained Hagerstown soils
- The moderately well drained Swanpond soils
- The shallow Opequon soils
- The moderately deep Carbo soils
- Small areas of the Funkstown soils that are subject to flooding; along concave drainageways
- Areas of rock outcrop
- Areas of Udorthents, smoothed

Use and Management

Uses: The Urban land is used for homes, shopping malls, schools, factories, roads, cemeteries, railroads, and industrial facilities.

Cropland

Suitability: Not suited

Pasture and Hayland

Suitability: Not suited

Community Development

Suitability: Onsite investigation is needed to determine the limitations affecting any proposed use.

Interpretive Groups

Land capability classification: Not assigned
Woodland ordination symbol: Not assigned

Figure 11.—An area of Urban land in Berkeley County.

UkC—Urban land-Berks complex, 0 to 15 percent slopes

Setting

This map unit consists of nearly level areas covered by buildings, roads, railroads, parking lots, and other urban structures and of gently sloping or strongly sloping areas of upland soils. The Urban land and the Berks soil occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Urban land: 45 percent
Berks soil and similar soils: 40 percent
Dissimilar inclusions: 15 percent

Representative Profile

Urban land

Because the original soil has been disturbed, a representative profile is not given.

Berks

Surface layer:
0 to 7 inches—brown channery silt loam

Subsoil:
7 to 12 inches—yellowish brown channery silt loam
12 to 21 inches—variegated yellowish brown and strong brown very channery silt loam

Underlying material:
21 to 25 inches—variegated strong brown and yellowish brown extremely channery silt loam

Bedrock:
25 inches—yellowish brown shale

Soil Properties and Qualities

Urban land

Most areas have been smoothed, and the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. In most areas the surface is impervious to water. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Berks

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate or severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, very strongly acid to slightly acid (pH 4.5 to 6.5)
Surface runoff: Medium or rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Soft, rippable, acid Martinsburg Shale

Minor Components

Dissimilar inclusions:
- The somewhat poorly drained Clearbrook soils
- The well drained Pope soils, moderately well drained Philo soils, and poorly drained Atkins soils that are subject to flooding; along narrow drainageways
- Areas of Udorthents, smoothed, that have been cut and filled
- Severely eroded soils

Similar soils:
- The shallow Weikert soils
- Soils that have slopes ranging from 8 to 15 percent
- Soils that are 40 to 60 inches deep over bedrock

Use and Management

Uses: This map unit is used for urban development.

Community Development

Suitability: Limited
Management concerns:
- The hazard of erosion is moderate or severe on construction sites.
- The depth to bedrock is a limitation on sites for septic tank absorption fields.
- The depth to bedrock and the slope are moderate limitations affecting excavations, building site development, and construction of roads. In most areas, however, the shale bedrock is soft enough to be excavated with conventional earthmoving equipment.
- Establishing and maintaining vegetation on roadbanks is difficult on the droughty Berks soil, especially on south aspects.
- The rock fragments in the surface layer and the droughtiness make establishment of lawns difficult in areas of the Berks soil.

Management measures:
- Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
- Sanitary facilities should be connected to public sewers and sewage treatment facilities.
- Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks. Seeded areas should be mulched with straw.

Interpretive Groups

Land capability classification: Not assigned
Woodland ordination symbol: Not assigned

UvC—Urban land-Carbo-Endcav complex, 0 to 15 percent slopes

Setting

This map unit consists of nearly level areas covered by buildings, roads, railroads, parking lots, and other urban structures and of gently sloping or strongly sloping areas in the uplands. Sinkholes are common in some areas. The Urban land and the Carbo and Endcav soils overlie the Chambersburg and New Market Limestones, generally in Martinsburg and the surrounding area. The Urban land and the two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Urban land: 45 percent
Carbo soil and similar soils: 25 percent
Endcav soil and similar soils: 20 percent
Dissimilar inclusions: 10 percent

Representative Profile

Urban land

Because the original soil has been disturbed, a representative profile is not given.

Carbo

Surface layer:
0 to 2 inches—dark yellowish brown silty clay loam
2 to 9 inches—dark yellowish brown silty clay

Subsoil:
9 to 18 inches—variegated strong brown and yellowish brown clay
18 to 28 inches—variegated yellowish brown and strong brown clay
28 to 34 inches—variegated dark yellowish brown, strong brown, and yellowish brown clay

Bedrock:
34 inches—hard, bluish gray limestone

Endcav

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

Subsoil:
8 to 23 inches—strong brown clay
23 to 41 inches—strong brown clay that has many pockets of coarse yellowish brown loam

Bedrock:
41 inches—gray limestone

Soil Properties and Qualities

Urban land

Most areas have been smoothed, and the original soils have been disturbed, filled over, or otherwise destroyed prior to construction. In most areas the surface is impervious to water. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Carbo

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Moderate or severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Medium or rapid
Depth to bedrock: 20 to 40 inches; the bedrock is steeply tilted under this soil, and soil depth may vary greatly within short distances
Bedrock type: Hard, nearly pure Chambersburg and New Market Limestones

Endcav

Drainage class: Well drained
Permeability: Slow (0.06 to 0.2 inch per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: High in the subsoil
Erosion hazard: Moderate or severe
Stoniness: None
Rockiness: None
Natural fertility: High
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Surface runoff: Medium or rapid
Depth to bedrock: 40 to 60 inches; the bedrock is steeply tilted under this soil, and soil depth may vary greatly within short distances
Bedrock type: Hard, nearly pure limestone, mainly members of the Chambersburg and New Market Formations

Minor Components

Dissimilar inclusions:
- The moderately well drained Swanpond soils
- Areas of Udorthents, smoothed, that have been cut and filled
- The moderately well drained Funkstown soils that are subject to flooding; along narrow drainageways
- Areas of rock outcrop
- Severely eroded soils that have a surface layer of clay

Similar soils:
- The shallow Opequon soils
- The very deep Hagerstown soils
- Soils that have slopes ranging from 15 to 25 percent

Use and Management

Uses: This map unit is not suited to cultivated crops, hay, pasture, or woodland. Most areas are used as sites for community development. Open areas are used mainly for lawns or home gardens.

Community Development

Suitability: Limited
Management concerns:
- The depth to hard, nonrippable limestone bedrock, the high shrink-swell potential, and, in some areas, the slope are the main limitations affecting the construction of buildings and excavations, including those for roads, sewer systems, and foundations. In most areas the hard bedrock has to be blasted before it can be excavated.

- The slow permeability limits the proper functioning of septic tank absorption fields.
- Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields and by storm-water runoff.
- Low strength is a limitation affecting the construction of roads.
- Erosion can be severe on construction sites.

Management measures:
- Properly designing and strengthening footings and foundations can help to prevent the structural damage caused by shrinking and swelling.
- Sanitary facilities should be connected to public sewers and sewage treatment facilities.
- Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength and by shrinking and swelling.
- Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.

Interpretive Groups

Land capability classification: Not assigned
Woodland ordination symbol: Not assigned

UwC—Urban land-Hagerstown complex, 0 to 15 percent slopes

Setting

This map unit consists of nearly level areas covered by buildings, roads, railroads, parking lots, and other urban structures and of gently sloping or strongly sloping areas on uplands. Sinkholes are common in some areas. The Urban land and the Hagerstown soil are mapped mostly in Martinsburg and the surrounding area, but they occur throughout the Great Valley. They occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Urban land: 40 percent
Hagerstown and similar soils: 40 percent
Dissimilar inclusions: 20 percent

Representative Profile

Urban land

Because the original soil has been disturbed, a representative profile is not given.

Hagerstown

Surface layer:
0 to 12 inches—brown silt loam

Subsoil:
12 to 20 inches—strong brown silt loam
20 to 42 inches—variegated yellowish red and strong brown silty clay
42 to 55 inches—variegated yellowish red and strong brown silty clay loam
55 to 71 inches—variegated strong brown and dark yellowish brown silty clay loam

Bedrock:
71 inches—hard, bluish gray limestone

Soil Properties and Qualities

Urban land

Most areas have been smoothed, and the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. In most areas the surface is impervious to water. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Hagerstown

Drainage class: Well drained
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Moderate in the subsoil
Erosion hazard: Moderate or severe
Stoniness: None
Rockiness: None
Natural fertility: Medium or high
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Surface runoff: Medium or rapid
Depth to bedrock: More than 60 inches
Bedrock type: Hard, nonrippable limestone

Minor Components

Dissimilar inclusions:
- The moderately deep Carbo soils and the shallow Opequon soils
- The moderately well drained Funkstown soils that are subject to flooding and ponding; along shallow drainageways and in sinkholes
- The moderately well drained Swanpond soils

- Areas of Udorthents, smoothed, that have been cut and filled
- Areas of rock outcrop
- Severely eroded soils that have a surface layer of silty clay

Similar soils:
- The well drained Duffield soils
- Soils that have slopes ranging from 15 to 25 percent
- The deep Endcav soils

Use and Management

Uses: This map unit is not suited to cultivated crops, hay, pasture, or woodland. Most areas are used as sites for community development. Open areas are used mainly for lawns or home gardens.

Community Development

Suitability: Limited
Management concerns:
- The depth to hard, nonrippable limestone bedrock and the slope are the main limitations affecting the construction of buildings and excavations, including those for roads, sewer systems, and foundations.
- Sinkholes and solution channels in the bedrock increase the hazard of ground-water pollution by seepage from septic tank absorption fields and by storm-water runoff.
- Low strength is a limitation affecting the construction of roads.
- Erosion can be severe on construction sites.

Management measures:
- Sanitary facilities should be connected to public sewers and sewage treatment facilities.
- Providing a suitable road base that includes the installation of properly designed geotextiles helps to prevent the road damage caused by low strength.
- Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation and to protect the ground water from pollution.

Interpretive Groups

Land capability classification: Not assigned
Woodland ordination symbol: Not assigned

W—Water

This map unit consists of areas inundated with water for most of the year and generally includes rivers, lakes, and ponds. No interpretations are given for this map unit.

WbB—Weikert-Berks channery silt loams complex, 3 to 8 percent slopes

Setting

These soils are on gently sloping, slightly convex, dissected shale uplands, mostly in the western part of the county. They occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Weikert soil and similar soils: 40 percent
Berks soil and similar soils: 40 percent
Dissimilar inclusions: 20 percent

Representative Profile

Weikert

Surface layer:
0 to 6 inches—dark brown channery silt loam

Subsoil:
6 to 14 inches—yellowish brown very channery silt loam

Underlying material:
14 to 18 inches—yellowish brown extremely channery silt loam

Bedrock:
18 inches—dark gray to light gray, fractured shale and siltstone

Berks

Surface layer:
0 to 6 inches—dark brown channery silt loam

Subsoil:
6 to 14 inches—brown very channery silt loam
14 to 26 inches—yellowish brown very channery loam

Underlying material:
26 to 36 inches—yellowish brown extremely channery silt loam

Bedrock:
36 inches—light olive brown and dark grayish brown, fractured shale

Soil Properties and Qualities

Weikert

Drainage class: Somewhat excessively drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Very low
Depth to the seasonal high water table: More than 6 feet

Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.5 to 6.0)
Surface runoff: Medium
Depth to bedrock: 10 to 20 inches
Bedrock type: Soft, rippable, acid shale

Berks

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Moderate
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.6 to 6.0)
Surface runoff: Medium
Depth to bedrock: 20 to 40 inches
Bedrock type: Soft, rippable, acid shale

Minor Components

Dissimilar inclusions:
• The somewhat poorly drained Clearbrook soils, which are in depressions and on head slopes
• Severely eroded soils
Similar soils:
• The well drained, reddish Calvin soils
• Soils that are more than 40 inches deep over bedrock
• Soils that have a very channery surface layer
• Soils that have slopes of less than 3 percent or more than 8 percent

Use and Management

Uses: Most areas of the Weikert and Berks soils have been cleared and are used for pasture or hay. Some areas are wooded. A few small areas are used for cultivated crops or orchards or as building sites.

Cropland

Suitability: Suited
Management concerns:
• The hazard of erosion is moderate in unprotected areas.
• Droughtiness during the growing season and the low natural fertility are management concerns.
Management measures:
• Conservation tillage, contour farming, cover crops, a cropping sequence that includes grasses and legumes, and good crop residue management help to control erosion and to maintain fertility and tilth.
• Because of the droughtiness, these soils are better suited to early maturing small grain than to late maturing crops, such as corn.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.
• Applying lime and fertilizer according to the results of soil tests helps to ensure maximum production.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• The droughtiness limits forage production during midsummer.
• Water for livestock is scarce, but potential sites where ponds or springs can be developed generally are available along nearby drainageways.
Management measures:
• Proper stocking rates, a rotation grazing system, and applications of lime and fertilizer help to keep pastures productive and to control runoff and erosion.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum results.

Woodland

Potential productivity: Moderate or moderately high
Management concerns:
• The limited depth to bedrock, the low natural fertility, and the droughtiness result in a high seedling mortality rate.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Planting should be timed so that seedlings can take full advantage of spring rains.

• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Tree plantations should be on north-facing slopes where possible.
• Building logging roads and skid trails on the contour and seeding the roads and trails when they are no longer being used help to control erosion.

Community Development

Suitability: Limited
Management concerns:
• The hazard of erosion is moderate on construction sites.
• The depth to bedrock is a limitation on sites for septic tank absorption fields.
• The depth to bedrock is a moderate limitation affecting excavations, building site development, and construction of roads. In most areas, however, the shale bedrock is soft enough to be excavated with conventional earthmoving equipment.
• Establishing and maintaining vegetation on roadbanks is difficult on these droughty soils, especially on south aspects.
• The rock fragments in the surface layer and the droughtiness make establishment of lawns difficult.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Selecting the deepest areas of these soils as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks.

Interpretive Groups

Land capability classification: IIIe
Woodland ordination symbol: Weikert—3D; Berks—4F

WbC—Weikert-Berks channery silt loams, 8 to 15 percent slopes

Setting

These soils are on strongly sloping, convex, dissected shale uplands. The Weikert soil is on the more sloping shoulder slopes and nose slopes, and the Berks soil is on the less sloping ridgetops and shoulder slopes. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Weikert soil and similar soils: 45 percent
Berks soil and similar soils: 40 percent
Dissimilar inclusions: 15 percent

Representative Profile

Weikert

Surface layer:
0 to 6 inches—dark brown channery silt loam

Subsoil:
6 to 14 inches—yellowish brown very channery silt loam

Underlying material:
14 to 18 inches—yellowish brown extremely channery silt loam

Bedrock:
18 inches—dark gray to light gray, fractured shale and siltstone

Berks

Surface layer:
0 to 6 inches—dark brown channery silt loam

Subsoil:
6 to 14 inches—brown very channery silt loam
14 to 26 inches—yellowish brown very channery silt loam

Underlying material:
26 to 36 inches—yellowish brown extremely channery silt loam

Bedrock:
36 inches—light olive brown and dark grayish brown, fractured shale

Soil Properties and Qualities

Weikert

Drainage class: Somewhat excessively drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Very low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low

Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.5 to 6.0)
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Bedrock type: Soft, rippable, acid shale

Berks

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.6 to 6.0)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Soft, rippable, acid shale

Minor Components

Dissimilar inclusions:
• The somewhat poorly drained Clearbrook soils, which are on gently sloping ridgetops and on head slopes
• Severely eroded soils
Similar soils:
• Small areas of the well drained, reddish Calvin soils, which are in the western part of the county
• Soils that are more than 40 inches deep over bedrock
• Soils that have slopes of less than 8 percent or more than 15 percent

Use and Management

Uses: Most areas of the Weikert and Berks soils are wooded. Some areas have been cleared and are used for pasture or hay. A few small areas are used for cultivated crops or orchards or as sites for community development.

Cropland

Suitability: Poorly suited; better suited to hay and pasture because of the severe hazard of erosion and droughtiness
Management concerns:
• The hazard of erosion is severe.
• The droughtiness during the growing season and the low natural fertility are management concerns.
Management measures:
• Conservation tillage, contour farming, contour stripcropping, cover crops, a cropping sequence that includes grasses and legumes, and good crop residue management help to control erosion and to maintain fertility and tilth.
• Because of the droughtiness, these soils are better suited to early maturing small grain than to late maturing crops, such as corn.
• Leaving crop residue on the surface and adding other organic material help to conserve soil moisture.
• Applying lime and fertilizer according to the results of soil tests helps to ensure maximum production.

Pasture and Hayland

Suitability: Suited
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• The droughtiness limits forage production during midsummer.
• Water for livestock is scarce, but potential sites where ponds or springs can be developed generally are available along nearby drainageways.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate or moderately high
Management concerns:
• The depth to bedrock, the low natural fertility, and the droughtiness result in a high seedling mortality rate, especially on south aspects.
• Erosion is a management concern on logging roads and skid trails.
Management measures:
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Planting should be timed so that seedlings can take full advantage of spring rains.

• Drought-tolerant species, such as Virginia pine, white pine, Scotch pine, and Norway spruce, should be selected for planting.
• Tree plantations should be on north-facing slopes where possible.
• The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been cut and filled to perennial grasses and legumes; and installing water bars and culverts.

Community Development

Suitability: Poorly suited
Management concerns:
• The hazard of erosion is severe on construction sites.
• The depth to bedrock is a limitation on sites for septic tank absorption fields.
• The depth to bedrock and the slope are moderate limitations affecting excavations, building site development, and construction of roads. In most areas, however, the shale bedrock is soft enough to be excavated with conventional earthmoving equipment.
• Establishing and maintaining vegetation on roadbanks is difficult on these droughty soils, especially on south aspects.
• The rock fragments in the surface layer and the droughtiness make establishment of lawns difficult.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Selecting the deepest areas of these soils as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock and the slope.
• Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks. Seeded areas should be mulched with straw.

Interpretive Groups

Land capability classification: IVe
Woodland ordination symbol: Weikert—3D; Berks—4F

WbD—Weikert-Berks channery silt loams, 15 to 25 percent slopes

Setting

These soils are on moderately steep, convex, dissected shale uplands. The Weikert soil is on the more sloping shoulder slopes and nose slopes, and the Berks soil is on the less sloping ridgetops and shoulder slopes. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Weikert soil and similar soils: 50 percent
Berks soil and similar soils: 35 percent
Dissimilar inclusions: 15 percent

Representative Profile

Weikert

Surface layer:
0 to 4 inches—dark brown channery silt loam

Subsoil:
4 to 14 inches—yellowish brown very channery silt loam

Underlying material:
14 to 18 inches—yellowish brown, extremely friable channery silt loam

Bedrock:
18 inches—dark gray to light gray, fractured shale and siltstone

Berks

Surface layer:
0 to 4 inches—dark brown channery silt loam

Subsoil:
4 to 14 inches—brown very channery silt loam
14 to 26 inches—yellowish brown very channery silt loam

Underlying material:
26 to 36 inches—yellowish brown extremely channery loam

Bedrock:
36 inches—light olive brown and dark grayish brown, fractured shale

Soil Properties and Qualities

Weikert

Drainage class: Somewhat excessively drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Very low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.5 to 6.0)
Surface runoff: Rapid
Depth to bedrock: 10 to 20 inches
Bedrock type: Soft, rippable, acid shale

Berks

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.6 to 6.0)
Surface runoff: Rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Soft, rippable, acid shale

Minor Components

Dissimilar inclusions:
- Soils that are less than 10 inches deep over bedrock
- Severely eroded soils
- Small areas of shale rock outcrop
- Small areas of the Atkins, Philo, and Pope soils that are subject to flooding; along narrow drainageways

Similar soils:
- Small areas of the well drained, reddish Calvin soils, which are in the western part of the county
- Soils that are more than 40 inches deep over bedrock
- Soils that have slopes of less than 15 percent or more than 25 percent

Use and Management

Uses: Most areas of the Weikert and Berks soils are wooded. Some areas are used for pasture or hay. A few small areas are used as sites for community development.

Cropland

Suitability: Not suited
Management concerns:
- The moderately steep slope, the severe hazard of erosion, droughtiness, and the low natural fertility make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hay; limited suitability for pasture
Management concerns:
- Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
- Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
- If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
- The droughtiness limits forage production during midsummer.
- Water for livestock is scarce, but potential sites where ponds or springs can be developed generally are available along nearby drainageways.

Management measures:
- Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
- Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate on south aspects; moderate or moderately high on north aspects
Management concerns:
- Erosion is a management concern on logging roads and skid trails.
- The slope is a moderate limitation affecting the operation of equipment.
- The depth to bedrock, the low natural fertility, and the droughtiness result in a high seedling mortality rate, especially on south aspects.

Management measures:
- The hazard of erosion can be reduced by building logging roads and skid trails on the contour; seeding logging roads, log landings, and areas that have been

cut and filled to perennial grasses and legumes; and installing water bars and culverts.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, Scotch pine, white pine, and Norway spruce, should be selected for planting.
• Tree plantations should be on north-facing slopes where possible.

Community Development

Suitability: Poorly suited
Management concerns:
• The hazard of erosion is severe on construction sites.
• The depth to bedrock and the slope are severe limitations on sites for septic tank absorption fields. Effluent from absorption fields may surface in downslope areas.
• The slope is a severe limitation affecting excavations, building site development, and construction of roads. In most areas extensive land shaping is necessary. The shale bedrock in most areas is soft enough to be excavated with conventional earthmoving equipment.
• Establishing and maintaining vegetation on roadbanks is difficult on these droughty soils, especially on south aspects.
• The rock fragments in the surface layer and the droughtiness make establishment of lawns difficult.
Management measures:
• Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal of surface runoff help to control erosion and sedimentation.
• Selecting the deepest areas of these soils as sites for septic tank absorption fields, installing the absorption fields on the contour, and enlarging the absorption fields can help to overcome the depth to bedrock.
• Buildings and roads should be designed so that they conform to the natural slope of the land.
• Drought-tolerant species, such as tall fescue and crownvetch, should be selected for planting on roadbanks. Seeded areas should be mulched with straw.

Interpretive Groups

Land capability classification: VIe
Woodland ordination symbol: Weikert—3R; Berks—3R on south aspects and 4R on north aspects

WkF—Weikert-Berks very channery silt loams, 25 to 70 percent slopes

Setting

These soils are on steep or very steep, convex, dissected shale uplands. The Weikert soil is dominant on south aspects and on very steep shoulder slopes and nose slopes, and the Berks soil is dominant on north aspects and on steep side slopes. The two soils occur as areas so intermingled on the landscape that it was impractical to separate them in mapping.

Composition

Weikert soil and similar soils: 50 percent
Berks soil and similar soils: 35 percent
Dissimilar inclusions: 15 percent

Representative Profile

Weikert

Surface layer:
0 to 2 inches—very dark grayish brown very channery silt loam

Subsoil:
2 to 13 inches—yellowish brown very channery silt loam

Bedrock:
13 inches—tilted and fractured, gray shale

Berks

Surface layer:
0 to 2 inches—dark brown very channery silt loam

Subsoil:
2 to 12 inches—dark yellowish brown very channery loam
12 to 24 inches—yellowish brown very channery silt loam

Bedrock:
24 inches—yellowish brown shale

Soil Properties and Qualities

Weikert

Drainage class: Somewhat excessively drained
Permeability: Moderately rapid (2.0 to 6.0 inches per hour)
Available water capacity: Very low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: None

Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.5 to 6.0)
Surface runoff: Very rapid
Depth to bedrock: 10 to 20 inches
Bedrock type: Soft, rippable, acid shale

Berks

Drainage class: Well drained
Permeability: Moderate or moderately rapid (0.6 inch to 6.0 inches per hour)
Available water capacity: Very low or low
Depth to the seasonal high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Erosion hazard: Very severe
Stoniness: None
Rockiness: None
Natural fertility: Low
Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.6 to 6.0)
Surface runoff: Very rapid
Depth to bedrock: 20 to 40 inches
Bedrock type: Soft, rippable, acid shale

Minor Components

Dissimilar inclusions:
• The moderately well drained Buchanan soils, which are on small, concave footslopes
• Small areas of the Atkins, Philo, and Pope soils that are subject to flooding; along narrow drainageways
• Severely eroded soils
• Areas of shale rock outcrop
• Soils that are less than 10 inches deep over bedrock
Similar soils:
• The somewhat excessively drained Dekalb soils
• The well drained, reddish Calvin soils, which are in the western part of the county
• Soils that are more than 40 inches deep over bedrock
• Soils that have slopes of less than 25 percent or more than 70 percent

Use and Management

Uses: Most areas of the Weikert and Berks soils are wooded. A few small areas have been cleared and are used as pasture.

Cropland

Suitability: Not suited
Management concerns:
• The steep or very steep slope, the droughtiness, and the low natural fertility make cultivation impractical.

Pasture and Hayland

Suitability: Not suited to hay; difficult to manage for pasture
Management concerns:
• Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are major pasture management concerns.
• Overgrazing causes surface compaction, increases the runoff rate and the hazard of erosion, and reduces the vigor of the plant cover.
• If pastures are overgrazed, erosion is a severe hazard in areas where the plant cover has been destroyed.
• The droughtiness limits forage production during midsummer.
• Because of the slope, it is difficult to safely operate conventional equipment used in clipping and in applying fertilizer.
• Water for livestock is scarce, but potential sites where ponds or springs can be developed generally are available along nearby drainageways.
Management measures:
• Proper stocking rates, uniform distribution of grazing, and a planned grazing system help to keep pastures in good condition.
• Applying lime and fertilizer according to the results of soil tests helps to ensure the maximum growth of forage, especially legumes.

Woodland

Potential productivity: Moderate on south aspects; moderate or moderately high on north aspects
Management concerns:
• Erosion is a severe hazard on logging sites.
• Operating logging equipment is hazardous because of the steep and very steep slopes.
• The depth to bedrock, the low natural fertility, and the droughtiness result in a high seedling mortality rate, especially on south aspects.
Management measures:
• Because of the slope, special care should be taken when logging roads and log landings are laid out and logging equipment is operated. Logging roads should be designed so that they conform to the topography.
• Because of the erosion hazard, water should be removed from logging roads by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid

trails, and log landings to perennial grasses and legumes after the trees are logged also help to prevent excessive erosion.
• Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.
• Planting should be timed so that seedlings can take full advantage of spring rains.
• Drought-tolerant species, such as Virginia pine, Scotch pine, white pine, and Norway spruce, should be selected for planting.
• Tree plantations should be on north-facing slopes where possible.

Community Development

Suitability: Not suited
Management concerns:
• The steep and very steep slopes and the depth to bedrock are severe limitations affecting community development. A better suited soil should be selected for development.

Interpretive Groups

Land capability classification: VIIe
Woodland ordination symbol: Weikert—3R; Berks—3R on south aspects and 4R on north aspects

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The

Figure 12.—Homes constructed in an area of Hagerstown silt loam, 3 to 8 percent slopes, which formerly was prime farmland.

temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 43,000 acres in the survey area, or nearly 21 percent of the total acreage, meets the soil requirements for prime farmland. Many areas of this land are along Back Creek in the western part of the county, but most are in the Shenandoah Valley. Most of this prime farmland is used for crops or orchards. The crops grown on this land, mainly corn, soybeans, and apples, account for much of the county's total agricultural income each year.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to urban uses (fig. 12). The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, less productive, and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland 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. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils not listed in table 5 would be classified as prime farmland if certain limitations were overcome. For example, Atkins silt loam, Dunning silt loam, and Tygart silt loam would be considered prime farmland if they were adequately drained.

Use and Management of the Soils

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

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

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

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or 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

Norman L. DeLawder, district conservationist, and Orland C. Parks, Jr., staff agronomist, Natural Resources 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 Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

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

In 1997, about 59,600 acres in the survey area was used for crops, hay, or pasture (USDA 1999). Of this total, about 5,400 acres was used for row crops, mainly corn; 2,600 acres was used for close-growing crops, mainly soybeans, wheat, oats, and barley; 17,400 acres was used as hayland; 24,200 acres was in pasture; and 7,000 acres was used for orchards. The field crops that can be grown in the county include corn, soybeans, sorghum/sudan, wheat, oats, rye, and barley. In recent years a considerable acreage of farmland has been converted to nonfarm uses. The total acreage for all land in farms in the county was about 72,600 acres in 1997, down from about 80,300 acres in 1987 (USDA 1999; U.S. Department of Commerce 1994).

Most of the soils in the county respond well to applications of lime and fertilizer. The amount of lime and fertilizer needed depends on the types of soils, the cropping history, the kinds of crops to be grown, and the desired yields. Soils that formed in material weathered from limestone bedrock, such as the Hagerstown, Swanpond, Endcav, Duffield, and Carbo soils, generally have a higher content of the basic nutrients needed for plant growth than the soils that formed in material weathered from acid shale bedrock, such as the Berks and Weikert soils. Laboratory analyses of soil samples can help to determine specific needs.

Soil erosion is a hazard on most of the cropland in the county, and controlling erosion is a major management concern. Loss of the surface layer as a result of erosion reduces the productivity of the soil, the level of fertility, and the water-holding capacity of the soil. Erosion is especially damaging to soils that have a clayey subsoil, such as the Hagerstown, Swanpond, Endcav, Carbo, and Caneyville soils, and to soils that tend to be droughty, such as the Berks and Weikert soils.

Management practices that provide a protective surface cover help to control erosion by reducing the rate of runoff and increasing the rate of water infiltration. Examples of these management practices are crop rotations that include grasses, legumes, and small grain; conservation tillage; winter cover crops; and crop residue management. Engineering practices, such as stripcropping, grassed waterways, and terracing, can be very effective in controlling erosion but are not commonly used in the county because most of the cropland has short, irregularly shaped slopes.

Improving or maintaining tilth is a management concern on most of the soils used as cropland in the county. Most of these soils have a surface layer of silt loam and a low content of organic matter. After periods of heavy rainfall, they tend to form a crust on the surface, which reduces the rate of water infiltration and increases the rate of runoff and of erosion. Tilth is also a management concern on soils that have a high content of clay in the plow layer. Examples are the Endcav, Carbo, and Opequon soils. If plowed when wet, these soils tend to become cloddy as they dry. As a result, it is difficult to prepare a good seedbed. Tilth can be maintained or improved by no-till planting, growing green manure crops, applying crop residue management, adding manure, and tilling at the proper soil moisture content.

The pasture plants that are common in the county include orchardgrass, bluegrass, tall fescue, and clovers. Most improved pastures consist of mixtures of orchardgrass and ladino clover. Pastures of cool-season plants provide most of the grazing in the spring and fall. Warm-season grasses, such as switchgrass, are being established to provide grazing in the summer.

Establishing and maintaining a mixture of grasses and legumes and preventing overgrazing are the main pasture management concerns. Overgrazing increases the runoff rate and the rate of erosion. Maintenance of stocking rates within the grazing capacity, a rotation grazing system, deferred grazing, weed control, restricted grazing during wet periods, and applications of lime and fertilizer are major pasture management practices.

The major hay plants are alfalfa, smooth bromegrass, orchardgrass, red clover, and ladino clover. Most of the soils that formed in material weathered from limestone, such as the Hagerstown, Duffield, Carbo, and Endcav soils, are suited to 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 (fig. 13). Many of the orchards in the county are in areas of the Duffield, Ryder, and Nollville soils along Apple Pie Ridge in the western part of the Shenandoah Valley. Other specialty crops include Christmas trees, cherries, plums, raspberries, truck crops, and watercress. The watercress is grown in areas of the very poorly drained Fairplay soils.

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 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

Figure 13.—In the foreground, a young peach orchard in an area of Hagerstown silt loam, 3 to 8 percent slopes. In the background is an apple orchard in an area of Ryder-Nollville channery silt loams, 15 to 25 percent slopes.

developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit (USDA 1961). Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained (fig. 14); *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

Figure 14.—A cultivated area of Hagerstown silt loam, 3 to 8 percent slopes, which has a moderate hazard of erosion. The land capability subclass is IIe.

have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of the map units in this survey area is given in the section “Detailed Soil Map Units” and in the yields table.

Woodland Management and Productivity

Barbara A. McWhorter, staff forester, Natural Resources Conservation Service, helped to prepare this section.

About 122,900 acres, or nearly 60 percent of the county, is forested. Most of this acreage is privately owned. Only about 1,200 acres is noncommercial forest land (Bones 1978). The West Virginia Department of Natural Resources manages a large tract of forest land on Sleepy Creek and Third Hill Mountains in the western part of the county.

The most common forest types, or natural associations of tree species, are the oak-hickory type, which makes up about 62 percent of the commercial forest land, and the Virginia-pitch pine type, which makes up about 11 percent. The maple-beech-birch type makes up about 7 percent, and the remainder of the acreage is covered by other hardwood and pine types.

The oak-hickory type is in areas throughout the county. Most of the Virginia-pitch pine type is on southern or western exposures or in areas of soils that are shallow over bedrock, such as the Weikert soils. The maple-beech-birch type is on north aspects at the higher elevations in the county.

Soil properties have a strong influence on tree species, tree growth, and woodland management. The depth and texture of soils, for example, affect the available water-holding capacity, which influences the occurrence of a species and the rate of growth. Other features, such as slope, stoniness or rockiness, or a clayey subsoil, influence the kinds of management needed. Aspect, or the direction a slope faces, also affects tree growth and woodland management.

A large acreage of soils in Berkeley County has a low or very low water-holding capacity, which limits the potential productivity for trees. The soils in this acreage are mainly the shallow Weikert soils and moderately deep Berks soils, which formed in material weathered from shale, and the moderately deep Dekalb soils, which formed in material weathered from sandstone.

In recent years the gypsy moth has had a seriously detrimental effect on the forests in the county. Large acreages of trees are defoliated every year, and many trees have died. Oak trees, the most abundant tree type in the county, are the preferred food of the gypsy moth larvae. Forest management plans should address how to control gypsy moths.

Table 8 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.

Because of the variability between soils on south aspects versus those on north aspects, dual entries are given for the ordination symbol, site index, average annual growth, seedling mortality rate, and plant competition rating of some soils, specifically those that are less than 40 inches deep to bedrock and have slopes of more than 15 percent. North aspects are those that face the compass directions from 315 to 135 degrees. South aspects are those that face the compass directions from 135 to 315 degrees. Aspect affects the potential productivity of sloping soils. The soils on north aspects generally are more moist and have a higher site index than those on south aspects. Aspect also affects the occurrence of a tree species, the seedling mortality rate, and the management practices needed.

The table lists 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, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness (fig. 15); *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. 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, T, D, C, S, and F.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the

Figure 15.—A wooded area of Buchanan loam, 3 to 15 percent slopes, extremely stony, which has a moderately high potential for production of trees. The woodland suitability group is 4X.

percent of the slope. A rating of *slight* indicates that no particular prevention measures 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.

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 under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied. Adequate site preparation before planting the new crop can help reduce plant competition.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. Also listed are other tree species, regardless of their potential value or growth, that commonly grow on the soils. The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class. *Average annual growth* of some of the common trees is expressed as *cubic feet per acre, board feet per acre*, or *cords per acre*.

Recreation

Berkeley County offers a variety of recreational facilities. Parks, campgrounds, golf courses, game courts, picnic areas, and other facilities are available to the public.

The Sleepy Creek Public Hunting and Fishing Area offers opportunities for outdoor recreational activities (fig. 16). This State-owned land is in the western part of the county, along Sleepy Creek and Third Hill Mountains. Camping areas and hiking trails are available, as well as opportunities for hunting, fishing, boating, and mountain biking. Sleepy Creek Lake, which is an impoundment of Meadow Branch, is an excellent largemouth bass fishery.

The Potomac River and Back Creek are good smallmouth bass fisheries. Opequon Creek, Mill Creek, Rockymarsh Run, Tilhance Creek, and Tuscarora Creek are stocked with trout each spring. Back Creek, Opequon Creek, and the Potomac River are suitable for canoeing throughout most of the year.

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

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

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

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of

Figure 16.—The Sleepy Creek Public Hunting and Fishing Area provides opportunities for outdoor recreational activities. The soils in the area include those in the Buchanan, Hazleton, Calvin, and Dekalb series.

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

Richard D. Heaslip, resource conservationist, Natural Resources Conservation Service, helped to prepare this section.

Berkeley County supports a large number of native wildlife species because of the favorable land use patterns and suitable climate. It includes large tracts of woodland in Back Creek Valley and in the Sleepy Creek Public Hunting and Fishing Area. These wooded areas, which consist of uneven-aged stands of oak-hickory-pine forest type, provide excellent habitat for white-tailed deer, wild turkey, ruffed grouse, and squirrels. In the Shenandoah Valley, open farmland and transitional areas between woodland and farmland provide habitat for cottontail rabbit, mourning doves, bobwhite quail, and ring-necked pheasants.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. Well drained soils can be used as cropland or can be forested with oak-hickory types. These areas can be used by upland wildlife species. Poorly drained soils support wetland vegetation, which is desirable for waterfowl habitat. 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 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. 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, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, switchgrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod, blackberry, mullein, beggartick, milkweed, and ironweed.

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, poplar, cherry, apple, hackberry, hawthorn, blackgum, dogwood, hickory, and redbud. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are crabapple, bayberry, and hazelnut.

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

Wetland plants are annual and perennial wild, woody or 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 alder, smartweed, wild millet, wildrice, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 3 feet. Some are naturally wet areas. Others are created by dams, dikes, 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 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. Wildlife attracted to these areas include bobwhite quail, pheasant, 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, ruffed grouse, 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, herons, shore birds, woodcock, muskrat, and beaver.

Engineering

Craig E. Savela, staff geologist, Natural Resources Conservation Service, helped to prepare this section.

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

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

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 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, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

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

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

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

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

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

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

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

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

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

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

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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

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

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

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

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

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

This table also gives for each soil the restrictive features that affect drainage, 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 (fig. 17). The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

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

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large

Figure 17.—Farm ponds constructed in areas of Hagerstown soils have a high failure rate due to seepage.

stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

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

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Taxonomic Units 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 (ASTM 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 1986).

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

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

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

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

Clay as a soil separate 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, 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 and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each 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.

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 the basis of measurements of similar soils.

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than

3 percent; *moderate*, 3 to 6 percent; and *high*, 6 to 9 percent. *Very high*, more 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 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil, including green manure crops in the planting sequence, no-till planting, and applying animal waste. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

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

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

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

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the estimated *frequency of flooding*. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal conditions (the chance of flooding is more than 50 percent in any year).

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

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

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

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

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

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 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 results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

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

For concrete, the risk of corrosion 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 (USDA 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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 Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

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 Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has 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 Hapludalfs.

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

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 underlying material can differ within a series.

Taxonomic Units and Their Morphology

Dr. John Sencindiver, professor of agronomy, West Virginia Agricultural and Forestry Experiment Station, helped to prepare this section.

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

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (USDA 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA 1975). 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.”

Atkins Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landscape position: Nearly level, slightly concave flood plains
Flooding: Frequently flooded (more than a 50 percent chance of flooding in any year) for brief periods
Parent material: Recent alluvial deposits washed from upland soils underlain by acid sandstone and shale
Slope range: 0 to 3 percent
Classification: Fine-loamy, mixed, acid, mesic Typic Fluvaquents

Representative Pedon

Atkins silt loam, in an abandoned area that was previously used as cropland; about 600 feet west of Back Creek; 4,000 feet east-southeast from the intersection of County Routes 7 and 18 on a bearing of 102 degrees; in the Shanghai area; USGS Tablers Station topographic quadrangle; lat. 39 degrees 26 minutes 08 seconds N. and long. 78 degrees 07 minutes 15 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; very friable; common fine to coarse roots; few fine grayish brown (10YR 5/2) iron depletions and few fine strong brown (7.5YR 4/6) iron concentrations; slightly acid; abrupt smooth boundary.

BA—8 to 11 inches; brown (10YR 5/3) silt loam; weak medium and coarse subangular blocky structure; very friable; few very fine and fine roots; few patchy stains of manganese or of iron and manganese on faces of peds; many medium grayish brown (10YR 5/2) iron depletions and few fine strong brown (7.5YR 4/6) iron concentrations; moderately acid; clear smooth boundary.

Bg1—11 to 29 inches; light brownish gray (10YR 6/2) silty clay loam; weak coarse prismatic structure parting to weak fine and medium subangular blocky; friable, slightly sticky and slightly plastic; common patchy stains of manganese or of iron and manganese on faces of peds; many medium strong brown (7.5YR 5/6) and common yellowish brown (10YR 5/6) iron concentrations; strongly acid; clear wavy boundary.

Bg2—29 to 57 inches; silty clay loam, 75 percent brown (7.5YR 5/2) and 25 percent grayish brown (10YR 5/2); weak very coarse prismatic structure parting to moderate medium subangular blocky; firm, slightly sticky and slightly plastic; common patchy stains of manganese or of iron and manganese on faces of peds; common medium strong brown (7.5YR 4/6) iron concentrations; strongly acid; clear wavy boundary.

Cg—57 to 65 inches; very gravelly silty clay loam, 75 percent brown (7.5YR 5/2) and 25 percent dark grayish brown (10YR 4/2); massive; firm, slightly sticky and slightly plastic; common patchy stains of manganese or of iron and manganese on rock fragments; 50 percent gravel; moderately acid.

Range in Characteristics

Solum thickness: 25 to 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5) above a depth of 40 inches ranging to moderately acid (pH 5.6 to 6.0) below a depth of 40 inches
Content of rock fragments: Commonly no fragments; in places, however, 0 to 20 percent, by volume, in the solum and 0 to 60 percent in the C horizon

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—1 to 3
Texture—silt loam
Other features—high-chroma iron concentrations in shades of red and low-chroma iron depletions in shades of gray

A horizon (if it occurs):
Hue—10YR
Value—2 to 4
Chroma—1 to 3
Texture—silt loam
Other features—high-chroma iron concentrations in shades of red and low-chroma iron depletions in shades of gray

BA horizon (if it occurs):
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silt loam, fine sandy loam, loam, or silty clay loam
Other features—high-chroma iron concentrations in shades of red and low-chroma iron depletions in shades of gray

Bg horizon:
Hue—7.5YR to 5Y or N
Value—4 to 7
Chroma—0 to 2
Texture—silt loam, fine sandy loam, loam, silty clay loam, or the gravelly analogs of those textures

Other features—high-chroma iron concentrations in shades of red or yellowish brown

Cg horizon:

Hue—7.5YR to 5Y or N
Value—4 to 7
Chroma—0 to 8
Texture—loam, silty clay loam, sandy loam, or the gravelly or very gravelly analogs of those textures
Other features—high-chroma iron concentrations in shades of red or yellowish brown

Berks Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate or moderately rapid
Landscape position: Gently sloping to very steep uplands
Flooding: None
Parent material: Material weathered from shale or siltstone
Slope range: 3 to 70 percent
Classification: Loamy-skeletal, mixed, mesic Typic Dystrochrepts

Representative Pedon

Berks channery silt loam, in a pastured area of Weikert-Berks channery silt loams, 8 to 15 percent slopes; the pastured area was previously used as cropland; about 1,800 feet north-northwest of the intersection of Routes 45/4 and 5/9 on a bearing of 356 degrees; in the Greensburg area; USGS Martinsburg topographic quadrangle; lat. 39 degrees 28 minutes 17 seconds N. and long. 77 degrees 53 minutes 52 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) channery silt loam; moderate fine and medium granular structure; friable; many fine and medium roots; 15 percent shale channers; neutral; abrupt smooth boundary.

Bw1—7 to 12 inches; yellowish brown (10YR 5/6) channery silt loam; moderate fine and medium subangular blocky structure; friable; common very fine and fine roots; 30 percent shale channers; slightly acid; clear smooth boundary.

Bw2—12 to 21 inches; variegated very channery silt loam, 80 percent yellowish brown (10YR 5/6) and 20 percent strong brown (7.5YR 5/6); weak medium and coarse subangular blocky structure; friable; few very fine and fine roots; 40 percent shale channers; strongly acid; clear wavy boundary.

C—21 to 25 inches; variegated extremely channery silt loam, 75 percent strong brown (7.5YR 5/6) and 25 percent yellowish brown (10YR 5/6); massive; friable; 70 percent shale channers; strongly acid, clear wavy boundary.

R—25 inches; yellowish brown shale bedrock.

Range in Characteristics

Solum thickness: 12 to 40 inches
Depth to bedrock: 20 to 40 inches
Reaction: In unlimed areas, extremely acid to slightly acid (pH 3.6 to 6.5)
Content of rock fragments: 15 to 40 percent in the A horizon, 15 to 60 percent in the B horizon, and 40 to 80 percent in the C horizon; fragments are shale or siltstone

Ap or A horizon:

Hue—10YR
Value—3 or 4
Chroma—2 to 4
Texture—channery or very channery silt loam

Bw horizon:

Hue—10YR or 7.5YR
Value—5 or 6
Chroma—4 to 6
Texture—silt loam, silty clay loam, loam, or the channery or very channery analogs of those textures

C horizon:

Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 8
Texture—silt loam, loam, or the very channery or extremely channery analogs of those textures

Blackthorn Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate or moderately rapid above the 2Bt horizon and moderate or moderately slow in the 2Bt horizon and below the 2Bt horizon
Landscape position: Gently sloping to very steep uplands on Wilson Ridge, Ferrel Ridge, and other outlying areas that are underlain by limestone bedrock; near Jones Spring
Flooding: None
Parent material: Acid, colluvial material overlying siliceous limestone residuum
Slope range: 3 to 50 percent
Classification: Loamy-skeletal, mixed, mesic Typic Hapludults

Representative Pedon

Blackthorn very gravelly loam, in a wooded area of Blackthorn-Pecktonville very gravelly loams, 15 to 35 percent slopes, extremely stony; about 1,650 feet west-southwest of the entrance to Camp Tomahawk on a bearing of 265 degrees; on Wilson Ridge; USGS Tablers Station topographic quadrangle; lat. 39 degrees 29 minutes 50 seconds N. and long. 78 degrees 04 minutes 13 seconds W.

Oi—2 inches to 1 inch; slightly decomposed hardwood leaf litter.

Oe—1 inch to 0; partially decomposed hardwood duff.

A—0 to 3 inches; very dark brown (10YR 3/2) very gravelly loam; moderate fine and medium granular structure; very friable; many fine to coarse roots; 50 percent sandstone gravel; very strongly acid; abrupt wavy boundary.

E—3 to 6 inches; brown (10YR 5/3) very gravelly sandy loam; weak fine granular structure; very friable; many fine to coarse roots; 50 percent sandstone gravel; very strongly acid; clear wavy boundary.

BE—6 to 14 inches; light yellowish brown (10YR 6/4) gravelly sandy loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; 30 percent sandstone gravel; very strongly acid; clear wavy boundary.

Bt1—14 to 24 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; few distinct patchy clay films on faces of peds and in pores; 35 percent sandstone gravel; very strongly acid; gradual wavy boundary.

Bt2—24 to 35 inches; strong brown (7.5YR 5/6) very gravelly loam; moderate medium subangular blocky structure; friable; few very fine and fine roots; common distinct patchy clay films on faces of peds and in pores; 40 percent sandstone and chert gravel; very strongly acid; clear wavy boundary.

2Bt3—35 to 75 inches; variegated very gravelly clay, 85 percent red (2.5YR 4/6) and 15 percent strong brown (7.5YR 5/6); moderate fine and medium subangular blocky structure; firm, moderately sticky and moderately plastic; few very fine and fine roots; many distinct patchy clay films on ped faces and rock surfaces; 30 percent sandstone and chert gravel and 20 percent stones; very strongly acid; clear wavy boundary.

3Bt4—75 to 90 inches; variegated clay, 65 percent red (2.5YR 4/6) and 35 percent strong brown (7.5YR 5/6); moderate fine and medium subangular blocky structure; firm, moderately sticky and moderately plastic; many distinct patchy clay films on ped faces and rock surfaces; 10 percent chert gravel; very strongly acid.

Range in Characteristics

Solum thickness: More than 60 inches
Depth to 2Bt horizon: 30 inches or more
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0) above the 2Bt horizon and very strongly acid or strongly acid (pH 4.5 to 5.5) in the 2Bt horizon and below the 2Bt horizon
Content of rock fragments: 15 to 65 percent in individual subhorizons above the 2Bt horizon and 0 to 55 percent in the 2Bt horizon and below the 2Bt horizon

A horizon:
Hue—10YR
Value—2 to 4
Chroma—2 or 3
Texture—very gravelly loam

E horizon:
Hue—10YR or 7.5YR
Value—5 or 6
Chroma—2 to 4
Texture—loam, sandy loam, or the gravelly, very gravelly, or extremely gravelly analogs of those textures

BE horizon:
Hue—10YR or 7.5YR
Value—5 or 6
Chroma—3 or 4
Texture—loam, sandy loam, or the gravelly, very gravelly, or extremely gravelly analogs of those textures

Bt horizon:
Hue—10YR or 7.5YR
Value—5 or 6
Chroma—4 to 6
Texture—loam, sandy loam, or the gravelly, very gravelly, or extremely gravelly analogs of those textures

2Bt horizon:
Hue—2.5YR to 7.5YR
Value—4 to 6
Chroma—4 to 8
Texture—clay, silty clay, or the gravelly or very gravelly analogs of those textures

3Bt horizon (if it occurs):
Hue—2.5YR to 7.5YR

Value—4 to 6
Chroma—4 to 8
Texture—clay, silty clay, or the gravelly or very gravelly analogs of those textures

Buchanan Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Landscape position: Gently sloping to steep, slightly concave footslopes, benches, and lower side slopes of mountains
Flooding: None
Parent material: Colluvial material derived from acid sandstone, siltstone, and shale
Slope range: 3 to 35 percent
Classification: Fine-loamy, mixed, mesic Aquic Fragiudults

Representative Pedon

Buchanan loam, 3 to 15 percent slopes, extremely stony, in a wooded area on Third Hill Mountain; about 1.9 miles north-northeast of the intersection of Routes 7/13 and 826 on a bearing of 18 degrees; USGS Glengary topographic quadrangle; lat. 39 degrees 29 minutes 02 seconds N. and long. 78 degrees 09 minutes 40 seconds W.

Oi—3 inches to 0; slightly decomposed organic material from hardwood leaf litter.
Oe—0 to 1 inch; organic material of intermediate decomposition from hardwood leaf litter.
A—1 to 2 inches; very dark gray (10YR 3/1) loam; weak fine and medium granular structure; very friable, nonsticky and nonplastic; common very fine to coarse roots; 5 percent gravel; very strongly acid; clear wavy boundary.
E—2 to 4 inches; light yellowish brown (10YR 6/4) loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; common fine to coarse roots; 5 percent gravel; very strongly acid; clear wavy boundary.
BE—4 to 13 inches; brownish yellow (10YR 6/6) gravelly loam; weak fine and medium subangular blocky structure; friable, nonsticky and slightly plastic; common fine and medium roots; 15 percent gravel; very strongly acid; clear wavy boundary.
Bt1—13 to 21 inches; light yellowish brown (10YR 6/4) gravelly loam; moderate fine and medium subangular blocky structure; friable, nonsticky and slightly plastic; few fine and medium roots; few faint patchy clay films on faces of peds and in pores; common medium faint strong brown (7.5YR 5/8) iron concentrations; 20 percent gravel; very strongly acid; clear wavy boundary.
Bt2—21 to 30 inches; strong brown (7.5YR 5/6) gravelly loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; few patchy clay films on faces of peds and in pores; many coarse distinct pale brown (10YR 6/3) and few fine light brownish gray (10YR 6/2) iron depletions and few medium prominent yellowish red (5YR 4/6) iron concentrations; 10 percent stones; 10 percent gravel; strongly acid; clear wavy boundary.
Btx1—30 to 49 inches; strong brown (7.5YR 5/6) gravelly loam; weak coarse prismatic structure parting to moderate fine subangular blocky; firm and brittle, slightly sticky and slightly plastic; few fine and medium roots between peds; few faint patchy clays films on faces of peds and in pores; many coarse prominent light brownish gray (10YR 6/2) iron depletions; few medium distinct dark red (2.5YR 3/6) and few fine distinct brownish yellow (10YR 6/8) iron concentrations; 30 percent gravel; strongly acid; clear wavy boundary.
Btx2—49 to 65 inches; reddish brown (5YR 4/4) very gravelly loam; weak coarse prismatic structure parting to weak fine and medium subangular blocky; very firm and brittle, nonsticky and slightly plastic; few faint patchy clay films on faces of peds and in pores; common coarse prominent gray (10YR 6/1) iron depletions and few medium distinct red (2.5YR 4/6) iron concentrations; 35 percent gravel; strongly acid.

Range in Characteristics

Solum thickness: 40 to 70 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5)
Content of rock fragments: 0 to 40 percent in individual subhorizons above the fragipan and 5 to 60 percent in the fragipan and in the C horizon
Depth to the fragipan: 20 to 36 inches

A horizon:
Hue—7.5YR or 10YR
Value—3 or 4
Chroma—1 to 3
Texture—loam or gravelly loam

E horizon:
Hue—10YR
Value—4 to 6

Chroma—2 to 4
Texture—loam, sandy loam, fine sandy loam, or the gravelly or very gravelly analogs of those textures

BE horizon (if it occurs):
Hue—10YR
Value—5 or 6
Chroma—5 or 6
Texture—loam, gravelly loam, or very gravelly loam

Bt horizon:
Hue—7.5YR or 10YR
Value—5 or 6
Chroma—4 to 6
Texture—loam, clay loam, sandy clay loam, or the gravelly or very gravelly analogs of those textures
Other features—low-chroma iron depletions in shades of gray and high-chroma iron concentrations in shades of red and brown in the top 10 inches of the horizon

Btx horizon:
Hue—10YR to 5YR
Value—4 to 6
Chroma—4 to 6
Texture—loam, clay loam, sandy clay loam, or the gravelly or very gravelly analogs of those textures
Other features—low-chroma iron depletions in shades of gray and high-chroma iron concentrations in shades of red and brown

C horizon (if it occurs):
Hue—10YR to 5YR
Value—4 to 6
Chroma—1 to 6
Texture—loam, sandy loam, clay loam, sandy clay loam, or the gravelly or very gravelly analogs of those textures
Other features—low-chroma iron depletions in shades of gray and high-chroma iron concentrations in shades of red and brown in some pedons

Calvin Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately rapid
Landscape position: Gently sloping to very steep, convex uplands
Flooding: None
Parent material: Material weathered from reddish, fine grained sandstone or siltstone; mainly members of the Hampshire Formation
Slope range: 3 to 65 percent
Classification: Loamy-skeletal, mixed, mesic Typic Dystrochrepts

Representative Pedon

Calvin channery loam, 8 to 15 percent slopes, in a wooded area; about 2,200 feet south-southeast of Sleepy Creek Lake Dam on a bearing of 162 degrees; USGS Stotlers Crossroads topographic quadrangle; lat. 39 degrees 31 minutes 35 seconds N. and long. 78 degrees 08 minutes 48 seconds W.

Oi—1 inch to 0; slightly decomposed hardwood leaf litter.
A—0 to 2 inches; very dark brown (7.5YR 2/2) channery loam; moderate fine and medium granular structure; very friable; many fine to coarse roots; 25 percent channers; very strongly acid; abrupt wavy boundary.
Bw1—2 to 8 inches; reddish brown (5YR 4/4) very channery loam; weak fine and medium subangular blocky structure; friable; common fine to coarse roots; 35 percent channers; very strongly acid; clear wavy boundary.
Bw2—8 to 23 inches; reddish brown (2.5YR 4/4) very channery loam; weak medium subangular blocky structure; friable; few fine to coarse roots; 50 percent channers; very strongly acid; gradual wavy boundary.
C—23 to 34 inches; reddish brown (2.5YR 4/4) extremely channery loam; massive; friable; few fine to coarse roots; 75 percent channers; very strongly acid; clear wavy boundary.
R—34 inches; fractured, reddish brown, fine grained sandstone; few fine to coarse roots in cracks.

Range in Characteristics

Solum thickness: 18 to 30 inches
Depth to bedrock: 20 to 40 inches
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5) throughout
Content of rock fragments: 15 to 25 percent in the A and BA horizons, 25 to 55 percent in the Bw horizon, and 40 to 80 percent in the C horizon

A horizon:
Hue—7.5YR
Value—2 to 4
Chroma—2 or 3
Texture—channery loam

BA horizon (if it occurs):
Hue—7.5YR or 5YR
Value—4

Chroma—2 to 6
Texture—channery or very channery analogs of loam or silt loam

Bw horizon:
Hue—2.5YR or 5YR
Value—4 or 5
Chroma—3 to 6
Texture—channery or very channery analogs of loam or silt loam

C horizon:
Hue—2.5YR or 5YR
Value—3 to 5
Chroma—2 to 4
Texture—very channery or extremely channery analogs of loam or silt loam

Caneyville Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape position: Gently sloping to moderately steep uplands, mainly in a band from Ferrel Ridge to Jones Spring in the western part of the county
Flooding: None
Parent material: Limestone residuum interbedded with thin layers of shale and siltstone, mainly in areas of the Bossardville, Helderberg, and Salina geologic deposits
Slope range: 3 to 25 percent slopes
Classification: Fine, mixed, mesic Typic Hapludalfs

Representative Pedon

Caneyville silty clay loam, 8 to 15 percent slopes, in an abandoned area that was previously used as cropland; about 2,350 feet west-northwest of the intersection of County Routes 7 and 7/2 on a bearing of 296 degrees; near Tomahawk; USGS Big Pool topographic quadrangle; lat. 39 degrees 31 minutes 55 seconds N. and long. 78 degrees 03 minutes 22 seconds W.

Ap1—0 to 4 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine and medium granular structure; friable, slightly sticky and slightly plastic; many very fine and fine roots; 5 percent limestone channers; neutral; clear wavy boundary.

Ap2—4 to 8 inches; brown (10YR 4/3) silty clay loam; few medium yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure parting to moderate fine and medium granular; friable, slightly sticky and slightly plastic; many very fine and fine roots; 10 percent limestone channers; neutral; abrupt smooth boundary.

Bt1—8 to 16 inches; strong brown (7.5YR 5/6) silty clay; few fine yellowish brown (10YR 5/8) and common coarse yellowish brown (10YR 5/4) mottles; moderate fine and medium subangular blocky structure; firm, very sticky and very plastic; common very fine and fine roots; few discontinuous clay films on faces of peds and in pores; few fine soft masses of iron and manganese; 3 percent shale channers; neutral; clear wavy boundary.

Bt2—16 to 28 inches; yellowish red (5YR 4/6) silty clay; moderate fine and medium subangular blocky structure; firm, very sticky and very plastic; common very fine and fine roots; few discontinuous clay films on ped faces, in pores, and on rock surfaces; few fine soft masses of iron and manganese; 3 percent shale channers; slightly alkaline; abrupt irregular boundary.

R—28 inches; unweathered limestone bedrock.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) in the upper part of the solum and moderately acid to slightly alkaline (pH 5.6 to 7.8) in the lower part of the solum and in the substratum
Content of rock fragments: 0 to 10 percent in the solum and as much as 35 percent in the C horizon, if it occurs

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—silty clay loam

BA horizon (if it occurs):
Hue—10YR or 7.5YR
Value—5
Chroma—4 or 5
Texture—silt loam or silty clay loam

Bt horizon:
Hue—10YR to 5YR
Value—4 to 6
Chroma—4 to 8
Texture—silty clay, clay, or silty clay loam

BC horizon (if it occurs):
Hue—10YR to 5YR
Value—4 to 6
Chroma—4 to 8

Texture—silty clay, clay, or clay loam

C horizon (if it occurs):
Hue—10YR to 5YR
Value—4 to 6
Chroma—4 to 8
Texture—clay, silty clay, clay loam, or the channery analogs of those textures

Carbo Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Slow
Landscape position: Gently sloping to steep uplands in the Great Valley
Flooding: None
Parent material: Material weathered from Chambersburg and New Market Limestones
Slope range: 3 to 35 percent
Classification: Very fine, mixed, mesic Typic Hapludalfs

Representative Pedon

Carbo silty clay loam, in an area of Carbo-Opequon complex, 3 to 8 percent slopes, in a hay field; about 4,300 feet east-northeast of the intersection of U.S. Highway 60 and Route 26 on a bearing of 79 degrees; in the Bunker Hill area; USGS Inwood topographic quadrangle; lat. 39 degrees 20 minutes 12 seconds N. and long. 78 degrees 02 minutes 23 seconds W.

Ap1—0 to 2 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine and medium granular structure; friable; few very fine and fine roots; neutral; abrupt smooth boundary.
Ap2—2 to 9 inches; dark yellowish brown (10YR 4/4) silty clay that has common medium pockets of strong brown (7.5YR 5/6) clay; weak medium granular structure; friable, moderately sticky and moderately plastic; common very fine and fine roots; 2 percent limestone channers; neutral; abrupt wavy boundary.
Bt1—9 to 18 inches; variegated clay, 95 percent strong brown (7.5YR 5/6) and 5 percent yellowish brown (10YR 5/6); moderate fine and medium subangular blocky structure; firm, very sticky and very plastic; few very fine and fine roots; many continuous clay films on faces of peds; 2 percent limestone channers; neutral; clear wavy boundary.
Bt2—18 to 28 inches; variegated clay, 55 percent yellowish brown (10YR 5/6) and 45 percent strong brown (7.5YR 5/6); moderate fine and medium subangular blocky structure; firm, very sticky and very plastic; few very fine and fine roots; common patchy clay films on faces of peds; 2 percent limestone channers; slightly acid; clear wavy boundary.
BC—28 to 34 inches; variegated clay, 75 percent dark yellowish brown (10YR 4/4), 20 percent strong brown (7.5YR 5/6), and 5 percent yellowish brown (10YR 5/6); weak fine and medium subangular blocky structure; firm, very sticky and very plastic; few very fine and fine roots; few patchy clay films on faces of peds; neutral; 10 percent limestone channers; abrupt wavy boundary.
R—34 inches; hard, bluish gray limestone.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Reaction: In unlimed areas, slightly acid or neutral (pH 6.1 to 7.3) in the Ap horizon and moderately acid to slightly alkaline (pH 5.6 to 7.8) in the B and C horizons
Content of rock fragments: 0 to 10 percent, by volume, in the A horizon and 0 to 15 percent, by volume, in the B and C horizons; mainly limestone channers

Ap horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3 or 4
Texture—silty clay loam or silty clay

Bt horizon:
Hue—5YR to 10YR
Value—4 or 5
Chroma—4 to 6
Texture—clay

BC horizon (if it occurs):
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 6
Texture—clay or silty clay

C horizon (if it occurs):
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 6
Texture—clay or silty clay

Clearbrook Series

Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landscape position: Nearly level or gently sloping heads of drainageways, broad, gently sloping ridges, and broad upland flats and depressions; mostly east of Interstate 81 but also in a narrow

belt directly east of North Mountain in the Great Valley and, to a much lesser extent, in the Back Creek Valley near Shanghai and Jones Spring

Flooding: None

Parent material: Material weathered from gray Martinsburg Shales in the Great Valley and, to a lesser extent, from gray Hamilton Shales and black Marcellus Shales in the Back Creek Valley

Slope range: 0 to 8 percent

Classification: Loamy-skeletal, mixed, mesic Aeric Epiaquults

Representative Pedon

Clearbrook silt loam, in an area of Clearbrook silt loam, 0 to 8 percent slopes, in a hay field; about 3,800 feet north-northeast of the intersection of State Highway 51 and Route 51/7 on a bearing of 43 degrees; in the Inwood area; USGS Inwood topographic quadrangle; lat. 39 degrees 21 minutes 27 seconds N. and long. 78 degrees 01 minutes 10 seconds W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable; many very fine and fine roots; 10 percent shale channers; slightly acid; abrupt smooth boundary.

Bt—9 to 11 inches; light olive brown (2.5YR 5/4) very channery silty clay loam; moderate fine and very fine subangular blocky structure; friable, slightly sticky and slightly plastic; many very fine and fine roots; common patchy clay films; few fine yellowish brown (10YR 5/6) iron concentrations and few fine light brownish gray (10YR 6/2) iron depletions; 50 percent shale channers; strongly acid; clear wavy boundary.

Btg—11 to 22 inches; gray (10YR 6/1) extremely channery silty clay loam; moderate fine and very fine subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine roots; many patchy clay films on ped faces and on rock fragments; few fine yellowish brown (10YR 5/6) iron concentrations; 65 percent shale channers; very strongly acid; clear wavy boundary.

Cr—22 inches; rippable shale bedrock.

Range in Characteristics

Solum thickness: 18 to 36 inches

Depth to bedrock: 20 to 40 inches

Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)

Content of rock fragments: 10 to 35 percent in the A horizon, 20 to 70 percent in the B horizon, and 50 to 90 percent in the C horizon

Ap or A horizon:
Hue—10YR
Value—3 to 5
Chroma—2 or 3
Texture—silt loam or channery silt loam

Bt horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 to 4
Texture—channery to extremely channery analogs of silty clay loam, silty clay, or silt loam
Other features—high-chroma iron concentrations in shades of red and brown and low-chroma iron depletions in shades of gray

C horizon (if it occurs):
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 to 4
Texture—very channery or extremely channery analogs of silty clay loam, silty clay, or silt loam
Other features—high-chroma iron concentrations in shades of red and brown and low-chroma iron depletions in shades of gray

Combs Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate or moderately rapid

Landscape position: On the flood plain along the Potomac River

Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year)

Parent material: Alluvial deposits washed from upland soils

Slope range: 0 to 3 percent

Classification: Coarse-loamy, mixed, mesic Fluventic Hapludolls

Representative Pedon

Combs fine sandy loam, in a hay field; about 9,200 feet north-northeast of the intersection of Routes 12/5 and 5/4 on a bearing of 22 degrees; in the Whitings Neck area along the Potomac River; USGS Williamsport topographic quadrangle; lat. 39 degrees 31 minutes 54 seconds N. and long. 77 degrees 50 minutes 13 seconds W.

Ap—0 to 10 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; weak fine and medium granular structure; very friable; common very fine and fine roots; mildly alkaline; abrupt smooth boundary.

AB—10 to 20 inches; dark brown (7.5YR 3/2) fine sandy loam, brown (10YR 5/3) dry; weak medium and coarse subangular blocky structure; friable; few fine to coarse roots; many very dark brown (10YR 2/2) organic coatings on faces of peds and in pores; neutral; gradual wavy boundary.
Bw—20 to 53 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few fine to coarse roots; many dark brown (10YR 2/2) organic coatings on faces of peds and in pores; common krotovinas; neutral; clear wavy boundary.
C—53 to 65 inches; brown to dark brown (10YR 4/3) fine sandy loam; massive; friable; neutral.

Range in Characteristics

Solum thickness: 40 to 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, moderately acid to neutral (pH 5.6 to 7.3)
Content of rock fragments: Averages less than 15 percent throughout the profile

A, Ap, or AB horizon:
Hue—10YR
Value—3 (moist)
Chroma—2 or 3 (moist)
Texture—fine sandy loam

Bw horizon:
Hue—10YR
Value—4
Chroma—4
Texture—fine sandy loam, very fine sandy loam, sandy loam, or loam

C horizon:
Hue—10YR
Value—4 or 5
Chroma—4
Texture—fine sandy loam, sandy loam, loamy sand, loamy fine sand, loam, or silt loam
Other features—high-chroma redox concentrations and low-chroma redox depletions in some pedons

Ab horizon (if it occurs):
Hue—10YR
Value—3 or 4
Chroma—3 or 4
Texture—fine sandy loam, very fine sandy loam, sandy loam, loam, or silt loam

Dekalb Series

Depth class: Moderately deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landscape position: Convex, gently sloping to steep ridgetops and steep or very steep shoulder slopes and nose slopes on mountainsides
Flooding: None
Parent material: Dominantly material weathered from acid sandstone; interbedded with shale and siltstone in some pedons
Slope range: 3 to 65 percent
Classification: Loamy-skeletal, siliceous, mesic Typic Dystrochrepts

Representative Pedon

Dekalb channery sandy loam, 3 to 15 percent slopes, extremely stony, in a wooded area; about 2,250 feet west-southwest of Neglar Spring along Route 7/13 on a bearing of 227 degrees; in the Sleepy Creek Public Hunting and Fishing Area; USGS Glengary topographic quadrangle; lat. 39 degrees 27 minutes 09 seconds N. and long. 78 degrees 11 minutes 01 seconds W.

Oi—2 inches to 0; slightly decomposed hardwood leaf litter.
Oa—0 to 1 inch; decomposed hardwood leaf litter.
A—1 to 4 inches; very dark brown (10YR 3/2) channery sandy loam; weak fine granular structure; very friable; many fine to coarse roots; 30 percent channers; extremely acid; clear smooth boundary.
E—4 to 6 inches; grayish brown (10YR 5/2) very channery loamy sand; weak fine granular structure; very friable; common fine and medium roots; 45 percent channers; extremely acid; clear wavy boundary.
Bw1—6 to 15 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine and medium subangular blocky structure; friable; common fine to coarse roots; 35 percent channers; very strongly acid; abrupt wavy boundary.
Bw2—15 to 24 inches; yellowish brown (10YR 5/4) extremely flaggy sandy loam; weak medium and coarse subangular blocky structure; friable; common fine to coarse roots; 60 percent flagstones; very strongly acid; abrupt wavy boundary.
R—24 inches; fractured, gray sandstone.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to bedrock: 20 to 40 inches
Reaction: In unlimed areas, extremely acid or very strongly acid (pH 3.5 to 5.0)
Content of rock fragments: 20 to 35 percent in the A horizon, 35 to 60 percent in the E and Bw horizons, and 50 to 90 percent in the C horizon; fragments are sandstone

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—channery analogs of sandy loam and loam

E horizon:
Hue—10YR
Value—5
Chroma—2 to 4
Texture—channery to extremely channery analogs of loamy sand, sandy loam, or loam

Bw horizon:
Hue—7.5YR or 10YR
Value—5 or 6
Chroma—4 to 6
Texture—very channery, very flaggy, extremely channery, or extremely flaggy analogs of sandy loam and loam

C horizon (if it occurs):
Hue—7.5YR or 10YR
Value—5 or 6
Chroma—4 to 6
Texture—very channery, very flaggy, extremely channery, or extremely flaggy analogs of sandy loam and loamy sand

Downsville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape position: Gently sloping or strongly sloping, old terraces high above the Potomac River
Flooding: None
Parent material: Alluvial deposits washed from upland soils that are underlain by acid sandstone, siltstone, and shale
Slope range: 3 to 15 percent
Classification: Loamy-skeletal, mixed, mesic Typic Paleudults

Representative Pedon

Downsville gravelly loam, 3 to 8 percent slopes, in a community subdivision; about 5,400 feet north-northwest of the intersection of U.S. Highway 11 and Route 11/1 on a bearing of 321 degrees; in the Marlowe area; USGS Williamsport topographic quadrangle; lat. 39 degrees 36 minutes 17 seconds N. and long. 77 degrees 51 minutes 44 seconds W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak fine and medium subangular blocky structure; friable; many fine to coarse roots; 25 percent gravel; slightly acid; abrupt smooth boundary.
BE—8 to 20 inches; brown (7.5YR 4/4) gravelly loam; weak medium and coarse subangular blocky structure; friable; few fine and medium roots; 30 percent gravel; moderately acid; gradual wavy boundary.
Bt1—20 to 39 inches; yellowish red (5YR 4/6) very gravelly loam; common coarse strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct discontinuous dark red (2.5YR 3/6) clay films on faces of peds and on rock fragments; many medium black (10YR 2/1) stains of iron and manganese on rock fragments; few medium soft black (10YR 2/1) masses of iron and manganese; 40 percent gravel and 10 percent cobbles; very strongly acid; gradual wavy boundary.
Bt2—39 to 70 inches; yellowish red (5YR 4/6) very gravelly sandy clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct discontinuous dark red (2.5YR 3/6) clay films on faces of peds and on rock fragments; common coarse black (10YR 2/1) stains of iron and manganese on rock fragments; 40 percent gravel; very strongly acid.

Range in Characteristics

Solum thickness: 60 to 110 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, very strongly acid or strongly acid (pH 4.5 to 5.5)
Content of rock fragments: Pebbles and cobbles range from 15 to 30 percent in the surface horizon and from 25 to 60 percent in the subsoil

A or Ap horizon:
Hue—7.5YR or 10YR
Value—3 to 5
Chroma—2 to 4
Texture—gravelly loam

BE horizon (if it occurs):
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 6
Texture—gravelly or very gravelly analogs of loam, fine sandy loam, or sandy loam

Bt horizon:
Hue—2.5YR to 7.5YR
Value—4 or 5
Chroma—4 to 8
Texture—gravelly or very gravelly analogs of loam, sandy loam, clay loam, sandy clay loam, or sandy clay

Duffield Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape position: Gently sloping or strongly sloping upland ridges and side slopes in the Great Valley
Flooding: None
Parent material: Limestone residuum that has a fairly high content of impurities from silty shale; mainly Conococheaque Limestone and, to a lesser extent, Elbrook Formation and Beekmantown Group
Slope range: 3 to 15 percent
Classification: Fine-loamy, mixed, mesic Ultic Hapludalfs

Representative Pedon

Duffield gravelly silt loam, 3 to 8 percent slopes, in an orchard; about 1,300 feet west-southwest of the intersection of County Routes 24 and 30/5 on a bearing of 246 degrees; near Arden; USGS Tablers Station topographic quadrangle; lat. 39 degrees 24 minutes 05 seconds N. and long. 78 degrees 03 minutes 50 seconds W.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) gravelly silt loam; weak medium subangular blocky structure parting to moderate fine granular; friable; common very fine to medium roots; 15 percent gravel; strongly acid; abrupt smooth boundary.
Bt1—9 to 15 inches; yellowish brown (10YR 5/8) gravelly silt loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine roots; few discontinuous clay films on faces of peds and in pores; 15 percent sandstone and chert gravel; strongly acid; clear wavy boundary.
Bt2—15 to 36 inches; yellowish brown (10YR 5/8) silty clay loam; moderate fine and medium subangular blocky structure; friable, moderately sticky and moderately plastic; few very fine roots; common discontinuous clay films on faces of peds and in pores; few iron and manganese stains on faces of peds; 10 percent sandstone and chert gravel; moderately acid; gradual wavy boundary.
Bt3—36 to 51 inches; dark yellowish brown (10YR 4/6) silty clay; weak medium platy structure parting to moderate fine and medium subangular blocky; friable, slightly sticky and slightly plastic; few very fine roots; common discontinuous clay films and black stains of iron and manganese on faces of peds and in pores; 10 percent shale channers; moderately acid; gradual wavy boundary.
BC—51 to 65 inches; dark yellowish brown (10YR 4/6) silty clay loam that has common coarse pockets of brownish yellow (10YR 6/8) silt loam; weak medium platy structure parting to weak fine subangular blocky; friable; few very fine roots; common black stains of iron and manganese on ped faces and rock surfaces; 10 percent shale channers; slightly acid.

Range in Characteristics

Solum thickness: 40 to 70 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) to a depth of 50 inches and strongly acid to slightly acid (pH 5.1 to 6.5) below a depth of 50 inches
Content of rock fragments: 0 to 20 percent in the upper part of the solum and 0 to 30 percent in the lower part of the solum and in the C horizon, if it occurs

Ap horizon:
Hue—10YR or 7.5YR
Value—3 or 4
Chroma—3 or 4
Texture—silt loam or gravelly silt loam

BA horizon (if it occurs):
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4
Texture—silt loam, silty clay loam, or the gravelly analogs of those textures

Bt horizon:
Hue—dominantly 10YR or 7.5YR; subhorizons of 5YR in the lower part of the horizon
Value—4 to 6
Chroma—4 to 8
Texture—dominantly silt loam, clay loam, loam, silty clay loam, or the gravelly analogs of those

textures; subhorizons of silty clay or clay are common

BC horizon (if it occurs):
Hue—10YR to 5YR
Value—4 or 5
Chroma—4 to 6
Texture—silt loam, clay loam, silty clay loam, loam, silty clay, clay, or the gravelly analogs of those textures

C horizon (if it occurs):
Hue—2.5YR to 7.5YR
Value—4 to 8
Chroma—4 to 8
Texture—silt loam, clay loam, silty clay loam, loam, silty clay, clay, or the gravelly analogs of those textures

Dunning Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landscape position: On flood plains along streams that drain the limestone uplands in the Great Valley
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year)
Parent material: Alluvial deposits washed mainly from limestone-influenced upland soils
Slope range: 0 to 3 percent
Classification: Fine, mixed, mesic Fluvaquentic Endoaquolls

Representative Pedon

Dunning silt loam in a pastured area; about 400 feet north-northwest of the intersection of County Routes 30 and 30/7 on a bearing of 326 degrees; along Middle Creek; USGS Tablers Station topographic quadrangle; lat. 39 degrees 22 minutes 47 seconds N. and long. 78 degrees 02 minutes 33 seconds W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; weak medium subangular blocky structure parting to moderate fine granular; friable; many very fine and fine roots; common fine reddish brown (5YR 4/4) iron concentrations; slightly alkaline; abrupt smooth boundary.

Ag—6 to 11 inches; very dark grayish brown (2.5Y 3/2) silt loam; weak medium subangular blocky structure parting to moderate fine granular; friable; common very fine and fine roots; common fine reddish brown (5YR 4/4) iron concentrations; slightly alkaline; abrupt smooth boundary.

Bg1—11 to 19 inches; dark gray (2.5Y 4/1) silty clay; moderate very fine and fine subangular blocky structure; firm, moderately sticky and moderately plastic; few very fine roots; common fine brown (7.5YR 5/4) iron concentrations; slightly alkaline; clear wavy boundary.

Bg2—19 to 33 inches; very dark gray (2.5Y 3/1) silty clay; weak medium prismatic structure parting to moderate very fine and fine subangular blocky; firm, moderately sticky and moderately plastic; few very fine roots; common fine brown (7.5YR 5/4) iron concentrations; slightly alkaline; gradual wavy boundary.

Bg3—33 to 51 inches; grayish brown (2.5Y 5/2) clay; moderate fine and medium subangular blocky structure; firm, moderately sticky and moderately plastic; few very fine roots; many medium yellowish brown (10YR 5/6) iron concentrations; slightly alkaline; clear wavy boundary.

Cg—51 to 65 inches; grayish brown (2.5Y 5/2) sandy clay loam; massive; friable, slightly sticky and slightly plastic; many coarse yellowish brown (10YR 5/6) iron concentrations; 10 percent subrounded pebbles of sandstone and shale; slightly alkaline.

Range in Characteristics

Solum thickness: 30 to 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8) throughout
Content of rock fragments: 0 to 10 percent in the solum and 0 to 30 percent in the C horizon

Ap and Ag horizons:
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1 to 3
Texture—silt loam
Other features—high-chroma iron concentrations in shades of red

Bg horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 or 2
Texture—silty clay or clay
Other features—high-chroma iron concentrations in shades of red

Cg horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 or 2
Texture—silty clay, clay, silty clay loam, sandy clay loam, or clay loam

Other features—high-chroma iron concentrations in shades of red

Endcav Series

Depth class: Deep
Drainage class: Well drained
Permeability: Slow
Landscape position: Gently sloping or strongly sloping, convex upland valley sides in the Great Valley
Flooding: None
Parent material: Material weathered mainly from Chambersburg Limestone and, to a lesser extent, from limestones in the Beekmantown Group and the Waynesboro Formation
Slope range: 3 to 15 percent
Classification: Very fine, mixed, mesic Typic Hapludalfs

Representative Pedon

Endcav silty clay loam, in an area of Carbo-Endcav silty clay loams, 3 to 8 percent slopes, in a meadow; about 4,700 feet south-southwest of the intersection of County Routes 1 and 1/4 on a bearing of 209 degrees; northwest of Falling Waters; USGS Hedgesville topographic quadrangle; lat. 39 degrees 34 minutes 37 seconds N. and long. 77 degrees 53 minutes 14 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) silty clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common very fine and fine roots; 5 percent limestone channers; slightly acid; abrupt smooth boundary.
Bt1—8 to 23 inches; strong brown (7.5YR 4/6) clay; moderate fine and medium subangular blocky structure; firm, very sticky and very plastic; few very fine and fine roots; common distinct clay films on faces of peds; few patchy distinct stains of iron and manganese on faces of peds; 1 percent limestone channers; neutral; clear wavy boundary.
Bt2—23 to 41 inches; strong brown (7.5YR 4/6) clay; many coarse pockets of yellowish brown (10YR 5/8) loam around weathered limestone channers; moderate fine and medium subangular blocky structure; firm, very sticky and very plastic; few very fine roots; common distinct clay films on faces of peds; few patchy distinct stains of iron and manganese on faces of peds; few nonintersecting slickensides; 10 percent limestone channers; slightly alkaline; abrupt irregular boundary.
R—41 inches; weathered limestone.

Range in Characteristics

Solum thickness: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Reaction: In unlimed areas, slightly acid or neutral (pH 6.1 to 7.3) in the A horizon and the upper part of the B horizon and moderately acid to slightly alkaline (pH 5.6 to 7.8) in the lower part of the B horizon and in the C horizon, if it occurs
Content of rock fragments: 0 to 15 percent in the A and B horizons and 0 to 75 in the C horizon, if it occurs

Ap horizon:
Hue—10YR or 7.5YR
Value—4
Chroma—3 or 4
Texture—silty clay loam

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 8
Texture—clay, silty clay, or the channery analogs of those textures

C horizon (if it occurs):
Hue—5YR to 10YR
Value—4 to 6
Chroma—4 to 8
Texture—clay, silty clay, clay loam, or the channery, very channery, or extremely channery analogs of those textures

Fairplay Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow to moderately rapid
Landscape position: Nearly level flood plains below limestone springs in the Great Valley
Flooding: Frequently flooded or ponded (more than a 50 percent chance of flooding or ponding in any year)
Parent material: Alluvial and lacustrine, calcareous marl sediments
Slope range: 0 to 3 percent
Classification: Fine-loamy, carbonatic, mesic Fluvaquentic Endoaquolls

Representative Pedon

Fairplay (marl) silt loam, in a wooded area along Hoke Run; about 1,900 feet west-southwest of the crossing of the Winchester and Western Railroad on Route 5 on a bearing of 248 degrees; in the Bedington area; USGS Hedgesville topographic quadrangle; lat. 39 degrees 31 minutes 04 seconds N. and long. 77 degrees 54 minutes 33 seconds W.

A1—0 to 6 inches; very dark grayish brown (2.5Y 3/2) marly silt loam; moderate fine and medium granular structure; friable; many very fine to coarse roots; about 1 percent gastropod shells; common fine and medium yellowish brown (10YR 5/6) iron concentrations; strongly effervescent; moderately alkaline; clear wavy boundary.

A2—6 to 15 inches; very dark gray (2.5Y 3/1) marly silt loam; moderate fine and medium granular structure; friable; common very fine to medium roots; about 3 percent gastropod shells; common fine and medium light olive brown (2.5Y 5/6) iron concentrations; strongly effervescent; moderately alkaline; clear wavy boundary.

Bkg—15 to 23 inches; dark gray (2.5Y 4/1) marly silt loam; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few very fine and fine roots; about 2 percent gastropod shells; common fine and medium light olive brown (2.5Y 5/6) iron concentrations; strongly effervescent; moderately alkaline; gradual wavy boundary.

Ckg1—23 to 30 inches; dark grayish brown (2.5Y 4/2) marly loam; massive; friable; common fine to coarse roots; about 2 percent gastropod shells; common fine and medium light olive brown (2.5Y 5/6) iron concentrations; strongly effervescent; moderately alkaline; clear irregular boundary.

Ckg2—30 to 36 inches; dark grayish brown (2.5Y 4/2) marly loam; massive; few fine and very fine roots; about 5 percent gastropod shells; common (10 percent) fine and medium hard carbonate nodules and stems and common (15 percent) very coarse hard carbonate nodules; common medium and coarse olive yellow (2.5Y 6/8) iron concentrations; violently effervescent; moderately alkaline; abrupt broken boundary.

Agb—36 to 39 inches; very dark gray (2.5Y 3/1) marly silt loam; massive; friable; few fine roots; about 5 percent gastropod shells; common (5 percent) fine and medium hard carbonate nodules and stems; common medium light brownish gray (2.5Y 6/2) iron depletions and few fine and medium olive brown (2.5Y 4/4) iron concentrations; violently effervescent; moderately alkaline; clear broken boundary.

Bkgb—39 to 49 inches; gray (2.5Y 5/1) marly loam; weak coarse prismatic structure parting to weak medium subangular blocky; friable; about 3 percent gastropod shells; many (25 percent) fine and medium hard carbonate nodules and stems; common medium light brownish gray (2.5Y 6/2) iron depletions and few medium light olive brown (2.5Y 5/6) iron concentrations; violently effervescent; moderately alkaline; gradual wavy boundary.

Ckgb—49 to 65 inches; grayish brown (2.5Y 5/2) marly loam; massive; friable; about 5 percent gastropod shells; many (25 percent) fine and medium hard carbonate nodules and stems; common medium light brownish gray (2.5Y 6/2) iron depletions and few medium light olive brown (2.5Y 5/6) iron concentrations; violently effervescent; moderately alkaline.

Range in Characteristics

Solum thickness: 20 to 90 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, slightly alkaline or moderately alkaline (pH 7.4 to 8.4) throughout and strongly effervescent or violently effervescent throughout
Content of rock fragments: 0 to 10 percent in the surface layer and 0 to 15 percent in the subsoil and substratum
Gastropod shells and secondary calcium carbonate nodules and stems: 0 to 10 percent in the surface layer and 5 to 30 percent in the subsoil and substratum

A horizon:
Hue—10YR or 2.5Y
Value—2 or 3
Chroma—1 to 3
Texture—marly silt loam

Agb horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 to 2
Texture—marly silt loam or marly loam

Bkg or Bkgb horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 or 2
Texture—marly silt loam or marly loam

Ckg or Ckgb horizon:
Hue—10YR or 2.5Y
Value—4 to 7
Chroma—1 or 2
Texture—marly silt loam, marly loam, or marly sandy loam

Funkstown Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape position: Nearly level, slightly concave upland drainageways, colluvial fans, depressions, and head slopes in the Great Valley
Flooding: Not flooded or occasionally flooded (a 10 to 50 percent chance of flooding in any year) for brief periods
Parent material: Alluvial and colluvial material washed from upland soils that formed dominantly in limestone residuum and some interbedded sandstone and shale
Slope range: 0 to 3 percent
Classification: Fine-loamy, mixed, mesic Oxyaquic Hapludalfs

Representative Pedon

Funkstown silt loam, in a pastured area; about 1,100 feet south-southwest of the intersection of Routes 5/9 and 5/3 on a bearing of 186 degrees; in the Greensburg area; USGS Martinsburg topographic quadrangle; lat. 39 degrees 28 minutes 01 second N. and long. 77 degrees 53 minutes 19 seconds W.

Ap—0 to 11 inches; dark yellowish brown (10YR 3/4) silt loam; moderate fine and medium granular structure; friable; common very fine and fine roots; 5 percent chert gravel; neutral; abrupt smooth boundary.
Bt1—11 to 16 inches; dark yellowish brown (10YR 4/6) gravelly loam; moderate medium subangular blocky structure; friable; few very fine and fine roots; few faint patchy clay films on faces of peds; 20 percent chert gravel; neutral; clear smooth boundary.
Bt2—16 to 27 inches; yellowish brown (10YR 5/6) very gravelly loam; weak fine and medium subangular blocky structure; firm; few very fine and fine roots; few medium iron and manganese concretions; few faint patchy clay films on faces of peds; 35 percent chert gravel and 5 percent sandstone cobbles; neutral; clear wavy boundary.
2Bt3—27 to 47 inches; variegated clay, 90 percent strong brown (7.5YR 5/6) and 10 percent brownish yellow (10YR 6/6); moderate fine subangular blocky structure; firm; few very fine roots; common prominent black manganese stains on faces of peds and in pores; common distinct clay films on faces of peds; 10 percent chert gravel; neutral; clear wavy boundary.
2Bt4—47 to 65 inches; variegated clay, 90 percent brownish yellow (10YR 6/8) and 10 percent strong brown (7.5YR 5/8); moderate fine and medium subangular blocky structure; firm; common distinct clay films on faces of peds; moderately acid.

Range in Characteristics

Solum thickness: More than 60 inches
Depth to lithologic discontinuity: 25 to 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, slightly acid or neutral in the upper part of the solum and slightly acid or moderately acid in the lower part of the solum
Content of rock fragments: 0 to 15 percent in the surface layer and 0 to 50 percent in individual horizons of the subsoil and substratum; fragments are chert and sandstone

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—3 or 4
Texture—silt loam

Bt horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 6
Texture—loam, silt loam, silty clay loam, clay loam, or the gravelly or very gravelly analogs of those textures

2Bt horizon:
Hue—5YR to 10YR
Value—4 to 6
Chroma—6 to 8
Texture—clay, silty clay loam, silty clay, or clay loam

2C horizon (if it occurs):
Hue—5YR to 2.5Y
Value—5
Chroma—4 to 8
Texture—silty clay loam or silty clay

Hagerstown Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape position: Nearly level to steep uplands in the Great Valley
Flooding: None
Parent material: Limestone residuum, mainly members of the Beekmantown Group
Slope range: 0 to 35 percent
Classification: Fine, mixed, mesic Typic Hapludalfs

Representative Pedon

Hagerstown silt loam, 3 to 8 percent slopes, in a hay field that has been stripcropped; about 2,600 feet east-northeast of the intersection of Routes 45/3 and 40 on a bearing of 66 degrees; in the area of Winebrenners Crossroads; USGS Martinsburg topographic quadrangle; lat. 39 degrees 28 minutes 02 seconds N. and long. 77 degrees 52 minutes 49 seconds W.

Ap—0 to 12 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; friable; common very fine and fine roots; 5 percent chert gravel; neutral; abrupt smooth boundary.

BA—12 to 20 inches; strong brown (7.5YR 4/6) silt loam; moderate fine and medium subangular blocky structure; friable; common very fine and fine roots; few faint clay films on faces of peds and few prominent stains of iron and manganese; 10 percent chert gravel; neutral; clear wavy boundary.

Bt1—20 to 30 inches; variegated silty clay, 85 percent yellowish red (5YR 4/6) and 15 percent strong brown (7.5YR 4/6); strong fine and medium subangular blocky structure; firm; few very fine roots; many distinct clay films on faces of peds and few prominent black stains of iron and manganese; neutral; clear wavy boundary.

Bt2—30 to 42 inches; variegated silty clay, 95 percent yellowish red (5YR 4/6) and 5 percent strong brown (7.5YR 4/6); strong fine and medium subangular blocky structure; firm; many distinct clay films on faces of peds and very few prominent black stains of iron and manganese; neutral; clear wavy boundary.

Bt3—42 to 55 inches; variegated silty clay loam, 90 percent yellowish red (5YR 4/6) and 10 percent strong brown (7.5YR 4/6); moderate medium subangular blocky structure; friable; common faint clay films on faces of peds and very few prominent black stains of iron and manganese; neutral; clear wavy boundary.

BC—55 to 71 inches; variegated silty clay loam, 85 percent strong brown (7.5YR 4/6) and 15 percent dark yellowish brown (10YR 4/6); moderate medium prismatic structure parting to moderate medium subangular blocky; friable; very few faint clay films on faces of peds and very few distinct black stains of iron and manganese; 5 percent limestone channers; neutral; abrupt irregular boundary.

R—71 inches; hard, bluish gray limestone.

Range in Characteristics

Solum thickness: 40 to 72 inches
Depth to bedrock: 60 to 72 inches or more
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Content of rock fragments: 0 to 25 percent in the Ap horizon and 0 to 20 percent in individual subhorizons of the subsoil and substratum; average content throughout the profile less than 15 percent; fragments are limestone, chert, or sandstone

Ap or A horizon:
Hue—10YR or 7.5YR
Value—3 or 4
Chroma—3 or 4
Texture—silt loam, silty clay loam, or gravelly silt loam

BA horizon (if it occurs):
Hue—7.5YR
Value—4 or 5
Chroma—4 to 6
Texture—silt loam, silty clay loam, or the gravelly analogs of those textures

Bt horizon:
Hue—7.5YR to 2.5YR
Value—4 or 5
Chroma—4 to 8
Texture—clay, silty clay, silty clay loam, or the gravelly analogs of those textures

BC and C horizons (if they occur):
Hue—10YR to 2.5YR
Value—4 or 5
Chroma—6 to 8
Texture—silty clay, clay, silty clay loam, silt loam, or the gravelly analogs of those textures

Hazleton Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid or rapid
Landscape position: Steep or very steep side slopes of North, Third Hill, and Sleepy Creek Mountains
Flooding: None
Parent material: Colluvial material derived from acid sandstone and shale
Slope range: 15 to 65 percent
Classification: Loamy-skeletal, siliceous, mesic Typic Dystrochrepts

Representative Pedon

Hazleton channery loam, in a wooded area of Hazleton-Dekalb complex, 35 to 65 percent slopes, extremely stony, on Third Hill Mountain; about 1,200 feet east-southeast of the intersection of Park and

Forest Routes 825 and 826 on a bearing of 129 degrees; in the Sleepy Creek Public Hunting and Fishing Area; USGS Stotlers Crossroads topographic quadrangle; lat. 39 degrees 30 minutes 01 second N. and long. 78 degrees 08 minutes 28 seconds W.

Oi—1 inch to 0; slightly decomposed hardwood leaf litter.
Oe—0 to 1 inch; partially decomposed hardwood leaf litter.
A—1 to 4 inches; very dark brown (10YR 2/2) channery loam; weak fine and medium granular structure; very friable; common fine to coarse roots; 20 percent channers; very strongly acid; clear smooth boundary.
E—4 to 11 inches; dark yellowish brown (10YR 4/4) channery loam; weak fine and medium subangular blocky structure parting to weak fine granular; very friable; many fine to coarse roots; 30 percent channers; very strongly acid; clear wavy boundary.
BE—11 to 15 inches; yellowish brown (10YR 5/6) very channery loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; 40 percent channers; very strongly acid; clear wavy boundary.
Bw1—15 to 22 inches; strong brown (7.5YR 5/6) very channery loam; weak medium and coarse subangular blocky structure; friable; few fine roots; very few clay films on faces of peds, in pores, and on rock fragments; 45 percent channers; very strongly acid; clear wavy boundary.
Bw2—22 to 37 inches; strong brown (7.5YR 5/6) very channery loam; weak medium and coarse subangular blocky structure; friable; few fine roots; common discontinuous faint clay films on faces of peds, in pores, and on rock fragments; 45 percent channers; very strongly acid; clear wavy boundary.
Bw3—37 to 48 inches; strong brown (7.5YR 5/6) very channery sandy loam; weak medium platy structure parting to weak medium subangular blocky; firm; few fine roots; common discontinuous clay films on faces of peds, in pores, and on rock fragments; 50 percent channers; very strongly acid; gradual wavy boundary.
C—48 to 65 inches; strong brown (7.5YR 4/6) very channery sandy loam; massive; firm; 55 percent channers; very strongly acid.

Range in Characteristics

Solum thickness: 30 to 50 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.5 to 5.5) throughout
Content of rock fragments: 10 to 40 percent in the A and E horizons, 15 to 70 percent in the BE and Bw horizons, and 35 to 85 percent in the C horizon

A horizon:
Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—channery loam

E horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—channery or very channery analogs of loam or sandy loam

BE horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 8
Texture—channery, very channery, or extremely channery analogs of loam or sandy loam

Bw horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 8
Texture—channery, very channery, or extremely channery analogs of loam or sandy loam in the upper part of the horizon and channery, very channery, or extremely channery analogs of loamy sand in the lower part

C horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 8
Texture—channery, very channery, or extremely channery analogs of sandy loam, loam, or loamy sand

Huntington Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape position: On flood plains, mainly along Opequon Creek and its tributaries
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year)
Parent material: Alluvial deposits washed from upland soils that formed in limestone or shale
Slope range: 0 to 3 percent
Classification: Fine-silty, mixed, mesic Fluventic Hapludolls

Representative Pedon

Huntington silt loam, in a meadow; about 100 feet east of Opequon Creek; 1,420 feet north-northeast of the Route 9 bridge on a bearing of 12 degrees; USGS Martinsburg topographic quadrangle; lat. 39 degrees 25 minutes 46 seconds N. and long. 75 degrees 56 minutes 07 seconds W.

Ap—0 to 11 inches; silt loam, dark brown (10YR 3/3) rubbed; moderate fine and medium granular structure; friable; common very fine to medium roots; strongly effervescent (1N HCl); slightly alkaline; clear smooth boundary.

Bw1—11 to 17 inches; silt loam, dark yellowish brown (10YR 4/4) rubbed; weak fine and medium subangular blocky structure; friable; few very fine to medium roots; common dark brown (10YR 3/3) organic coatings on faces of peds and in pores; strongly effervescent (1N HCl); slightly alkaline; clear smooth boundary.

Bw2—17 to 20 inches; silt loam, brown (10YR 4/3) rubbed; weak fine and medium subangular blocky structure; friable; few very fine and fine roots; many dark brown (10YR 3/3) organic coatings on faces of peds and in pores; strongly effervescent (1N HCl); slightly alkaline; clear smooth boundary.

Ab—20 to 29 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium granular structure; friable; few very fine to coarse roots; strongly effervescent (1N HCl); slightly alkaline; clear wavy boundary.

Bwb1—29 to 36 inches; silt loam, brown (10YR 4/3) rubbed; weak medium prismatic structure parting to weak fine and medium subangular blocky; friable; few very fine and fine roots; many dark brown (10YR 3/3) organic coatings on faces of peds and in pores; strongly effervescent (1N HCl); slightly alkaline; clear wavy boundary.

Bwb2—36 to 42 inches; silt loam, dark yellowish brown (10YR 4/4) rubbed; weak fine and medium subangular blocky structure; friable; few very fine roots; few dark brown (10YR 3/3) organic coatings on faces of peds and in pores; strongly effervescent (1N HCl); slightly alkaline; clear wavy boundary.

Cb1—42 to 62 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; friable; few very fine roots; strongly effervescent (1N HCl); slightly alkaline; clear wavy boundary.

Cb2—62 to 65 inches; yellowish brown (10YR 5/4) loamy fine sand; single grain; loose; strongly effervescent (1N HCl); slightly alkaline.

Range in Characteristics

Solum thickness: Commonly 40 to 60 inches but ranges to 70 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, neutral to moderately alkaline (pH 6.6 to 8.4); most pedons effervesce with 1N HCl throughout the profile
Content of rock fragments: 0 to 2 percent in the upper 40 inches and 0 to 25 percent below a depth of 40 inches
Relic snail shells and shell fragments: In many peds, especially in the lower horizons

Ap horizon:
Hue—10YR or 7.5YR
Value—2 or 3
Chroma—2 or 3
Texture—silt loam

AB or BA horizon (if it occurs):
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—2 or 3
Ped surface colors—similar to the matrix colors of the Ap horizon
Texture—silt loam or silty clay loam

Ab horizon (if it occurs):
Hue—10YR or 7.5YR
Value—3
Chroma—2 or 3
Texture—silt loam or silty clay loam

Bw or Bwb horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 or 4
Ped coatings—commonly have value of 3 but value ranges from 2 to 4
Texture—silt loam or silty clay loam

C or Cb horizon (if it occurs):
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 or 4
Texture—silt loam, fine sandy loam, loamy fine sand, loam, or silty clay loam; C horizon commonly stratified

Lappans Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid or rapid

Landscape position: Flood plains along streams below limestone springs in the Great Valley
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year)
Parent material: Alluvial and lacustrine, calcareous marl sediments
Slope range: 0 to 3 percent
Classification: Fine-loamy, carbonatic, mesic Typic Calciudolls

Representative Pedon

Lappans (marl) loam, in a pastured area; about 4,100 feet east-southeast of the intersection of Routes 5/3 and 5 on a bearing of 124 degrees; in the Greensburg area; USGS Shepherdstown topographic quadrangle; lat. 39 degrees 29 minutes 03 seconds N. and long. 77 degrees 52 minutes 24 seconds W.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) marly loam; moderate fine and medium granular structure; friable; common fine and very fine roots; less that 1 percent snail shells and shell fragments; strongly effervescent; moderately alkaline; clear smooth boundary.
BA—10 to 18 inches; gray (10YR 5/2) marly loam; weak medium and coarse subangular blocky structure; friable; few very fine and fine roots; less than 1 percent snail shells and shell fragments; strongly effervescent; moderately alkaline; clear wavy boundary.
Bk—18 to 38 inches; light gray (10YR 7/1) marly loam; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; friable; few very fine and fine roots between peds; very dark grayish brown (10YR 3/2) wormcasts and soil material filling old root channels; strongly effervescent; moderately alkaline; gradual wavy boundary.
Ck1—38 to 46 inches; light gray (10YR 7/1) marly loam; massive; friable; strongly effervescent; moderately alkaline; clear wavy boundary.
Ck2—46 to 65 inches; light gray (10YR 7/2) marly sandy loam; massive; friable; strongly effervescent; moderately alkaline.

Range in Characteristics

Solum thickness: 35 to 90 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, slightly alkaline or moderately alkaline (pH 7.4 to 8.4) throughout; effervesces violently with acid throughout the profile
Content of rock fragments: Averages less than 15 percent throughout
Secondary lime concretions and snail shells: 0 to 20 percent throughout

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—marly loam

BA horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—marly analog of loam, sandy loam, or silt loam

Bk horizon:
Hue—10YR
Value—4 to 7
Chroma—1 to 3
Texture—marly analog of loam, clay loam, or sandy loam
Other features—high-chroma iron concentrations in shades of red and brown and low-chroma iron depletions in shades of gray below a depth of 30 inches in some pedons

Ck horizon:
Hue—10YR
Value—4 to 7
Chroma—1 or 2
Texture—marly analog of loam, clay loam, or sandy loam
Other features—high-chroma iron concentrations in shades of red and brown and low-chroma iron depletions in shades of gray in some pedons

Lindside Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow or moderate
Landscape position: Nearly level flood plains, mainly along streams in the Great Valley
Flooding: Frequently flooded (more than a 50 percent chance of flooding in any year)
Parent material: Alluvial deposits washed from upland soils that formed in limestone
Slope range: 0 to 3 percent
Classification: Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts

Representative Pedon

Lindside silt loam, in a hay field; about 6,150 feet east-northeast of Full Gospel Church on a bearing of

60 degrees; along Opequon Creek; USGS Martinsburg topographic quadrangle; lat. 39 degrees 29 minutes 22 seconds N. and long. 77 degrees 54 minutes 42 seconds W.

Ap1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; many very fine to coarse roots; slightly alkaline; abrupt wavy boundary.

Ap2—3 to 10 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine and medium granular structure; friable; common very fine to medium roots; slightly alkaline; clear smooth boundary.

Bw1—10 to 20 inches; brown (10YR 4/3) silt loam; weak fine and medium subangular blocky structure; friable; few very fine to medium roots; few fine and medium irregular soft masses of carbonates; slightly alkaline; clear wavy boundary.

Bw2—20 to 28 inches; brown (10YR 4/3) silt loam; moderate very fine and fine subangular blocky structure; friable; few very fine to medium roots; few fine dark gray (10YR 4/1) iron depletions and common dark yellowish brown (10YR 4/4) iron concentrations; slightly alkaline; clear smooth boundary.

Bg—28 to 46 inches; dark gray (10YR 4/1) silty clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; friable, slightly sticky and slightly plastic; few very fine and fine roots; few patchy iron and manganese stains on faces of peds; few medium dark grayish brown (10YR 4/2) iron depletions and few fine reddish brown (5YR 4/4) iron concentrations; slightly alkaline; gradual wavy boundary.

Cg—46 to 65 inches; silty clay loam, 85 percent gray (10YR 6/1) and 15 percent grayish brown (10YR 5/2); massive; firm, slightly sticky and slightly plastic; common medium and coarse strong brown (7.5YR 5/6) iron concentrations; slightly alkaline.

Range in Characteristics

Solum thickness: 25 to 50 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, strongly acid to slightly alkaline (pH 5.1 to 7.8) throughout
Content of rock fragments: 0 to 5 percent above a depth of 40 inches and 0 to 30 percent below a depth of 40 inches

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—silt loam

BA horizon: (if it occurs)
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 or 4
Texture—silt loam

Bw horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 to 6
Texture—silt loam or silty clay loam
Other features—high-chroma iron concentrations in shades of red and low-chroma iron depletions in shades of gray below a depth of 14 inches

Bg horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 or 2
Texture—silt loam or silty clay loam
Other features—high-chroma iron concentrations in shades of red

Cg horizon:
Hue—10YR
Value—4 to 6
Chroma—1 or 2
Texture—silt loam, loam, silty clay loam, sandy loam, the gravelly analogs of those textures, or stratified layers of any of those textures
Other features—high-chroma iron concentrations in shades of red

Monongahela Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and moderately slow or slow in the fragipan
Landscape position: Nearly level to strongly sloping stream terraces, mainly along Back Creek and, to a lesser extent, along Opequon Creek and the Potomac River
Flooding: None
Parent material: Old, acid, alluvial deposits washed from upland soils that are underlain by sandstone, siltstone, or shale
Slope range: 0 to 15 percent
Classification: Fine-loamy, mixed, mesic Typic Fragiudults

Representative Pedon

Monongahela silt loam, 0 to 3 percent slopes, in a hay field; about 1,650 feet west-southwest of the iron bridge crossing Back Creek along Route 18 on a bearing of 265 degrees; in the Shanghai area; USGS Tablers Station topographic quadrangle; lat. 39 degrees 26 minutes 08 seconds N and long. 78 degrees 07 minutes 25 seconds W.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) silt loam; moderate very fine and fine granular structure; very friable; common medium and coarse roots; slightly acid; abrupt smooth boundary.

Bt1—10 to 21 inches; yellowish brown (10YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; many very fine and fine roots; many distinct continuous clay films on faces of peds and in pores; 5 percent gravel; very strongly acid; clear wavy boundary.

Bt2—21 to 27 inches; dark yellowish brown (10YR 4/6) silt loam; moderate fine and medium subangular blocky structure; friable; few very fine and fine roots; common distinct continuous clay films on faces of peds and in pores; common fine and medium distinct yellowish brown (10YR 5/8) iron concentrations and common fine and medium prominent gray (10YR 6/1) iron depletions; 5 percent gravel; very strongly acid; clear wavy boundary.

Btx1—27 to 45 inches; light olive brown (2.5Y 5/4) silt loam; strong coarse prismatic structure parting to weak fine and medium platy; very firm and brittle; common distinct continuous clay films on faces of peds; common fine and medium prominent yellowish brown (10YR 5/8) iron concentrations and common fine and medium prominent gray (10YR 6/1) iron depletions; very strongly acid; gradual wavy boundary.

Btx2—45 to 53 inches; yellowish brown (10YR 5/8) clay loam; strong coarse prismatic structure parting to weak medium platy; firm and brittle; few distinct discontinuous clay films on faces of peds; common medium prominent gray (10YR 6/1) iron depletions; 10 percent gravel; very strongly acid; gradual wavy boundary.

C—53 to 65 inches; yellowish brown (10YR 5/6) sandy loam; weak very coarse prismatic structure; friable; many medium and coarse prominent gray (10YR 6/1) iron depletions; 10 percent gravel; very strongly acid.

Range in Characteristics

Solum thickness: 40 to 72 inches
Depth to bedrock: More than 60 inches
Depth to the fragipan: 18 to 30 inches
Reaction: In unlimed areas, strongly acid or very strongly acid (pH 4.5 to 5.5)
Content of rock fragments: 0 to 20 percent above the Btx horizon, 0 to 25 percent in the Btx horizon, and 10 to 40 percent in the C horizon

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—silt loam or gravelly loam

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 8
Texture—silt loam, silty clay loam, loam, clay loam, or the gravelly analogs of those textures
Other features—high-chroma iron concentrations in shades of red or yellow and low-chroma iron depletions in shades of gray in the lower part of the Bt horizon

Btx horizon:
Hue—7.5YR to 2.5Y
Value—5 or 6
Chroma—3 to 8
Texture—loam, silt loam, clay loam, sandy clay loam, or the gravelly analogs of those textures
Other features—high-chroma iron concentrations in shades of red or yellow and low-chroma iron depletions in shades of gray

C horizon:
Hue—7.5YR to 2.5Y
Value—4 to 7
Chroma—2 to 8
Texture—sandy loam, loam, silt loam, silty clay loam, clay loam, or the gravelly or very gravelly analogs of those textures
Other features—high-chroma iron concentrations in shades of red and yellow and low-chroma iron depletions in shades of gray

Murrill Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape position: Mainly on footslopes on the east side of North Mountain and, to a lesser extent, on steep limestone uplands directly above the Potomac River
Flooding: None
Parent material: Partly in colluvial material derived mainly from acid sandstone and shale and partly in the underlying material weathered from limestone

Slope range: 3 to 35 percent
Classification: Fine-loamy, mixed, mesic Typic Hapludults

Representative Pedon

Murrill gravelly loam, 3 to 8 percent slopes, in an orchard; about 2,500 feet north-northeast of the intersection of Routes 45/8 and 15 on a bearing of 10 degrees; in the Nollville area; USGS Tablers Station topographic quadrangle; lat. 39 degrees 28 minutes 37 seconds N. and long. 78 degrees 01 minutes 54 seconds W.

Oe—1 inch to 0; organic material of intermediate decomposition.
Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) gravelly loam; moderate fine and medium granular structure; friable; many very fine and fine roots; 15 percent gravel; neutral; abrupt smooth boundary.
Bt1—9 to 17 inches; yellowish brown (10YR 5/6) loam; moderate fine and medium subangular blocky structure; common very fine and fine roots; few distinct discontinuous clay films on faces of peds and on rock fragments; 10 percent gravel; slightly acid; clear wavy boundary.
Bt2—17 to 24 inches; strong brown (7.5YR 5/6) gravelly clay loam; moderate medium and coarse subangular blocky structure; friable; common very fine and fine roots; common distinct continuous clay films on faces of peds and on rock fragments; 15 percent gravel; moderately acid; clear wavy boundary.
Bt3—24 to 34 inches; strong brown (7.5YR 5/6) gravelly clay loam; moderate medium and coarse subangular blocky structure; friable; few very fine and fine roots; common prominent continuous clay films throughout; 25 percent gravel; moderately acid; clear wavy boundary.
2Bt4—34 to 72 inches; silty clay, 60 percent yellowish red (5YR 4/6) and 40 percent strong brown (7.5YR 5/6); strong medium and coarse subangular blocky structure; firm; many prominent continuous clay films throughout; slightly acid.

Range in Characteristics

Solum thickness: More than 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Content of rock fragments: 10 to 30 percent in the upper part of the solum and 0 to 25 percent in the 2Bt horizon

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 to 4
Texture—gravelly loam

E horizon (if it occurs):
Hue—10YR
Value—5 or 6
Chroma—3 to 6
Texture—loam, sandy loam, silt loam, or the gravelly analogs of those textures

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 6
Texture—silty clay loam, sandy clay loam, clay loam, silt loam, loam, or the gravelly analogs of those textures

2Bt horizon:
Hue—2.5YR to 10YR
Value—4 or 5
Chroma—6
Texture—silty clay loam, silty clay, clay loam, or the gravelly analogs of those textures

Nollville Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderate
Landscape position: Gently sloping to moderately steep upland ridges and side slopes in the Great Valley
Flooding: None
Parent material: Material weathered from interbedded limestone and limy shales, mainly on the Elbrook Formation
Slope range: 3 to 25 percent
Classification: Fine-loamy, mixed, mesic Typic Hapludalfs

Representative Pedon

Nollville channery silt loam, in an area of Ryder-Nollville channery silt loams, 8 to 15 percent slopes, in a hay field; about 1 mile north-northeast of the intersection of Routes 15 and 16 on a bearing of 24 degrees; near Nollville; USGS Tablers Station topographic quadrangle; lat. 39 degrees 28 minutes 50 seconds N. and long. 78 degrees 00 minutes 59 seconds W.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) channery silt loam; moderate fine and medium granular structure; friable; common very fine to medium roots; 20 percent shale channers; neutral; abrupt smooth boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/8) channery silty clay loam that has few streaks and pockets of strong brown (7.5YR 5/6); moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine and fine roots; few patchy clay films on faces of peds and in pores; few black stains of iron and manganese on faces of peds and on shale fragments; 20 percent shale fragments; neutral; clear wavy boundary.

Bt2—20 to 29 inches; yellowish brown (10YR 5/8) silty clay loam that has common streaks and pockets of strong brown (7.5YR 5/6); moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine and fine roots; common discontinuous clay films on faces of ped and in pores; few black stains of iron and manganese on faces of peds and on shale fragments; 5 percent shale fragments; neutral; clear wavy boundary.

Bt3—29 to 41 inches; strong brown (7.5YR 5/6) silty clay that has few streaks and pockets of yellowish brown (10YR 5/8); weak medium prismatic structure parting to moderate medium subangular blocky; friable, moderately sticky and moderately plastic; many continuous clay films on faces of peds and in pores; few black stains of iron and manganese on faces of peds and on shale fragments; 5 percent shale fragments; slightly acid; clear wavy boundary.

C—41 to 57 inches; strong brown (7.5YR 5/6) very channery silty clay loam that has common streaks and pockets of brownish yellow (10YR 6/8); massive; friable, slightly sticky and slightly plastic; few patchy clay films on shale fragments; few black stains of iron and manganese on shale fragments; 55 percent shale fragments; slightly acid; abrupt wavy boundary.

R—57 inches; slightly weathered, fractured and tilted, interbedded limestone and limy shale.

Range in Characteristics

Solum thickness: 40 to 60 inches
Depth to bedrock: 40 to 60 inches
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3)
Content of rock fragments: 15 to 25 percent in the Ap horizon, 0 to 20 percent in the upper part of the Bt horizon, 0 to 40 percent in the lower part of the Bt horizon, and 0 to 60 percent in the C horizon

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 to 4
Texture—channery silt loam

BE horizon (if it occurs):
Hue—10YR
Value—4 to 6
Chroma—4 to 6
Texture—silt loam, loam, or the channery analogs of those textures

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—6 to 8
Texture—silty clay loam, silt loam, or the channery or very channery analogs of those textures; subhorizons of silty clay or clay in the lower part of the Bt horizon in many pedons

BC horizon (if it occurs):
Hue—10YR or 7.5YR
Value—5 or 6
Chroma—6 to 8
Texture—silty clay loam, silty clay, silt loam, or the channery or very channery analogs of those textures

C horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—6 to 8
Texture—silty clay loam, silt loam, loam, silty clay, or the channery or very channery analogs of those textures

Opequon Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate or moderately slow
Landscape position: Gently sloping to steep uplands in the Great Valley
Flooding: None
Parent material: Material weathered from Chambersburg and New Market Limestones
Slope range: 3 to 60 percent
Classification: Clayey, mixed, mesic Lithic Hapludalfs

Representative Pedon

Opequon silty clay, in an area of Carbo-Opequon complex, 3 to 8 percent slopes, in a hay field; about 4,450 feet east-northeast of the intersection of U.S. Route 60 and Route 26 on a bearing of 77 degrees; in the Bunker Hill area; USGS Inwood topographic quadrangle; lat. 39 degrees 20 minutes 13 seconds N. and long. 78 degrees 02 minutes 20 seconds W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) silty clay; moderate fine subangular blocky structure; friable; common very fine and fine roots; 5 percent limestone channers; slightly alkaline; abrupt smooth boundary.

Bt1—8 to 13 inches; variegated clay, 95 percent yellowish brown (10YR 5/6) and 5 percent strong brown (7.5YR 5/6); moderate fine angular blocky structure; firm, very sticky and very plastic; common very fine and fine roots; common distinct clay films on faces of peds; 5 percent limestone channers; slightly alkaline; clear wavy boundary.

Bt2—13 to 17 inches; variegated clay, 85 percent yellowish brown (10YR 5/6) and 15 percent dark yellowish brown (10YR 4/4); moderate fine angular blocky structure; firm, very sticky and very plastic; few very fine and fine roots; common distinct clay films on faces of peds; 10 percent limestone channers; slightly alkaline; abrupt wavy boundary.

R—17 inches; hard, bluish gray limestone.

Range in Characteristics

Solum thickness: 12 to 20 inches
Depth to bedrock: 12 to 20 inches
Reaction: In unlimed areas, moderately acid to slightly alkaline (pH 5.6 to 7.8)
Content of rock fragments: 0 to 35 percent, by volume, throughout; fragments are mostly limestone channers

Ap or A horizon:
Hue—10YR or 7.5YR
Value—3 or 4
Chroma—3 or 4
Texture—silty clay

Bt horizon:
Hue—5YR to 10YR
Value—4 or 5
Chroma—4 to 6
Texture—clay or silty clay

C horizon (if it occurs):
Hue—5YR to 10YR
Value—4 or 5
Chroma—4 to 6
Texture—clay or silty clay

Pecktonville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part of the solum and slow or moderately slow in the lower part
Landscape position: Gently sloping or strongly sloping, convex ridges and moderately steep to very steep, convex side slopes in the western part of the county, mainly on Ferrel Ridge, on Wilson Ridge, and in other outlying areas; limestone bedrock near Jones Spring
Flooding: None
Parent material: Dominantly material weathered from stratified, siliceous limestone that has a fairly high content of angular chert fragments and in some material weathered from sandstone
Slope range: 3 to 50 percent
Classification: Clayey, mixed, mesic Typic Paleudults

Representative Pedon

Pecktonville very gravelly loam, in a wooded area of Blackthorn-Pecktonville very gravelly loams, 15 to 35 percent slopes, extremely stony; about 3,000 feet west-northwest of the entrance to Camp Tomahawk on a bearing of 274 degrees; on Wilson Ridge; USGS Tablers Station topographic quadrangle; lat. 39 degrees 29 minutes 59 seconds N and long. 78 degrees 04 minutes 19 seconds W.

Oe—0 to 1 inch; partially decomposed hardwood leaf litter.

A—1 to 3 inches; very dark grayish brown (10YR 3/2) very gravelly loam; moderate fine and medium granular structure; very friable; many very fine to coarse roots; 40 percent gravel; moderately acid; clear wavy boundary.

E—3 to 7 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium subangular blocky structure; friable; many very fine to medium roots; 20 percent gravel; strongly acid; clear wavy boundary.

BE—7 to 12 inches; strong brown (7.5YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; friable; common very fine to coarse roots; 10 percent gravel; strongly acid; clear wavy boundary.

Bt1—12 to 17 inches; yellowish red (5YR 5/6) gravelly silty clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; few patchy clay films on faces of peds; 15 percent gravel; strongly acid; clear wavy boundary.

Bt2—17 to 32 inches; variegated gravelly clay, 65 percent yellowish red (5YR 5/6), 25 percent strong brown (7.5YR 5/6), and 10 percent brownish yellow (10YR 6/6); moderate medium and coarse subangular blocky structure; firm, moderately sticky and moderately plastic; few very fine and fine roots; common continuous clay films on rock fragments and faces of peds; 15 percent gravel; strongly acid; clear wavy boundary.

Bt3—32 to 46 inches; variegated gravelly clay, 85 percent yellowish red (5YR 5/8), 10 percent red (2.5YR 4/8), and 5 percent brownish yellow (10YR 6/6); moderate medium and coarse subangular blocky structure; firm, moderately sticky and moderately plastic; few very fine to coarse roots; many continuous clay films on rock fragments and faces of peds; 20 percent gravel; very strongly acid; clear wavy boundary.

Bt4—46 to 62 inches; variegated gravelly clay, 75 percent yellowish red (5YR 5/6), 15 percent red (2.5YR 4/8), and 10 percent brownish yellow (10YR 6/6); moderate medium platy structure parting to moderate medium subangular blocky; firm, very sticky and very plastic; few very fine and fine roots; many continuous clay films on faces of peds, on rock fragments, and in root channels; common coarse pinkish gray (7.5YR 7/2) iron depletions along faces of peds; 20 percent gravel; strongly acid; clear wavy boundary.

Bt5—62 to 65 inches; red (2.5YR 4/6) clay; moderate medium and coarse subangular blocky structure; firm, very sticky and very plastic; few fine roots; common distinct patchy stains of manganese or of iron and manganese throughout; many continuous clay films on faces of peds, on rock fragments, and in root channels; 10 percent gravel; strongly acid.

Range in Characteristics

Solum thickness: More than 60 inches
Depth to bedrock: More than 72 inches
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Content of rock fragments: 35 to 60 percent in the A horizon, 10 to 60 percent in the E and BE horizons, and 0 to 35 percent in the Bt horizon; fragments are mostly angular chert pebbles

A horizon:
Hue—10YR
Value—3 or 4
Chroma—1 to 3
Texture—very gravelly loam

E horizon:
Hue—10YR
Value—5 or 6
Chroma—3 to 6
Texture—silt loam, loam, or the gravelly or very gravelly analogs of those textures

BE horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—4 to 6
Texture—loam, silt loam, silty clay loam, or the gravelly or very gravelly analogs of those textures

Bt horizon:
Hue—2.5YR or 5YR
Value—4 or 5
Chroma—6 to 8
Texture—silty clay loam, clay loam, silty clay, clay, or the gravelly analogs of those textures
Other features—redoximorphic features below a depth of 42 inches

Philo Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape position: Nearly level flood plains, mainly along Back Creek and its tributaries
Flooding: Occasionally flooded (a 5 to 50 percent chance of flooding in any year)
Parent material: Recent alluvial deposits washed from upland soils that formed in material weathered from acid sandstone and shale
Slope range: 0 to 3 percent
Classification: Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts

Representative Pedon

Philo silt loam in a hay field; about 5,800 feet north-northeast of the County Route 18 bridge over Back Creek on a bearing of 24 degrees; east of Shanghai; USGS Tablers Station topographic quadrangle; lat. 39 degrees 26 minutes 57 seconds N and long. 78 degrees 06 minutes 25 seconds W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; friable; common very fine to coarse roots; 5 percent gravel; slightly acid; abrupt smooth boundary.

Bw1—10 to 17 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium and coarse subangular blocky structure parting to weak medium granular; friable; common very fine and fine roots; common fine and medium very dark brown concretions of iron and manganese; slightly acid; clear wavy boundary.

Bw2—17 to 29 inches; yellowish brown (10YR 5/4) silt loam; weak medium and coarse subangular blocky structure parting to moderate medium granular; friable; few very fine roots; common fine and medium very dark brown concretions of iron and manganese; few fine light brownish gray (10YR 6/2) iron depletions and few fine dark yellowish brown (10YR 4/6) iron concentrations; very strongly acid; clear wavy boundary.

Bw3—29 to 45 inches; brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; friable; few very fine and fine roots; common fine and medium very dark brown concretions of iron and manganese; common medium light brownish gray (10YR 6/2) iron depletions and common medium yellowish brown (10YR 5/6) iron concentrations; very strongly acid; clear wavy boundary.

BC—45 to 53 inches; brown (7.5YR 5/4) silt loam; weak coarse subangular blocky structure; friable; few very fine and fine roots; few fine and medium very dark brown concretions of iron and manganese; many medium and coarse light brownish gray (10YR 6/2) iron depletions and common fine and medium yellowish brown (10YR 5/6) iron concentrations; very strongly acid; clear wavy boundary.

C—53 to 65 inches; brown (7.5YR 4/4) silt loam; massive; friable; few fine and medium very dark brown concretions of iron and manganese; common medium and coarse light brownish gray (10YR 6/2) iron depletions and common medium strong brown (7.5YR 5/6) iron concentrations; very strongly acid.

Range in Characteristics

Solum thickness: 25 to 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, very strongly acid to moderately acid throughout
Content of rock fragments: 0 to 10 percent in the surface layer, 0 to 20 percent in the subsoil, and 0 to 40 percent in the substratum

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—2 or 3
Texture—silt loam

Bw horizon:
Hue—7.5YR to 2.5Y
Value—4 or 5
Chroma—3 to 6
Texture—silt loam or loam
Other features—high-chroma iron concentrations in shades of red and brown and low-chroma iron depletions in shades of gray

BC horizon:
Colors and textures—similar to those of the Bw horizon

C horizon:
Hue—7.5YR to 2.5Y
Value—4 or 5
Chroma—1 to 4
Texture—silt loam, loam, sandy loam, loamy sand, sand, the gravelly or very gravelly analogs of those textures, or stratified layers of any of those textures
Other features—high-chroma iron concentrations in shades of red and brown and low-chroma iron depletions in shades of gray; gleyed in some pedons

Poorhouse Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landscape position: Nearly level or gently sloping, slightly concave slopes near the eastern foot of North Mountain and small areas in slight depressions scattered throughout the Great Valley
Flooding: None
Parent material: Material weathered from limestone mixed with some colluvial material
Slope range: 0 to 8 percent
Classification: Fine, mixed, mesic Aquic Hapludalfs

Representative Pedon

Poorhouse silt loam, 0 to 3 percent slopes, in an area of cropland; about 2,000 feet east-northeast of the intersection of Routes 45/8 and 30/1 on a bearing of 66 degrees; east of North Mountain; USGS Tablers Station topographic quadrangle; lat. 39 degrees 26 minutes 24 seconds N. and long. 78 degrees 03 minutes 15 seconds W.

Ap—0 to 12 inches; silt loam, 95 percent light olive brown (2.5Y 5/3) and 5 percent yellowish brown (10YR 5/6); moderate medium and coarse subangular blocky structure; friable; common very fine and fine roots; slightly acid; abrupt smooth boundary.

Bt1—12 to 18 inches; yellowish brown (10YR 5/6) silty clay; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm, moderately sticky and moderately plastic; very few very fine roots; common discontinuous clay films on faces of peds and in pores; common fine and medium light brownish gray (10YR 6/2) iron depletions and few fine strong brown (7.5YR 5/6) iron concentrations; very strongly acid; clear wavy boundary.

Bt2—18 to 26 inches; yellowish brown (10YR 5/4) clay; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm, moderately sticky and moderately plastic; very few very fine roots; many discontinuous clay films on faces of peds and in pores; many medium gray (10YR 5/1) iron depletions and few fine strong brown (7.5YR 5/6) iron concentrations; very strongly acid; clear wavy boundary.

Bt3—26 to 36 inches; brown (10YR 5/3) clay; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; very few very fine roots; few pressure faces; many discontinuous clay films on faces of peds and in pores; few black stains of iron and manganese; common medium gray (10YR 5/1) iron depletions and few fine strong brown (7.5YR 5/6) iron concentrations; neutral; clear wavy boundary.

Bt4—36 to 49 inches; brown (10YR 5/3) clay; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; very few very fine roots; common pressure faces; many discontinuous clay films on faces of peds and in pores; few black stains of iron and manganese; few fine gray (10YR 5/1) iron depletions and few fine strong brown (7.5YR 5/6) iron concentrations; neutral; clear wavy boundary.

Bt5—49 to 54 inches; brown (10YR 5/3) clay; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; very few very fine roots; common pressure faces; many discontinuous clay films on faces of peds and in pores; many medium gray (10YR 5/1) iron depletions and many fine strong brown (7.5YR 4/6) iron concentrations; neutral; clear wavy boundary.

Btg—54 to 65 inches; gray (2.5Y 5/0) silty clay; moderate medium prismatic structure parting to moderate medium subangular blocky; firm, moderately sticky and moderately plastic; very few fine roots; common discontinuous clay films on faces of peds and in pores; few black stains of iron and manganese; many fine and medium strong brown (7.5YR 4/6) iron concentrations and common coarse dark grayish brown (2.5Y 4/2) iron depletions; 5 percent limestone channers; slightly alkaline.

Range in Characteristics

Solum thickness: 40 to 70 inches or more
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, very strongly acid to neutral (pH 4.5 to 7.3) in the upper part of the solum and moderately acid to slightly alkaline (pH 5.6 to 7.8) in the lower part of the solum and in the C horizon, if it occurs
Content of rock fragments: 0 to 25 percent throughout the profile; fragments are mainly sandstone

Ap horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 to 4
Texture—silt loam

Bt horizon:
Hue—10YR, 2.5Y, or N
Value—4 to 6
Chroma—0 to 6
Texture—clay, silty clay, clay loam, silty clay loam, or the channery or gravelly analogs of those textures
Other features—high-chroma iron concentrations in shades of red and brown and low-chroma iron depletions in shades of gray; gleyed colors in the lower part of the horizon in many pedons
Consistence—firm or very firm when moist; hard when dry; and moderately plastic and moderately sticky when wet

C horizon (if it occurs):
Hue—10YR, 2.5Y, or N
Value—4 to 6
Chroma—0 to 6
Texture—clay, silty clay, clay loam, silty clay loam, or the channery or gravelly analogs of those textures
Other features—high-chroma iron concentrations in shades of red and brown and low-chroma iron depletions in shades of gray; gleyed in many pedons
Consistence—similar to that of the Bt horizon

Pope Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate or moderately rapid
Landscape position: Nearly level flood plains, mainly along Back Creek and its tributaries in the western part of the county
Flooding: Frequent or occasional
Parent material: Loamy, alluvial deposits washed from

upland soils that are underlain by acid sandstone, siltstone, and shale
Slope range: 0 to 3 percent
Classification: Coarse-loamy, mixed, mesic Fluventic Dystrochrepts

Representative Pedon

Pope silt loam, in an abandoned area of cropland; about 9,600 feet south-southeast of the intersection of Routes 7 and 7/8 on a bearing of 170 degrees; in the Jones Springs area; USGS Tablers Station topographic quadrangle; lat. 39 degrees 27 minutes 55 seconds N. and long. 78 degrees 05 minutes 25 seconds W.

Ap—0 to 11 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common very fine and fine roots; moderately acid; clear smooth boundary.
Bw1—11 to 28 inches; brown (10YR 4/3) silt loam; weak medium and coarse subangular blocky structure; very friable; few very fine and fine roots; few faint organic coatings in root channels and in pores; moderately acid; clear smooth boundary.
Bw2—28 to 34 inches; brown (10YR 4/3) silt loam; weak fine and medium subangular blocky structure; very friable; few very fine and fine roots; moderately acid; clear wavy boundary.
Bw3—34 to 51 inches; brown (7.5YR 4/4) silt loam; weak medium and coarse subangular blocky structure; friable; few very fine and fine roots; very strongly acid; many faint organic coatings in root channels and in pores; very strongly acid; clear wavy boundary.
C—51 to 65 inches; brown (7.5YR 4/4) loam; massive; friable; very strongly acid.

Range in Characteristics

Solum thickness: 30 to 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, extremely acid to strongly acid (pH 3.6 to 5.5)
Content of rock fragments: Averages less than 15 percent in the surface layer, 0 to 30 percent in the subsoil, and 0 to 75 percent in the substratum

Ap or A horizon:
Hue—10YR
Value—4 or 5; some pedons have an Ap horizon that has value of 3 to 6 or more when dry
Chroma—2 to 4
Texture—silt loam or fine sandy loam

Bw horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6
Texture—silt loam, loam, sandy loam, fine sandy loam, very fine sandy loam, or the gravelly analogs of those textures
Other features—high-chroma iron concentrations in shades of red and low-chroma iron depletions in shades of gray below a depth of 24 inches in some pedons

C horizon (if it occurs):
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 6
Texture—loam, sandy loam, fine sandy loam, loamy sand, the gravelly or very gravelly analogs of those textures, or stratified layers of any of those textures
Other features—high-chroma iron concentrations in shades of red and low-chroma iron depletions in shades of gray in some pedons

Ryder Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landscape position: Gently sloping to moderately steep upland ridges and side slopes in the Great Valley
Flooding: None
Parent material: Material weathered from interbedded limestone and limy shales, mainly on the Elbrook Formation
Slope range: 3 to 25 percent
Classification: Fine-loamy, mixed, mesic Ultic Hapludalfs

Representative Pedon

Ryder channery silt loam, in an area of Ryder-Nollville channery silt loams, 8 to 15 percent slopes, in a hay field; about 1 mile north-northeast of the intersection of Routes 15 and 16 on a bearing of 28 degrees; near Nollville; USGS Tablers Station topographic quadrangle; lat. 39 degrees 28 minutes 50 seconds N. and long. 78 degrees 00 minutes 57 seconds W.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) channery silt loam mixed with a few coarse pockets of yellowish brown (10YR 5/6) channery silty clay loam; moderate fine and medium granular structure; friable; common very fine to medium roots; 20 percent shale fragments; neutral; abrupt smooth boundary.
Bt—9 to 25 inches; strong brown (7.5YR 5/6) channery silty clay loam that has common coarse

pockets and streaks of yellowish brown (10YR 5/6); moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few very fine and fine roots; common patchy clay films on faces of peds and in pores; very few black stains of iron and manganese on faces of peds; 25 percent shale fragments; slightly acid; clear wavy boundary.

C—25 to 33 inches; yellowish brown (10YR 5/6) extremely channery silty clay loam that has common medium pockets and streaks of strong brown (7.5YR 5/6) and yellowish red (5YR 4/6); massive; friable, slightly sticky and slightly plastic; few black stains of iron and manganese on shale fragments; 65 percent shale fragments; slightly acid; abrupt irregular boundary.

R—33 inches; slightly weathered, fractured and tilted, interbedded limestone and limy shale.

Range in Characteristics

Solum thickness: 20 to 36 inches
Depth to bedrock: 24 to 40 inches
Reaction: In unlimed areas, strongly acid to neutral (pH 5.1 to 7.3) in the solum and moderately acid to neutral (pH 5.6 to 7.3) in the C horizon
Content of rock fragments: 15 to 25 percent in the Ap horizon, 10 to 25 percent in the Bt horizon, and 25 to 75 percent in the C horizon

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—3 or 4
Texture—channery silt loam

Bt horizon:
Hue—10YR or 7.5YR
Value—5 or 6
Chroma—4 to 6
Texture—silty clay loam, silt loam, loam, or the channery analogs of those textures

C horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4 to 6
Texture—channery, very channery, or extremely channery analogs of silty clay loam, silt loam, or loam

Swanpond Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landscape position: Nearly level or gently sloping uplands in the Great Valley
Flooding: None
Parent material: Material weathered from limestone
Slope range: 0 to 8 percent
Classification: Very fine, mixed, active, mesic Vertic Paleudalfs

Representative Pedon

Swanpond silt loam, 0 to 3 percent slopes, in an area of cropland; 1,300 feet north-northwest of the intersection of Routes 5/9 and 5/3 on a bearing of 339 degrees; in the Greensburg area; USGS Martinsburg topographic quadrangle; lat. 39 degrees 28 minutes 24 seconds N. and long. 77 degrees 53 minutes 23 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; moderate fine and medium granular structure; friable; few very fine roots; neutral; abrupt smooth boundary.

Bt1—7 to 25 inches; yellowish brown (10YR 5/6) clay; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; friable, very sticky and very plastic; very few very fine roots; common distinct clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—25 to 32 inches; yellowish brown (10YR 5/6) clay; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; friable, very sticky and very plastic; very few very fine roots; common distinct clay films on faces of peds; few prominent black stains of manganese on faces of peds; strongly acid; clear wavy boundary.

Btss1—32 to 39 inches; yellowish brown (10YR 5/6) clay; moderate coarse prismatic structure parting to moderate fine and medium angular blocky; friable, very sticky and very plastic; very few very fine roots between peds; common slickensides; many prominent clay films on faces of peds; common prominent black stains of manganese on faces of peds; few fine distinct gray (10YR 6/1) iron depletions along faces of peds; strongly acid; clear wavy boundary.

Btss2—39 to 49 inches; yellowish brown (10YR 5/6) clay; moderate coarse prismatic structure parting to moderate fine and medium angular blocky; firm, very sticky and very plastic; very few very fine roots between peds; common slickensides; many prominent clay films on faces of peds; common prominent black stains of manganese on faces of peds; common coarse distinct gray (10YR 6/1) iron depletions along faces of peds; strongly acid; clear wavy boundary.

Btss3—49 to 65 inches; strong brown (7.5YR 5/6) clay; strong coarse prismatic structure parting to moderate fine and medium angular blocky; firm, very sticky and very plastic; common slickensides; many prominent clay films on faces of peds; common prominent black stains of manganese on faces of peds; many coarse distinct gray (10YR 6/1) iron depletions along faces of peds; strongly acid.

Range in Characteristics

Solum thickness: More than 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, strongly acid to slightly alkaline (pH 5.1 to 7.8)
Content of rock fragments: 0 to 15 percent throughout

Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—3 to 5
Texture—silt loam

BA horizon (if it occurs):
Hue—10YR
Value—4
Chroma—3 to 6
Texture—silt loam or silty clay loam

Bt horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 8
Texture—clay with some subhorizons of silty clay
Other features—low-chroma iron depletions in shades of gray and high-chroma iron concentrations in shades of red begin at a depth of 30 to 40 inches; few or common slickensides generally in one or more subhorizons

BC and C horizons (if they occur):
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 8
Texture—clay or silty clay
Other features—low-chroma iron depletions in shades of gray and high-chroma iron concentrations in shades of red in most pedons

Tygart Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Landscape position: Nearly level or gently sloping, low stream terraces, mainly along Back Creek and, to a lesser extent, along Opequon Creek and the Potomac River
Flooding: None
Parent material: Acid, slackwater alluvium
Slope range: 0 to 8 percent
Classification: Clayey, mixed, mesic Aeric Endoaquults

Representative Pedon

Tygart silt loam, 0 to 3 percent slopes, in a pastured area; about 4,400 feet north-northeast of the County Route 18 bridge over Back Creek on a bearing of 35 degrees; near Shanghai; USGS Tablers Station topographic quadrangle; lat. 39 degrees 26 minutes 38 seconds N. and long. 78 degrees 62 minutes 25 seconds W.

Ap—0 to 10 inches; brown (10YR 5/3) silt loam; moderate fine granular structure; friable; common very fine to medium roots; few fine charcoal fragments; slightly acid; abrupt smooth boundary.

BA—10 to 15 inches; light yellowish brown (10YR 6/4) silt loam; weak medium subangular blocky structure; friable; few fine and very fine roots; few fine charcoal fragments; many medium or coarse strong brown (7.5YR 5/6) iron concentrations and few medium light brownish gray (10YR 6/2) iron depletions; very strongly acid; clear smooth boundary.

Bt—15 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; firm, moderately sticky and moderately plastic; few very fine roots along faces of peds; common discontinuous clay films on faces of peds and in pores; many coarse gray (10YR 6/1) iron depletions and common medium strong brown (7.5YR 5/8) iron concentrations; very strongly acid; gradual wavy boundary.

Btg—24 to 47 inches; gray (10YR 6/1) clay; moderate coarse prismatic structure parting to moderate medium and coarse platy; firm, moderately sticky and moderately plastic; few very fine roots along faces of peds; many discontinuous clay films on faces of peds and in pores; many coarse yellowish brown (10YR 5/6) and few fine yellowish red (5YR 4/6) iron concentrations; 2 percent gravel; very strongly acid; clear wavy boundary.

BCg—47 to 59 inches; silty clay, 50 percent gray (10YR 6/1) and 50 percent yellowish brown (10YR 5/6); weak fine and medium subangular blocky structure; firm, moderately sticky and moderately plastic; few fine and medium yellowish red (5YR 5/6) iron concentrations; 2 percent gravel; strongly acid; clear wavy boundary.

Cg—59 to 65 inches; gray (2.5Y 6/1) silty clay; massive; firm, moderately sticky and moderately plastic; common fine and medium yellowish brown (10YR 5/6) and few fine yellowish red (5YR 4/6) iron concentrations; 2 percent gravel; moderately acid.

Range in Characteristics

Solum thickness: 40 to 60 inches
Depth to bedrock: More than 60 inches
Reaction: In unlimed areas, very strongly acid to moderately acid (pH 4.5 to 6.0)
Content of rock fragments: 0 to 3 percent throughout

Ap horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—silt loam

BA horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—3 or 4
Texture—silt loam or silty clay loam

Bt horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—3 to 6
Texture—silty clay or silty clay loam
Other features—high-chroma iron concentrations in shades of red and yellow and low-chroma iron depletions in shades of gray

Btg horizon:
Hue—10YR, 2.5Y, or N
Value—5 or 6
Chroma—0 to 2
Texture—clay, silty clay, or silty clay loam
Other features—high-chroma iron concentrations in shades of red and yellow

BCg horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—1 to 6
Texture—clay, silty clay, or silty clay loam
Other features—high-chroma iron concentrations in shades of red and yellow

Cg horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—1 or 2
Texture—clay, silty clay, or silty clay loam
Other features—high-chroma iron concentrations in shades of red and yellow

Udorthents

Depth class: Varies
Drainage class: Varies
Permeability: Varies; generally moderately slow or slow in areas that have been heavily compacted by equipment
Landscape position: Nearly level to very steep areas that have been drastically disturbed by excavating, grading, filling, or a combination of these practices. Most of these areas are the result of road construction, such as along Interstate 81, or construction of commercial or industrial buildings, schools, or recreational areas, such as ball fields.
Parent material: Varies
Slope range: 0 percent to nearly vertical in excavated areas
Classification: Udorthents

Representative Pedon

Because the characteristics of these soils vary so much, a representative profile is not given. The surface layer of these soils ranges from sandy loam to clay with a wide range in size, amount, and kind of rock fragments. Generally, the soils derived from materials excavated from areas underlain by limestone are clayey in texture, while the soils derived from materials excavated from areas underlain by shale or sandstone are loamy in texture.

Range in Characteristics

Solum thickness: Varies
Depth to bedrock: Varies from very shallow in excavated areas to very deep in filled areas
Reaction: Varies
Content of rock fragments: Varies

Weikert Series

Depth class: Shallow
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Landscape position: Gently sloping to very steep uplands
Flooding: None
Parent material: Material weathered from shale or siltstone
Slope range: 3 to 70 percent
Classification: Loamy-skeletal, mixed, mesic Lithic Dystrochrepts

Representative Pedon

Weikert very channery silt loam, in an area of Weikert-Berks very channery silt loams, 25 to 70 percent slopes, in a grazed woodlot; about 1,400 feet north-northwest of the intersection of Routes 45/4 and 5/9 on a bearing of 354 degrees; in the Greensburg area; USGS Martinsburg topographic quadrangle; lat. 39 degrees 28 minutes 13 seconds N. and long. 77 degrees 53 minutes 52 seconds W.

Oi—1 inch to 0; slightly decomposed, mixed litter from oaks and pines.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) very channery silt loam; moderate fine granular structure; very friable; many fine to coarse and common very fine roots; 40 percent shale channers; very strongly acid; clear smooth boundary.

Bw—2 to 13 inches; yellowish brown (10YR 5/6) very channery silt loam; weak fine and medium subangular blocky structure; friable; many fine to coarse and common very fine roots; common distinct silt coatings on faces of peds, in pores, and on shale fragments; 60 percent shale channers; extremely acid; clear wavy boundary.

R—13 inches; tilted and fractured, gray shale.

Range in Characteristics

Solum thickness: 8 to 20 inches
Depth to bedrock: 10 to 20 inches
Reaction: In unlimed areas, extremely acid to moderately acid (pH 3.5 to 6.0)
Content of rock fragments: 15 to 50 percent in the A horizon, 35 to 60 percent in the B horizon, and 60 to 85 percent in the C horizon; fragments are shale or siltstone

A horizon:
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture—channery silt loam or very channery silt loam

E horizon (if it occurs):
Hue—10YR
Value—5 or 6
Chroma—4
Texture—channery or very channery analogs of silt loam or loam

Bw horizon:
Hue—10YR
Value—4 to 6
Chroma—4 to 6
Texture—very channery silt loam or very channery loam

C horizon (if it occurs):
Hue—10YR
Value—4 to 6
Chroma—4 to 6
Texture—extremely channery silt loam or extremely channery loam

Formation of the Soils

This section explains the origin and development of the soils in Berkeley County. It describes the influence of the five factors of soil formation on the soils in the county. It also describes the morphology of the soils as it applies to horizon nomenclature and the geological characteristics of the county.

Factors of Soil Formation

The soils in Berkeley County have resulted from the interaction of five major factors of soil formation—parent material, time, climate, living organisms, and topography (Jenny 1941). Each factor modifies the effect of the other factors. Parent material, topography, and time have produced the major differences among the soils in Berkeley County. Climate and living organisms generally show their influence throughout broad areas.

Parent Material, Time, and Climate

The character of the parent material strongly influences the time required for soil formation and the nature of the soils produced. The soils in Berkeley County formed in residual, colluvial, and alluvial materials.

Most of the soils formed in residual material weathered from limestone, shale, sandstone, or siltstone. The residual material is the oldest parent material in the county. Some of the soils that formed in residual material, such as the Hagerstown soils, show a high degree of development. Other soils are not so well developed because the soil-forming processes have been hindered by slope or by rock that is resistant to weathering. Dekalb soils, for example, formed in material weathered from hard sandstone and show a very limited degree of development.

The colluvial parent material on foot slopes, on toe slopes, and near the head of drainageways has moved downslope from residual soils. This material is younger than the residual material, but the soil-forming processes have had a considerable amount of time to act on the parent material. The resulting soils, such as those in the Buchanan series, are strongly leached and moderately well developed.

The alluvial parent material on terraces and flood plains has washed from upland soils that formed in residual and colluvial material. The soils on the terraces, such as the Monongahela soils, are much older than the soils on the flood plains. They also are strongly leached and have a moderately well developed soil profile. The soils on the flood plains, such as the Pope soils, are the youngest soils in the county. They exhibit a weakly developed profile.

Climate generally is relatively uniform throughout the county and is not responsible for any major differences among the soils. Rainfall and temperature, however, have had a general influence on the development of layers in the soil profile. The water from rainfall dissolves minerals, supports biological activity, and transports mineral and organic residue through the soil profile. Because more water enters the soil as precipitation than is lost through evaporation, the humid climate in the county has caused the soils to be leached. The temperature determines the type of physical, chemical, and biological activities that take place and the speed at which they act. A detailed description of the climate is given in the section “General Nature of the County.”

Living Organisms

Living organisms, including plants, animals, bacteria, fungi, and humans, affect soil formation. The kind and amount of vegetation generally are responsible for the amount of organic matter in the soil, the color of the surface layer, and, in part, the amount of nutrients in the soil. Earthworms and burrowing animals help to keep the soil open and porous, and they mix organic and mineral material by moving the soil to the surface. Bacteria and fungi decompose organic matter and can be instrumental in releasing nutrients for plant uptake. Humans influence the characteristics of the surface layer by clearing vegetation, plowing, or adding lime and fertilizer.

Topography

Topography affects soil formation through its effect on the amount of water moving through the soil, the amount and rate of runoff, and the rate of erosion. Large amounts of water have moved through gently sloping and strongly sloping soils. This movement of water favors the formation of moderately developed or well developed soils that are uniform in depth. On steep and very steep hillsides, less water moves through the profile and the amount and rate of runoff are greater. Also, the soil material may be washed away almost as rapidly as a soil forms. Thus, it is likely that some of the steeper soils will be more shallow over bedrock and less developed than the soils on the more gentle slopes.

The topography in the county favors the formation of soils on flood plains and terraces, and soil formation is progressing at a rapid rate. Soils on the flood plains are young and weakly developed, however, mainly because too little time has elapsed since the material was deposited.

Morphology of the Soils

Soils are formed as a result of the physical weathering of parent rock, the chemical weathering of rock fragments and organic matter, the transfer of materials within the soil profile, and the gains and losses of organic matter and minerals. The results of these soil-forming processes are evident in the different layers, or horizons, in the soil profile. The profile extends from the surface downward to material that is little changed by the soil-forming processes. The layers include the O, A, E, B, and C horizons.

The O horizon is a very dark, organic layer. It may overlie either mineral or organic soils. Soils that have an O horizon are almost exclusively in forested areas of the county. The O horizon mainly is undecomposed or partially decomposed hardwood leaf litter. It is quickly destroyed by such activities as land clearing and plowing.

The A horizon is the surface layer. It is the mineral layer that has the maximum accumulation of organic matter. It becomes darker as the organic matter accumulates.

The E horizon underlies the A or O horizon and is a light-colored mineral layer. It is the horizon of maximum leaching, or eluviation, of clay, iron, and aluminum. In areas that have been farmed, the E horizon commonly is no longer evident because it has been mixed with the A horizon when the soil was plowed.

The B horizon underlies the A, E, or O horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, and other compounds leached from the E horizon. It generally has blocky structure and is firmer and lighter in color than the overlying horizons.

The C horizon is commonly called the substratum. It consists of material that has been modified by weathering but has been altered little by the soil-forming processes. It generally is structureless and contains few, if any, roots.

In Berkeley County many processes have been involved in the formation of soil horizons. The more important of these are the accumulation of organic matter, the reduction and transfer of iron, the formation and translocation of clay minerals, and the formation of soil structure. These processes are continuous and have been taking place for thousands of years.

Most of the well drained and moderately well drained soils on uplands in the county have a yellowish brown to yellowish red B horizon. These colors are caused mainly by the presence of iron oxides. The B horizon in these soils has blocky structure.

A fragipan has formed in the B horizon of many of the soils on foot slopes and terraces. This layer is dense and brittle, mottled in color, and moderately slowly permeable or slowly permeable to water and air.

Some of the soils in the county have gray colors that are the result of gleying, or the reduction of iron, during soil formation. These soils are moderately well drained, somewhat poorly drained, poorly drained, or very poorly drained.

Geology

Craig E. Savela, staff geologist, Natural Resources Conservation Service, helped to prepare this section.

The landforms of Berkeley County clearly show the effects of uplift, folding, and geologic erosion. The relative resistance of various rocks to erosion and folding has affected the topography of the county. The ridgetops formed in areas of resistant sandstone, and the valleys formed mainly in areas of softer, erosive shale and limestone. The parallel ridges and valleys are oriented in a northeast-southwest direction. Outcrops of rocks also follow this orientation.

The county lies entirely within the Northern Appalachian Ridges and Valleys physiographic province. The bedrock is steeply folded and highly faulted. A system of generally parallel streams drains the county northeastward to the Potomac River. The exposed rocks in the county are all sedimentary in origin and belong to the Mississippian, Devonian, Silurian, Ordovician, and Cambrian geologic periods (Grimsley 1916).

Limestone, shale, sandstone, and siltstone are the common types of rock. Most of the soils in the county formed in material weathered from these rocks.

The youngest rocks in the county are Pocono Group Sandstones, which are of Mississippian age.

They are exposed on Sleepy Creek Mountain. Dekalb soils are dominant in this area.

The oldest rocks in the county are the limestones and limy shales of the Elbrook and Waynesboro Formations, which are of Middle Cambrian age. They are exposed in a band that is along the eastern flank and parallel to North Mountain. Ryder, Nollville, and Duffield soils are dominant in this area, which is the major apple-growing region in the county.

Rocks of Ordovician age are extensive in the Opequon Creek drainage area of the Shenandoah Valley. Hagerstown soils commonly formed in material weathered from the limestones and dolomites of the Beekmantown Group. Berks, Weikert, and Clearbrook soils are dominant on the shales of the Martinsburg Formation. Chambersburg and New Market Limestones have been extensively quarried. Carbo, Opequon, and Swanpond soils are common in areas underlain by these rocks.

Rocks of Silurian age are exposed in the Ferrel Ridge area, directly west of the community of Tomahawk, and in the Wilson Ridge area, east of Jones Springs. Caneyville and Pecktonville soils formed in material weathered from Bossardville Limestone, Rondout Waterlime, and Bloomsburg Red Shale.

Rocks of Devonian age outcrop extensively west of North Mountain. They include the shales of the Hampshire Formation, Chemung Group, and Braillier and Mahantango Formations. Calvin, Berks, and Weikert soils formed in material weathered from these shales.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

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:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium

carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.
Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.
California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.
Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.
Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.
Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.
Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.
Cement rock. Shaly limestone used in the manufacture of cement.
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 along the longest axis. A single piece is called a channer.
Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.
Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.
Coarse textured soil. Sand or loamy sand.
Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
Complex, soil. A map unit of two or more kinds of soil 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.
Congeliturbate. Soil material disturbed by frost action.
Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.
Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a “wire” when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

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.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic).—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated).—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

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.

Forb. Any herbaceous plant not a grass or a sedge.

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.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

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.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock 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.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

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. It 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.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and are less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Iron concentrations. Areas in the soil where iron in solution has precipitated upon oxidation. Iron concentrations generally appear as reddish mottles and are commonly found along root channels, in pores, and along faces of peds. They are common in soils that are seasonally saturated.

Iron depletions. Areas in the soil where iron in solution has been removed from the soil matrix. These areas generally appear as grayish mottles, which is the color of the stripped soil particles. Iron depletions are common in soils that are seasonally saturated.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Limiting inclusion. A soil that is unlike the named soil in the map unit and that has properties limiting or restricting its use compared to the named soil. Limiting inclusions generally are dissimilar soils.

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.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

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, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

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).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nonlimiting inclusion. A soil that is unlike the named soil in the map unit but that has no properties limiting or restricting its use compared to the named soil. Nonlimiting inclusions can be similar or dissimilar soils.

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.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

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, such as 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.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill 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 drawbar 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.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

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-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

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.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 3
Gently sloping	3 to 8
Strongly sloping	8 to 15
Moderately steep	15 to 25
Steep	25 to 35
Very steep	35 to 70

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
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.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion 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.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 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.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

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 footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded 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.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Martinsburg, West Virginia)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	38.7	20.6	29.6	66	-6	22	2.35	1.28	3.31	5	6.9
February----	42.3	23.0	32.6	71	-1	38	2.50	1.16	3.65	5	6.7
March-------	53.4	31.7	42.5	83	11	160	3.14	1.89	4.27	6	5.2
April-------	64.2	40.6	52.4	89	22	378	3.17	1.50	4.61	6	.5
May---------	74.2	50.2	62.2	92	32	688	4.06	1.97	5.87	7	.0
June--------	83.0	58.7	70.8	97	42	925	3.42	1.76	4.87	6	.0
July--------	86.8	63.6	75.2	99	49	1,091	3.53	1.73	5.09	6	.0
August------	85.2	61.9	73.6	98	45	1,041	3.39	1.69	4.87	5	.0
September---	78.1	54.5	66.3	96	34	788	2.81	1.16	4.20	4	.0
October-----	66.3	42.4	54.4	86	22	448	3.42	1.38	5.14	5	.0
November----	54.8	34.4	44.6	79	15	185	3.08	1.55	4.42	5	1.3
December----	43.2	25.7	34.4	70	3	49	2.67	1.37	3.80	5	4.7
Yearly:											
Average---	64.2	42.3	53.2	---	---	---	---	---	---	---	---
Extreme---	112.0	-13.0	---	100	-8	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,812	37.54	32.74	42.19	65	25.3

* 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 1961-90 at Martinsburg, West 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--	Apr. 10	Apr. 24	May 8
2 years in 10 later than--	Apr. 5	Apr. 19	May 3
5 years in 10 later than--	Mar. 27	Apr. 8	Apr. 23
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 24	Oct. 10	Sep. 29
2 years in 10 earlier than--	Oct. 30	Oct. 15	Oct. 5
5 years in 10 earlier than--	Nov. 10	Oct. 24	Oct. 16

Table 3.--Growing Season

(Recorded in the period 1961-90 at Martinsburg, West Virginia)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	196	175	149
8 years in 10	203	183	158
5 years in 10	215	198	175
2 years in 10	227	213	192
1 year in 10	234	221	201

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
At	Atkins silt loam	1,040	0.5
BkE	Blackthorn very gravelly loam, 15 to 35 percent slopes, extremely stony	200	0.1
BpE	Blackthorn-Pecktonville very gravelly loams, 15 to 35 percent slopes, extremely stony	1,765	0.9
BpF	Blackthorn-Pecktonville very gravelly loams, 35 to 45 percent slopes, extremely stony	400	0.2
BuB	Buchanan gravelly loam, 3 to 8 percent slopes	675	0.3
BuC	Buchanan gravelly loam, 8 to 15 percent slopes	1,255	0.6
BxC	Buchanan loam, 3 to 15 percent slopes, extremely stony	4,080	2.0
BxE	Buchanan loam, 15 to 35 percent slopes, extremely stony	8,080	3.9
CaB	Calvin channery loam, 3 to 8 percent slopes	755	0.4
CaC	Calvin channery loam, 8 to 15 percent slopes	3,240	1.6
CaD	Calvin channery loam, 15 to 25 percent slopes	1,800	0.9
CaE	Calvin channery loam, 25 to 35 percent slopes	1,315	0.6
CaF	Calvin channery loam, 35 to 65 percent slopes	630	0.3
CbB	Caneyville silt loam, 3 to 8 percent slopes	210	0.1
CcC	Caneyville silty clay loam, 8 to 15 percent slopes	645	0.3
CcD	Caneyville silty clay loam, 15 to 25 percent slopes	325	0.2
CeB	Carbo-Endcav silty clay loams, 3 to 8 percent slopes	375	0.2
CeC	Carbo-Endcav silty clay loams, 8 to 15 percent slopes	375	0.2
CgB	Carbo-Opequon complex, 3 to 8 percent slopes	1,880	0.9
CgC	Carbo-Opequon complex, 8 to 15 percent slopes	700	0.3
ChC	Carbo-Opequon complex, 3 to 15 percent slopes, very rocky	795	0.4
ChE	Carbo-Opequon complex, 15 to 35 percent slopes, very rocky	340	0.2
CkB	Clearbrook silt loam, 0 to 8 percent slopes	1,800	0.9
CmB	Clearbrook channery silt loam, 0 to 8 percent slopes	1,745	0.8
CrB	Clearbrook-Berks channery silt loams, 3 to 8 percent slopes	11,510	5.6
Cs	Combs fine sandy loam	820	0.4
DaC	Dekalb channery loam, 8 to 15 percent slopes	695	0.3
DaD	Dekalb channery loam, 15 to 25 percent slopes	310	0.2
DaE	Dekalb channery loam, 25 to 35 percent slopes	165	0.1
DkC	Dekalb channery sandy loam, 3 to 15 percent slopes, extremely stony	1,735	0.8
DrE	Dekalb-Rock outcrop complex, 15 to 25 percent slopes, rubbly	1,460	0.7
DsB	Downsville gravelly loam, 3 to 8 percent slopes	1,670	0.8
DsC	Downsville gravelly loam, 8 to 15 percent slopes	1,125	0.6
DsD	Downsville gravelly loam, 15 to 25 percent slopes	165	0.1
DuB	Duffield silt loam, 3 to 8 percent slopes	695	0.3
DuC	Duffield silt loam, 8 to 15 percent slopes	590	0.3
DyB	Duffield gravelly silt loam, 3 to 8 percent slopes	1,790	0.9
DyC	Duffield gravelly silt loam, 8 to 15 percent slopes	855	0.4
Dz	Dunning silt loam	820	0.4
Fa	Fairplay (marl) silt loam	230	0.1
Fk	Funkstown silt loam	3,240	1.6
FnA	Funkstown silt loam, nonflooded	950	0.5
FsA	Funkstown gravelly silt loam, nonflooded	405	0.2
HbA	Hagerstown silt loam, 0 to 3 percent slopes	420	0.2
HbB	Hagerstown silt loam, 3 to 8 percent slopes	16,230	7.8
HbC	Hagerstown silt loam, 8 to 15 percent slopes	815	0.4
HcB	Hagerstown silty clay loam, 3 to 8 percent slopes	730	0.3
HcC	Hagerstown silty clay loam, 8 to 15 percent slopes	1,970	1.0
HcD	Hagerstown silty clay loam, 15 to 25 percent slopes	2,015	1.0
HdB	Hagerstown gravelly silt loam, 3 to 8 percent slopes	4,140	2.0
HdC	Hagerstown gravelly silt loam, 8 to 15 percent slopes	2,670	1.3
HdD	Hagerstown gravelly silt loam, 15 to 25 percent slopes	100	*
HgC	Hagerstown-Opequon-Rock outcrop complex, 3 to 15 percent slopes	13,395	6.4
HgE	Hagerstown-Opequon-Rock outcrop complex, 15 to 35 percent slopes	895	0.4
HkF	Hazleton-Berks channery loams, 35 to 65 percent slopes, extremely stony	1,535	0.7
HsE	Hazleton-Dekalb complex, 15 to 35 percent slopes, extremely stony	2,890	1.4
HsF	Hazleton-Dekalb complex, 35 to 65 percent slopes, extremely stony	6,965	3.4
Hu	Huntington silt loam	765	0.4

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
La	Lappans (marl) loam	580	0.3
Ln	Lindside silt loam	1,825	0.9
MhA	Monongahela silt loam, 0 to 3 percent slopes	165	0.1
MhB	Monongahela silt loam, 3 to 8 percent slopes	2,075	1.0
MhC	Monongahela silt loam, 8 to 15 percent slopes	180	0.1
MoB	Monongahela gravelly loam, 3 to 8 percent slopes	425	0.2
MrB	Murrill gravelly loam, 3 to 8 percent slopes	460	0.2
MrC	Murrill gravelly loam, 8 to 15 percent slopes	235	0.1
PeB	Pecktonville gravelly loam, 3 to 8 percent slopes	300	0.2
PeC	Pecktonville gravelly loam, 8 to 15 percent slopes	765	0.4
PeD	Pecktonville gravelly loam, 15 to 25 percent slopes	300	0.2
PgC	Pecktonville very gravelly loam, 3 to 15 percent slopes, extremely stony	720	0.3
Ph	Philo silt loam	1,360	0.7
PoA	Poorhouse silt loam, 0 to 3 percent slopes	860	0.4
PoB	Poorhouse silt loam, 3 to 8 percent slopes	940	0.5
Ps	Pope fine sandy loam	820	0.4
Px	Pope silt loam	755	0.4
Qm	Quarry, limestone	1,090	0.5
Qs	Quarry, shale	250	0.1
ReF	Rock outcrop-Opequon complex, 25 to 60 percent slopes	360	0.2
RnB	Ryder-Nollville channery silt loams, 3 to 8 percent slopes	1,600	0.8
RnC	Ryder-Nollville channery silt loams, 8 to 15 percent slopes	4,070	2.0
RnD	Ryder-Nollville channery silt loams, 15 to 25 percent slopes	1,295	0.6
RvC	Ryder-Nollville channery silt loams, 8 to 15 percent slopes, very rocky	410	0.2
SwA	Swanpond silt loam, 0 to 3 percent slopes	2,895	1.4
SwB	Swanpond silt loam, 3 to 8 percent slopes	575	0.3
TyA	Tygart silt loam, 0 to 3 percent slopes	600	0.3
TyB	Tygart silt loam, 3 to 8 percent slopes	965	0.5
Ua	Udorthents, smoothed	1,700	0.8
Ub	Urban land	1,350	0.7
UkC	Urban land-Berks complex, 0 to 15 percent slopes	460	0.2
UvC	Urban land-Carbo-Endcav complex, 0 to 15 percent slopes	315	0.1
UwC	Urban land-Hagerstown complex, 0 to 15 percent slopes	1,595	0.8
W	Water	635	0.3
WbB	Weikert-Berks channery silt loams, 3 to 8 percent slopes	2,450	1.2
WbC	Weikert-Berks channery silt loams, 8 to 15 percent slopes	21,280	10.3
WbD	Weikert-Berks channery silt loams, 15 to 25 percent slopes	10,865	5.3
WkF	Weikert-Berks very channery silt loams, 25 to 70 percent slopes	19,185	9.2
	Total	205,900	100.0

* Less than 0.1 percent.

Table 5.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
BuB	Buchanan gravelly loam, 3 to 8 percent slopes
Cs	Combs fine sandy loam
DsB	Downsville gravelly loam, 3 to 8 percent slopes
DuB	Duffield silt loam, 3 to 8 percent slopes
DyB	Duffield gravelly silt loam, 3 to 8 percent slopes
Fk	Funkstown silt loam
FnA	Funkstown silt loam, nonflooded
FsA	Funkstown gravelly silt loam, nonflooded
HbA	Hagerstown silt loam, 0 to 3 percent slopes
HbB	Hagerstown silt loam, 3 to 8 percent slopes
HcB	Hagerstown silty clay loam, 3 to 8 percent slopes
HdB	Hagerstown gravelly silt loam, 3 to 8 percent slopes
Hu	Huntington silt loam
La	Lappans (marl) loam
Ln	Lindside silt loam
MhA	Monongahela silt loam, 0 to 3 percent slopes
MrB	Murrill gravelly loam, 3 to 8 percent slopes
PeB	Pecktonville gravelly loam, 3 to 8 percent slopes
Ph	Philo silt loam
Px	Pope silt loam
RnB	Ryder-Nollville channery silt loams, 3 to 8 percent slopes
SwA	Swanpond silt loam, 0 to 3 percent slopes
SwB	Swanpond silt loam, 3 to 8 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	Land capability	Corn	Corn silage	Soybeans	Wheat	Grass-legume hay	Alfalfa hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
At-------------- Atkins	IIIw	100	20	40	30	3.0	---	5.5
BkE------------- Blackthorn	VIIs	---	---	---	---	---	---	---
BpE, BpF-------- Blackthorn-Pecktonville	VIIs	---	---	---	---	---	---	---
BuB------------- Buchanan	IIe	100	20	40	45	3.0	3.5	6.5
BuC------------- Buchanan	IIIe	90	18	35	40	3.0	3.5	5.5
BxC, BxE-------- Buchanan	VIIs	---	---	---	---	---	---	---
CaB------------- Calvin	IIe	80	16	30	35	3.0	3.5	6.5
CaC------------- Calvin	IIIe	75	15	30	35	2.5	3.0	6.0
CaD------------- Calvin	IVe	70	14	25	30	2.0	3.0	5.5
CaE------------- Calvin	VIe	---	---	---	---	---	---	5.0
CaF------------- Calvin	VIIe	---	---	---	---	---	---	---
CbB------------- Caneyville	IIIe	90	18	35	40	3.5	4.0	6.0
CcC------------- Caneyville	IVe	75	15	30	35	3.0	3.5	5.0
CcD------------- Caneyville	VIe	---	---	---	---	---	---	5.0
CeB------------- Carbo-Endcav	IIIe	90	18	35	40	3.5	4.5	6.0
CeC------------- Carbo-Endcav	IVe	80	16	30	35	3.0	4.0	5.5
CgB------------- Carbo-Opequon	IIIe	80	16	30	40	3.0	4.0	5.5
CgC------------- Carbo-Opequon	IVe	65	13	25	30	2.0	3.0	4.5
ChC------------- Carbo-Opequon	VIs	---	---	---	---	---	---	4.0

See footnotes at end of table.

Table 6.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Wheat	Grass-legume hay	Alfalfa hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
ChE------------- Carbo-Opequon	VIIs	---	---	---	---	---	---	---
CkB, CmB-------- Clearbrook	IVw	70	15	25	30	3.0	---	5.5
CrB------------- Clearbrook-Berks	IIIe	75	16	30	35	3.0	---	5.5
Cs-------------- Combs	IIw	135	25	55	60	4.5	5.5	8.5
DaC------------- Dekalb	IIIe	75	15	30	35	2.5	3.0	5.5
DaD------------- Dekalb	IVe	70	14	25	30	2.0	3.0	5.5
DaE------------- Dekalb	VIe	---	---	---	---	---	---	4.5
DkC------------- Dekalb	VIIs	---	---	---	---	---	---	---
DrE------------- Dekalb-Rock outcrop	VIIs	---	---	---	---	---	---	---
DsB------------- Downsville	IIe	115	23	40	40	3.5	5.0	7.0
DsC------------- Downsville	IIIe	105	21	35	40	3.0	4.5	7.0
DsD------------- Downsville	IVe	90	18	30	30	3.0	4.5	6.0
DuB------------- Duffield	IIe	130	26	40	50	3.5	5.0	8.5
DuC------------- Duffield	IIIe	125	25	35	45	3.0	4.5	8.0
DyB------------- Duffield	IIe	130	26	40	50	3.5	5.0	8.5
DyC------------- Duffield	IIIe	125	25	35	45	3.0	4.5	8.0
Dz-------------- Dunning	IVw	100	20	35	30	3.0	---	7.0
Fa-------------- Fairplay	Vw	---	---	---	---	3.0	---	6.0
Fk, FnA, FsA---- Funkstown	IIw	150	30	60	65	3.5	5.0	9.0
HbA------------- Hagerstown	I	150	30	60	65	3.5	5.5	8.5

See footnotes at end of table.

Table 6.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Wheat	Grass-legume hay	Alfalfa hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
HbB------------- Hagerstown	IIe	135	27	54	60	3.5	5.5	8.5
HbC------------- Hagerstown	IIIe	125	25	50	56	3.5	5.0	8.0
HcB------------- Hagerstown	IIe	125	25	50	56	3.5	5.0	8.5
HcC------------- Hagerstown	IIIe	120	24	48	54	3.5	4.5	8.5
HcD------------- Hagerstown	IVe	110	22	44	35	3.0	4.0	7.5
HdB------------- Hagerstown	IIe	135	27	54	60	3.5	5.5	8.5
HdC------------- Hagerstown	IIIe	125	25	50	56	3.5	5.0	8.0
HdD------------- Hagerstown	IVe	110	22	44	35	3.0	4.0	7.5
HgC------------- Hagerstown-Opequon-Rock outcrop	VIs	---	---	---	---	---	---	5.5
HgE------------- Hagerstown-Opequon-Rock outcrop	VIIs	---	---	---	---	---	---	---
HkF------------- Hazleton-Berks	VIIs	---	---	---	---	---	---	---
HsE, HsF-------- Hazleton-Dekalb	VIIs	---	---	---	---	---	---	---
Hu-------------- Huntington	IIw	130	26	50	60	3.5	5.5	9.0
La-------------- Lappans	IIw	100	20	40	45	3.0	4.0	8.0
Ln-------------- Lindside	IIw	120	24	50	55	3.5	4.5	8.5
MhA------------- Monongahela	IIw	110	22	45	40	3.0	3.5	6.5
MhB------------- Monongahela	IIe	100	20	40	40	3.0	3.5	6.5
MhC------------- Monongahela	IIIe	90	18	35	35	3.0	3.0	6.5
MoB------------- Monongahela	IIe	100	20	40	40	3.0	3.5	6.5

See footnotes at end of table.

Table 6.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Wheat	Grass-legume hay	Alfalfa hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
MrB------------- Murrill	IIe	120	24	40	45	3.5	4.5	8.5
MrC------------- Murrill	IIIe	110	22	35	40	3.0	4.0	7.5
PeB------------- Pecktonville	IIe	120	24	50	55	3.5	4.5	7.0
PeC------------- Pecktonville	IIIe	110	22	45	50	3.0	4.0	6.5
PeD------------- Pecktonville	IVe	100	20	40	45	3.0	4.0	6.0
PgC------------- Pecktonville	VIIs	---	---	---	---	---	---	---
Ph-------------- Philo	IIw	130	26	50	55	3.5	4.5	8.5
PoA, PoB-------- Poorhouse	IIIw	90	18	35	40	3.0	---	6.5
Ps-------------- Pope	IIw	105	21	35	35	3.5	4.5	7.0
Px-------------- Pope	IIw	130	24	45	45	4.0	5.0	8.0
Qm**, Qs**. Quarry								
ReF------------- Rock outcrop-Opequon	VIIIs	---	---	---	---	---	---	---
RnB------------- Ryder-Nollville	IIe	115	23	45	45	3.5	4.5	7.5
RnC------------- Ryder-Nollville	IIIe	105	21	40	40	3.0	4.0	6.5
RnD------------- Ryder-Nollville	IVe	90	18	30	35	3.0	3.5	6.0
RvC------------- Ryder-Nollville	VIs	---	---	---	---	---	---	5.0
SwA------------- Swanpond	IIw	125	25	50	55	3.5	5.0	8.0
SwB------------- Swanpond	IIe	115	23	45	50	3.5	5.0	8.0
TyA------------- Tygart	IIIw	95	19	40	---	3.0	---	5.5
TyB------------- Tygart	IIIw	95	19	40	---	3.0	---	5.5

See footnotes at end of table.

Table 6.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Soybeans	Wheat	Grass-legume hay	Alfalfa hay	Pasture
		Bu	Tons	Bu	Bu	Tons	Tons	AUM*
Ua**. Udorthents, smoothed								
Ub**. Urban land								
UkC**. Urban land-Berks								
UvC**. Urban land-Carbo-Endcav								
UwC**. Urban land-Hagerstown								
W**. Water								
WbB------------- Weikert-Berks	IIIe	70	14	30	30	2.5	3.0	5.0
WbC------------- Weikert-Berks	IVe	65	13	25	25	2.5	2.5	4.5
WbD------------- Weikert-Berks	VIe	---	---	---	---	---	---	3.5
WkF------------- Weikert-Berks	VIIe	---	---	---	---	---	---	---

* 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.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	420	---	---	---
II	46,610	32,120	14,490	---
III	39,295	34,890	4,405	---
IV	33,350	28,985	4,365	---
V	230	---	230	---
VI	27,270	12,670	---	14,600
VII	50,880	19,815	---	31,065
VIII	1,700	---	---	1,700

Table 8.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available. When two entries are separated by a slash, the first entry is for south aspects and the second is for north aspects)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth*: Cubic feet/acre	Average annual growth*: Board feet/acre	Average annual growth*: Cords/acre
At-------------- Atkins	5W	Slight	Severe	Severe	Severe	Pin oak-------------	90	72	320	.95
						Eastern cottonwood--	105	---	---	---
						Red maple-----------	---	---	---	---
						American sycamore---	---	---	---	---
BkE------------- Blackthorn	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	52	180	.67
						White oak-----------	70	52	180	.67
						Eastern white pine--	80	147	---	---
						Yellow-poplar-------	75	62	265	.73
						Black walnut--------	---	---	---	---
BpE**:										
Blackthorn-----	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	52	180	.67
						White oak-----------	70	52	180	.67
						Eastern white pine--	80	147	---	---
						Yellow-poplar-------	75	62	265	.73
						Black walnut--------	---	---	---	---
Pecktonville---	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	75	57	215	.74
						Chestnut oak--------	76	58	222	.75
						White oak-----------	76	58	222	.75
						Yellow-poplar-------	86	82	392	.95
						Black walnut--------	76	---	---	---
BpF**:										
Blackthorn-----	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	70	52	180	.67
						White oak-----------	70	52	180	.67
						Eastern white pine--	80	147	---	---
						Yellow-poplar-------	75	62	265	.73
						Black walnut--------	---	---	---	---
Pecktonville---	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	75	57	215	.74
						Chestnut oak--------	76	58	222	.75
						White oak-----------	76	58	222	.75
						Yellow-poplar-------	86	82	392	.95
						Black walnut--------	76	---	---	---
BuB, BuC-------- Buchanan	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	250	.81
						Yellow-poplar-------	90	90	440	1.04
						White oak-----------	---	---	---	---
						Black oak-----------	---	---	---	---
BxC------------- Buchanan	4X	Slight	Moderate	Slight	Moderate	Northern red oak----	80	62	250	.81
						Yellow-poplar-------	90	90	440	1.04
						White oak-----------	---	---	---	---
						Black oak-----------	---	---	---	---
BxE------------- Buchanan	4X	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	62	250	.81
						Yellow-poplar-------	90	90	440	1.04
						White oak-----------	---	---	---	---
						Black oak-----------	---	---	---	---

See footnotes at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth*: Cubic feet/acre	Average annual growth*: Board feet/acre	Average annual growth*: Cords/acre
CaB, CaC-------- Calvin	4F	Slight	Slight	Moderate	Moderate	Northern red oak---- White oak----------- Chestnut oak-------- Virginia pine-------	71 --- --- ---	53 --- --- ---	187 --- --- ---	.68 --- --- ---
CaD, CaE-------- Calvin	3R/4R	Moderate	Moderate	Moderate	Slight/ Moderate	Northern red oak---- White oak----------- Chestnut oak-------- Virginia pine-------	67/77 --- --- ---	49/59 --- --- ---	159/229 --- --- ---	.63/.77 --- --- ---
CaF------------- Calvin	3R/4R	Severe	Severe	Moderate	Slight/ Moderate	Northern red oak---- White oak----------- Chestnut oak-------- Virginia pine-------	67/77 --- --- ---	49/59 --- --- ---	159/229 --- --- ---	.63/.77 --- --- ---
CbB------------- Caneyville	4C	Slight	Moderate	Slight	Slight	Northern red oak---- Eastern redcedar---- White oak----------- Black locust--------	70 36 65 ---	52 --- 48 ---	180 --- 145 ---	.67 --- .60 ---
CcC------------- Caneyville	4C	Moderate	Moderate	Moderate	Slight	Northern red oak---- Eastern redcedar---- White oak----------- Black locust--------	70 46 65 ---	52 --- 48 ---	180 --- 145 ---	.67 --- .60 ---
CcD------------- Caneyville	3R/4R	Moderate	Moderate	Moderate	Slight/ Moderate	Northern red oak---- Eastern redcedar---- White oak----------- Black locust--------	65/70 36/46 60/65 ---	48/52 --- 43/48 ---	145/180 --- 110/145 ---	.60/.67 --- .52/.60 ---
CeB**:										
Carbo-----------	4C	Slight	Moderate	Moderate	Moderate	Northern red oak---- Virginia pine------- Yellow-poplar------- Eastern white pine--	70 55 80 80	52 --- 71 147	180 --- 320 ---	.67 --- .83 ---
Endcav----------	5C	Slight	Moderate	Moderate	Severe	Northern red oak---- Yellow-poplar------- Eastern white pine--	85 90 90	67 90 166	285 440 ---	.88 1.04 ---
CeC**:										
Carbo-----------	4C	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Virginia pine------- Yellow-poplar------- Eastern white pine--	70 55 80 80	52 80 71 147	180 --- 320 ---	.67 --- .83
Endcav----------	5C	Moderate	Moderate	Moderate	Severe	Northern red oak---- Yellow-poplar------- Eastern white pine--	85 90 90	67 90 166	285 440 ---	.88 1.04 ---
CgB**:										
Carbo-----------	4C	Slight	Moderate	Moderate	Moderate	Northern red oak---- Virginia pine------- Yellow-poplar------- Eastern white pine--	70 55 80 80	52 80 71 147	180 --- 320 ---	.67 --- .83 ---
Opequon---------	3C	Slight	Moderate	Severe	Slight	Northern red oak---- White oak----------- Eastern redcedar----	60 60 ---	43 43 ---	110 110 ---	.52 .52 ---

See footnotes at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth*: Cubic feet/acre	Average annual growth*: Board feet/acre	Average annual growth*: Cords/acre
CgC**:										
Carbo	4C	Moderate	Moderate	Moderate	Moderate	Northern red oak	70	52	180	.67
						Virginia pine	55	80	---	---
						Yellow-poplar	80	71	320	.83
						Eastern white pine	80	147	---	---
Opequon	3C	Moderate	Moderate	Severe	Slight	Northern red oak	60	43	110	.52
						White oak	60	43	110	.52
						Eastern redcedar	---	---	---	---
ChC**:										
Carbo	4C	Moderate	Moderate	Moderate	Moderate	Northern red oak	70	52	180	.67
						Virginia pine	55	80	---	---
						Yellow-poplar	80	71	320	.83
						Eastern white pine	80	147	---	---
Opequon	3C	Moderate	Moderate	Severe	Slight	Northern red oak	60	43	110	.52
						White oak	60	43	110	.52
						Eastern redcedar	---	---	---	---
ChE**:										
Carbo	3R/4R	Severe	Severe	Moderate	Slight/ Moderate	Northern red oak	60/70	43/52	110/180	.52/.67
						Virginia pine	45/55	55/80	---	---
						Yellow-poplar	70/80	54/71	210/320	.63/.83
						Eastern white pine	70/80	127/147	---	---
Opequon	2R/3R	Severe	Severe	Severe	Slight	Northern red oak	50/60	34/43	60/110	.38/52
						White oak	50/60	34/43	60/110	.38/52
						Eastern redcedar	---	--	---	---
CkB, CmB Clearbrook	4W	Slight	Severe	Slight	Severe	Northern red oak	70	52	180	.67
						Yellow-poplar	80	71	320	.83
CrB**:										
Clearbrook	4W	Slight	Moderate	Slight	Severe	Northern red oak	70	52	180	.67
						Yellow-poplar	80	71	320	.83
Berks	4F	Slight	Slight	Moderate	Moderate	Northern red oak	70	52	180	.67
						Black oak	70	52	180	.67
						Virginia pine	70	109	---	---
						White oak	65	48	145	.60
Cs Combs	5A	Slight	Slight	Slight	Severe	Northern red oak	90	72	320	.95
						Yellow-poplar	100	107	580	1.23
						American sycamore	---	---	---	---
DaC Dekalb	3F	Slight	Slight	Moderate	Slight	Northern red oak	57	40	95	.48
						White oak	---	---	---	---
						Chestnut oak	---	---	---	---
						Virginia pine	60	91	---	---
DaD, DaE Dekalb	2R/3R	Moderate	Moderate	Moderate	Slight	Northern red oak	52/57	36/40	70/95	.41/.48
						White oak	---	---	---	---
						Chestnut oak	---	---	---	---
						Virginia pine	50/60	68/91	---	---
DkC Dekalb	3X	Slight	Moderate	Moderate	Moderate	Northern red oak	57	40	95	.48
						White oak	---	---	---	---
						Chestnut oak	---	---	---	---
						Virginia pine	60	91	---	---

See footnotes at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth*: Cubic feet/acre	Average annual growth*: Board feet/acre	Average annual growth*: Cords/acre
DrE**:										
Dekalb	2R	Moderate	Severe	Severe	Slight	Scarlet oak	47/52	32/36	---/70	---/.41
						Chestnut oak	---	---	---	---
						Virginia pine	45/50	55/68	---	---
						Pitch pine	---	---	---	---
Rock outcrop.										
DsB, DsC Downsville	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	250	.81
						White oak	75	57	215	.74
						Yellow-poplar	90	90	440	1.04
DsD Downsville	4R	Moderate	Slight	Moderate/Slight	Moderate	Northern red oak	80	62	250	.81
						White oak	75	57	215	.74
						Yellow-poplar	90	90	440	1.04
DuB Duffield	5A	Slight	Slight	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
DuC Duffield	5A	Moderate	Slight	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
DyB, DyC Duffield	5A	Slight	Slight	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
Dz Dunning	5W	Slight	Severe	Moderate	Severe	Pin oak	95	77	355	1.02
						Red maple	---	---	---	---
						American sycamore	---	---	---	---
Fa Fairplay	4W	Slight	Severe	Severe	Severe	Pin oak	70	52	180	.67
						Green ash	---	---	---	---
						White ash	---	---	---	---
						Black willow	---	---	---	---
						Silver maple	---	---	---	---
Fk, FnA, FsA Funkstown	5A	Slight	Slight	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
HbA, HbB, HbC Hagerstown	5C	Slight	Moderate	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
HcB, HcC Hagerstown	5C	Slight	Moderate	Moderate	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
HcD Hagerstown	5C	Moderate	Severe	Moderate/Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
HdB, HdC Hagerstown	5C	Slight	Moderate	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
HdD Hagerstown	5C	Moderate	Severe	Moderate/Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
HgC**:										
Hagerstown	5C	Slight	Moderate	Slight	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14

See footnotes at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/acre	Board feet/acre	Cords/acre
HgC**:										
Opequon	3C	Moderate	Moderate	Severe	Slight	Northern red oak	60	43	110	.52
						White oak	60	43	110	.52
						Eastern redcedar	---	--	---	---
Rock outcrop.										
HgE**:										
Hagerstown	5C	Moderate	Severe	Slight/ Moderate	Severe	Northern red oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
Opequon	2R/3R	Severe	Severe	Severe	Slight	Northern red oak	50/60	34/43	60/110	.38/.52
						White oak	50/60	34/43	60/110	.38/.52
						Chestnut oak	---	---	---	---
Rock outcrop.										
HkF**:										
Hazleton	3R/4R	Severe	Severe	Moderate/ Slight	Slight/ Moderate	Northern red oak	60/70	43/52	110/180	.52/.67
						White oak	60/70	43/52	110/180	.52/.67
						Yellow-poplar	70/80	54/71	210/320	.63/.83
						Virginia pine	60/70	91/109	---	---
						Black oak	60/70	43/52	110/180	.52/.67
Berks	3R/4R	Severe	Severe	Moderate	Slight/ Moderate	Northern red oak	60/70	43/52	110/180	.52/.67
						Chestnut oak	60/70	43/52	110/180	.52/.67
						White oak	60/70	43/52	110/180	.52/.67
						Black oak	60/70	43/52	110/180	.52/.67
						Virginia pine	60/70	91/109	---	---
HsE**:										
Hazleton	3R/4R	Moderate	Moderate	Moderate/ Slight	Slight/ Moderate	Northern red oak	60/70	43/52	110/180	.52/.67
						White oak	60/70	43/52	110/180	.52/.67
						Black oak	60/70	43/52	110/180	.52/.67
						Virginia pine	60/70	91/109	---	---
Dekalb	2R/3R	Moderate	Moderate	Severe/ Moderate	Slight	Northern red oak	52/57	36/40	70/95	.41/.48
						White oak	50/60	34/43	60/110	.38/.52
						Chestnut oak	---	---	---	---
						Virginia pine	50/60	68/91	---	---
HsF**:										
Hazleton	3R/4R	Severe	Severe	Moderate/ Slight	Slight/ Moderate	Northern red oak	60/70	43/52	110/180	.52/.67
						White oak	60/70	43/52	110/180	.52/.67
						Black oak	60/70	43/52	110/180	.52/.67
						Virginia pine	60/70	91/109	---	---
Dekalb	2R/3R	Severe	Severe	Severe/ Moderate	Slight	Northern red oak	52/57	36/40	70/95	.41/.48
						White oak	50/60	34/43	60/110	.38/.52
						Chestnut oak	---	---	---	---
						Virginia pine	50/60	68/91	---	---
Hu Huntington	5A	Slight	Slight	Slight	Severe	Yellow-poplar	95	98	510	1.14
						Northern red oak	85	67	285	.88
La Lappans	5A	Slight	Slight	Slight	Severe	Northern red oak	85	67	285	.88
						White oak	85	67	285	.88
						Yellow-poplar	95	98	510	1.14
						Black locust	80	---	---	---

See footnotes at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/acre	Board feet/acre	Cords/acre
Ln-------------- Lindside	5A	Slight	Slight	Slight	Severe	Northern red oak----	86	68	292	.89
						Yellow-poplar-------	95	98	510	1.14
						Black walnut--------	---	---	---	---
						White ash-----------	85	111	---	---
						White oak-----------	85	67	285	.88
						Red maple-----------	---	---	---	---
MhA, MhB-------- Monongahela	4A	Slight	Slight	Slight	Moderate	Northern red oak----	70	52	180	.67
						Yellow-poplar-------	85	81	380	.93
						Eastern white pine--	72	126	---	---
						Virginia pine-------	66	102	---	---
MhC------------- Monongahela	4A	Moderate	Slight	Slight	Moderate	Northern red oak----	70	52	180	.67
						Yellow-poplar-------	85	81	380	.93
						Eastern white pine--	72	126	---	---
						Virginia pine-------	66	102	---	---
MoB------------- Monongahela	4A	Slight	Slight	Slight	Moderate	Northern red oak----	70	52	180	.67
						Yellow-poplar-------	85	81	380	.93
						Eastern white pine--	72	126	---	---
						Virginia pine-------	66	102	---	---
MrB, MrC-------- Murrill	4A	Slight	Slight	Slight	Moderate	Northern red oak----	72	54	194	.70
						Yellow-poplar-------	95	98	510	1.14
						Eastern white pine--	80	147	---	---
						White ash-----------	70	75	---	---
PeB, PeC-------- Pecktonville	4A	Slight	Slight	Moderate	Moderate	Northern red oak----	76	58	222	.75
						Chestnut oak--------	76	58	222	.75
						Yellow-poplar-------	86	82	392	.95
PeD------------- Pecktonville	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	76	58	222	.75
						Chestnut oak--------	76	58	222	.75
						Yellow-poplar-------	86	82	392	.95
PgC------------- Pecktonville	4X	Slight	Moderate	Moderate	Moderate	Northern red oak----	76	58	222	.75
						Chestnut oak--------	76	58	222	.75
						Yellow-poplar-------	86	82	392	.95
Ph-------------- Philo	5A	Slight	Slight	Slight	Severe	Northern red oak----	86	68	292	.89
						Yellow-poplar-------	102	110	608	1.27
						Virginia pine-------	74	114	---	---
						Black oak-----------	85	67	285	.88
						White oak-----------	85	67	285	.88
						White ash-----------	85	111	---	---
PoA, PoB-------- Poorhouse	5W	Slight	Severe	Moderate	Severe	White oak-----------	85	67	285	.88
						Black walnut--------	---	---	---	---
						Yellow-poplar-------	95	98	510	1.14
						Shagbark hickory----	---	---	---	---
						Hackberry-----------	---	---	---	---
						Black locust--------	---	---	---	---

See footnotes at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/acre	Board feet/acre	Cords/acre
Ps, Px---------- Pope	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	250	.81
						American beech------	---	---	---	---
						White oak-----------	80	62	250	.81
						Blackgum------------	---	---	---	---
						American sycamore---	---	---	---	---
						Yellow-poplar-------	96	100	524	1.15
						American basswood---	---	---	---	---
						Eastern hemlock-----	---	---	---	---
						Bitternut hickory---	---	---	---	---
ReF**: Rock outcrop.										
Opequon--------	2R/3R	Severe	Severe	Severe	Slight/	Northern red oak----	50	34	60	.38
					Moderate	White oak-----------	50	34	60	.38
						Chestnut oak--------	---	---	---	---
						Eastern redcedar----	---	---	---	---
RnB**, RnC**: Ryder----------	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	250	.81
						Yellow-poplar-------	90	90	440	1.04
						Eastern white pine--	90	166	---	---
						White ash-----------	80	98	---	---
Nollville------	5A	Slight	Slight	Slight	Severe	Northern red oak----	85	67	285	.88
						Yellow-poplar-------	95	98	510	1.14
						Eastern white pine--	95	176	---	---
RnD**: Ryder----------	4R	Moderate	Moderate	Moderate/	Moderate	Northern red oak----	75/80	57/62	215/250	.74/.81
				Slight		Yellow-poplar-------	85/90	81/90	380/440	.93/1.04
						Eastern white pine--	85/90	155/166	---	---
						White ash-----------	75/80	78/98	---	---
Nollville------	5R	Moderate	Moderate	Slight	Severe	Northern red oak----	85	67	278	.87
						Yellow-poplar-------	95	98	510	1.14
						Eastern white pine--	95	176	---	---
RvC**: Ryder----------	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	250	.81
						Yellow-poplar-------	90	90	440	1.04
						Eastern white pine--	90	166	---	---
						White ash-----------	80	98	---	---
Nollville------	5A	Slight	Slight	Slight	Severe	Northern red oak----	85	67	285	.88
						Yellow-poplar-------	95	98	510	1.14
SwA, SwB-------- Swanpond	4C	Slight	Moderate	Slight	Moderate	Northern red oak----	75	57	215	.74
						Yellow-poplar-------	85	67	285	.88
TyA, TyB-------- Tygart	4W	Slight	Severe	Severe	Severe	Northern red oak----	80	62	250	.81
						Yellow-poplar-------	90	90	440	1.04
						Red maple-----------	---	---	---	---
						White ash-----------	80	98	---	---
						Black oak-----------	80	62	250	.81
WbB**, WbC**: Weikert--------	3D	Slight	Slight	Severe	Slight	Northern red oak----	59	42	105	.51
						Virginia pine-------	56	82	---	---

See footnotes at end of table.

Table 8.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/acre	Board feet/acre	Cords/acre
WbB**, WbC**:										
Berks	4F	Slight	Slight	Moderate	Moderate	Northern red oak	70	52	180	.67
						Black oak	70	52	180	.67
						Virginia pine	70	109	---	---
WbD**:										
Weikert	3R	Moderate	Moderate	Severe	Slight	Northern red oak	55/64	38/47	85/138	.45/.58
						Virginia pine	52/60	73/91	---	---
Berks	3R/4R	Moderate	Moderate	Moderate	Slight/Moderate	Northern red oak	60/70	43/52	110/180	.52/.67
						Black oak	60/70	43/52	110/180	.52/.67
						Virginia pine	60/70	91/109	---	---
WkF**:										
Weikert	3R	Severe	Severe	Severe	Slight	Northern red oak	55/64	38/47	85/138	.45/.58
						Virginia pine	52/60	73/91	---	---
Berks	3R/4R	Severe	Severe	Moderate	Slight/Moderate	Northern red oak	60/70	43/52	110/180	.52/.67
						Black oak	60/70	43/52	110/180	.52/.67
						Virginia pine	60/70	91/109	---	---

* Average annual growth is equal to the total volume growth at rotation divided by the rotation age. Actual annual growth varies with stand vigor and other factors. Yield data are based on site indices of natural stands at age 50 years. The International 1\4 Log Rule is used for board feet. Cords are standard rough cords. This information should be used for planning only.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 9.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
At-------------------- Atkins	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
BkE------------------- Blackthorn	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
BpE*, BpF*:					
Blackthorn-----------	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
Pecktonville---------	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
BuB------------------- Buchanan	Moderate: wetness, small stones, percs slowly.	Moderate: wetness, percs slowly, small stones.	Severe: small stones.	Moderate: wetness.	Severe: small stones.
BuC------------------- Buchanan	Moderate: slope, wetness, small stones.	Moderate: slope, wetness, percs slowly.	Severe: slope, small stones.	Moderate: wetness.	Severe: small stones.
BxC------------------- Buchanan	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones.
BxE------------------- Buchanan	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
CaB------------------- Calvin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
CaC------------------- Calvin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones.
CaD------------------- Calvin	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
CaE, CaF-------------- Calvin	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CbB: Caneyville	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight	Moderate: depth to rock.
CcC: Caneyville	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
CcD: Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
CeB*:					
Carbo	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Severe: erodes easily.	Moderate: depth to rock.
Endcav	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
CeC*:					
Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
Endcav	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
CgB*:					
Carbo	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
Opequon	Severe: too clayey, depth to rock.	Severe: too clayey, depth to rock.	Severe: too clayey, depth to rock.	Severe: too clayey.	Severe: depth to rock, too clayey.
CgC*, ChC*:					
Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
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: depth to rock, too clayey.
ChE*:					
Carbo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
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, depth to rock, too clayey.

See footnotes at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CkB: Clearbrook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
CmB: Clearbrook	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.	Severe: wetness.	Severe: wetness.
CrB*:					
Clearbrook	Severe: wetness.	Moderate: wetness, small stones.	Severe: small stones, wetness.	Moderate: wetness.	Moderate: small stones, large stones, wetness.
Berks	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, depth to rock.
Cs: Combs	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
DaC: Dekalb	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Moderate: small stones, slope.
DaD: Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.	Severe: slope.
DaE: Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
DkC: Dekalb	Severe: large stones.	Severe: small stones, too acid.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: small stones, large stones.
DrE*:					
Dekalb	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: small stones, large stones, slope.
Rock outcrop.					
DsB: Downsville	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
DsC: Downsville	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
DsD: Downsville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
DuB: Duffield	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DuC: Duffield	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
DyB: Duffield	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
DyC: Duffield	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
Dz: Dunning	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Fa: Fairplay	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
Fk: Funkstown	Severe: flooding.	Moderate: wetness.	Moderate: flooding, small stones, wetness.	Slight	Moderate: flooding.
FnA: Funkstown	Moderate: wetness.	Moderate: wetness.	Moderate: small stones, wetness.	Slight	Slight.
FsA: Funkstown	Moderate: small stones, wetness.	Moderate: wetness, small stones.	Severe: small stones.	Slight	Moderate: small stones.
HbA: Hagerstown	Slight	Slight	Moderate: small stones.	Slight	Slight.
HbB: Hagerstown	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
HbC: Hagerstown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
HcB: Hagerstown	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
HcC: Hagerstown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
HcD: Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
HdB: Hagerstown	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
HdC: Hagerstown	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HdD: Hagerstown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
HgC*:					
Hagerstown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Opequon	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
Rock outcrop.					
HgE*:					
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Opequon	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, depth to rock.
Rock outcrop.					
HkF*:					
Hazleton	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
Berks	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
HsE*:					
Hazleton	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
Dekalb	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, small stones, slope.
HsF*:					
Hazleton	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope.
Dekalb	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, small stones, slope.
Hu: Huntington	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
La: Lappans	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Ln: Lindside	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
MhA: Monongahela	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, small stones, percs slowly.	Moderate: wetness.	Moderate: wetness.
MhB: Monongahela	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, small stones.	Moderate: wetness.	Moderate: wetness.
MhC: Monongahela	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, wetness.
MoB: Monongahela	Moderate: wetness, small stones, percs slowly.	Moderate: wetness, percs slowly, small stones.	Moderate: slope, wetness, small stones.	Severe: erodes easily.	Moderate: large stones, wetness.
MrB: Murrill	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
MrC: Murrill	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
PeB: Pecktonville	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight	Moderate: small stones.
PeC: Pecktonville	Moderate: slope, small stones, percs slowly.	Moderate: slope, percs slowly, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones.
PeD: Pecktonville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
PgC: Pecktonville	Severe: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones, slope, small stones.	Severe: large stones, small stones.	Severe: small stones, large stones.
Ph: Philo	Severe: flooding.	Moderate: wetness.	Moderate: small stones, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
PoA, PoB: Poorhouse	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ps: Pope	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Px: Pope	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: flooding.
Qm*, Qs*. Quarry					
ReF*: Rock outcrop.					
Opequon	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, depth to rock.
RnB*: Ryder	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, depth to rock.
Nollville	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
RnC*: Ryder	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope, depth to rock.
Nollville	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
RnD*: Ryder	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Nollville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
RvC*: Ryder	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope, depth to rock.
Nollville	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
SwA: Swanpond	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: small stones, percs slowly.	Slight	Slight.

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SwB------------------- Swanpond	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Slight.
TyA, TyB-------------- Tygart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ua*------------------- Udorthents, smoothed	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Ub*------------------- Urban land	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
UkC*:					
Urban land-----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Berks----------------	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, depth to rock.
UvC*:					
Urban land-----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Carbo----------------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Moderate: slope, depth to rock.
Endcav---------------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
UwC*:					
Urban land-----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
Hagerstown-----------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Moderate: slope.
W*. Water					
WbB*:					
Weikert--------------	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.	Slight----------	Severe: small stones, depth to rock.
Berks----------------	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Severe: small stones.
WbC*:					
Weikert--------------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight----------	Severe: small stones, depth to rock
Berks----------------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Severe: small stones.

See footnote at end of table.

Table 9.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WbD*:					
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope, depth to rock.
Berks	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
WkF*:					
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope, depth to rock.
Berks	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.--Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
At----------------- Atkins	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Good.
BkE---------------- Blackthorn	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
BpE*:										
Blackthorn--------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Pecktonville------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
BpF*:										
Blackthorn--------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Pecktonville------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
BuB---------------- Buchanan	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BuC---------------- Buchanan	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BxC, BxE----------- Buchanan	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
CaB---------------- Calvin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
CaC---------------- Calvin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
CaD---------------- Calvin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CaE---------------- Calvin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
CaF---------------- Calvin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
CbB---------------- Caneyville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CcC---------------- Caneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CcD---------------- Caneyville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

Table 10.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
CeB*:										
Carbo	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Endcav	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CeC*:										
Carbo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Endcav	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CgB*:										
Carbo	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Opequon	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CgC*, ChC*:										
Carbo	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Opequon	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
ChE*:										
Carbo	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Opequon	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CkB, CmB Clearbrook	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Poor.
CrB*:										
Clearbrook	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Poor.
Berks	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
Cs Combs	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
DaC Dekalb	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
DaD Dekalb	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
DaE Dekalb	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
DkC Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

Table 10.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
DrE*:										
Dekalb	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.										
DsB Downsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DsC Downsville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DsD Downsville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DuB Duffield	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DuC Duffield	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DyB Duffield	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DyC Duffield	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Dz Dunning	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Fa Fairplay	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Fk, FnA, FsA Funkstown	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
HbA, HbB Hagerstown	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HbC Hagerstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HcB Hagerstown	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HcC Hagerstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HcD Hagerstown	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HdB Hagerstown	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HdC Hagerstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HdD Hagerstown	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

Table 10.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
HgC*:										
Hagerstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Opequon	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
HgE*:										
Hagerstown	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Opequon	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
HkF*:										
Hazleton	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
HsE*:										
Hazleton	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
HsF*:										
Hazleton	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Hu: Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
La: Lappans	Fair	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
Ln: Lindside	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
MhA: Monongahela	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MhB: Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MhC: Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

Table 10.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
MoB---------------- Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MrB---------------- Murrill	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MrC---------------- Murrill	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PeB---------------- Pecktonville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PeC---------------- Pecktonville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PeD---------------- Pecktonville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PgC---------------- Pecktonville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ph----------------- Philo	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
PoA---------------- Poorhouse	Fair	Fair	Good	Good	Good	Fair	Poor	Good	Good	Fair.
PoB---------------- Poorhouse	Fair	Fair	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ps, Px------------- Pope	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Qm*, Qs*----------- Quarry	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
ReF*: Rock outcrop.										
Opequon-----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
RnB*: Ryder-------------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Nollville---------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RnC*: Ryder-------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Nollville---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RnD*: Ryder-------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

Table 10.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
RnD*:										
Nollville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RvC*:										
Ryder	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Nollville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SwA Swanpond	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
SwB Swanpond	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TyA Tygart	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
TyB Tygart	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ua*. Udorthents, smoothed										
Ub*. Urban land										
UkC*: Urban land.										
Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
UvC*: Urban land.										
Carbo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Endcav	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
UwC*: Urban land.										
Hagerstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
W*. Water										
WbB*:										
Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.

See footnote at end of table.

Table 10.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
WbB*:										
Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
WbC*:										
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.
WbD*:										
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.
WkF*:										
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.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
At: Atkins	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
BkE: Blackthorn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BpE*, BpF*:						
Blackthorn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pecktonville	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: small stones, slope.
BuB: Buchanan	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Severe: small stones.
BuC: Buchanan	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Severe: small stones.
BxC: Buchanan	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Severe: large stones, small stones.
BxE: Buchanan	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: large stones, small stones, slope.
CaB: Calvin	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones.
CaC: Calvin	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones.
CaD, CaE, CaF: Calvin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CbB: Caneyville	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: depth to rock.

See footnote at end of table.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CcC--------------- Caneyville	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, depth to rock.
CcD--------------- Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CeB*:						
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.
Endcav-----------	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
CeC*:						
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.
Endcav-----------	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
CgB*:						
Carbo------------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: low strength, shrink-swell.	Moderate: depth to rock.
Opequon----------	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, low strength, shrink-swell.	Severe: depth to rock, too clayey.
CgC*, ChC*:						
Carbo------------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength, shrink-swell.	Moderate: slope, depth to rock.
Opequon----------	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, shrink-swell.	Severe: depth to rock, too clayey.
ChE*:						
Carbo------------	Severe: slope, depth to rock.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Opequon----------	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: slope, depth to rock, low strength.	Severe: slope, depth to rock, too clayey.

See footnote at end of table.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CkB, CmB: Clearbrook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
CrB*:						
Clearbrook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: shrink-swell, low strength, wetness.	Moderate: small stones, wetness.
Berks	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Moderate: small stones.
Cs: Combs	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
DaC: Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Moderate: small stones, slope.
DaD, DaE: Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
DkC: Dekalb	Severe: depth to rock, cutbanks cave.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Severe: small stones, large stones.
DrE*:						
Dekalb	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: small stones, large stones, slope.
Rock outcrop.						
DsB: Downsville	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones.
DsC: Downsville	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, large stones, slope.
DsD: Downsville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
DuB: Duffield	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
DuC: Duffield	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.

See footnote at end of table.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DyB---------------Duffield	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
DyC---------------Duffield	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
Dz----------------Dunning	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Fa----------------Fairplay	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, flooding.
Fk----------------Funkstown	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
FnA---------------Funkstown	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Slight.
FsA---------------Funkstown	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: small stones.
HbA---------------Hagerstown	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
HbB---------------Hagerstown	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
HbC---------------Hagerstown	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
HcB---------------Hagerstown	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
HcC---------------Hagerstown	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
HcD---------------Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
HdB---------------Hagerstown	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones, small stones.

See footnote at end of table.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HdC--------------- Hagerstown	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, small stones, slope.
HdD--------------- Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
HgC*:						
Hagerstown-------	Severe: depth to rock, too clayey.	Severe: depth to rock, shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: slope, depth to rock.	Severe: low strength.	Moderate: slope.
Opequon----------	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, low strength, shrink-swell.	Severe: depth to rock.
Rock outcrop.						
HgE*:						
Hagerstown-------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, low strength.	Severe: slope.
Opequon----------	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: slope, depth to rock, low strength.	Severe: slope, depth to rock.
Rock outcrop.						
HkF*:						
Hazleton---------	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Berks------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
HsE*:						
Hazleton---------	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Dekalb-----------	Severe: depth to rock, cutbanks cave, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, small stones, slope.
HsF*:						
Hazleton---------	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.

See footnote at end of table.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HsF*:						
Dekalb	Severe: depth to rock, cutbanks cave, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, small stones, slope.
Hu Huntington	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
La Lappans	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Ln Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
MhA Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness.
MhB Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: wetness.
MhC Monongahela	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: slope, wetness.
MoB Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: large stones, wetness.
MrB Murrill	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Moderate: small stones.
MrC Murrill	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: small stones, slope.
PeB Pecktonville	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: small stones.
PeC Pecktonville	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: small stones.
PeD Pecktonville	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.

See footnote at end of table.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and andscaping
PgC: Pecktonville	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: small stones, large stones.
Ph: Philo	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.
PoA, PoB: Poorhouse	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
Ps: Pope	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Px: Pope	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Qm*, Qs*. Quarry						
ReF*: Rock outcrop.						
Opequon	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: slope, depth to rock, low strength.	Severe: slope, depth to ock.
RnB*: Ryder	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: small stones, depth to ock.
Nollville	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
RnC*: Ryder	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope, depth to ock.
Nollville	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
RnD*: Ryder	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nollville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

See footnote at end of table.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
RvC*:						
Ryder	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope, depth to rock.
Nollville	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
SwA, SwB Swanpond	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
TyA, TyB Tygart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Ua*. Udorthents, smoothed						
Ub* Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
UkC*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Berks	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, depth to rock, slope.
UvC*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
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.
Endcav	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
UwC*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Hagerstown	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
W*. Water						

See footnote at end of table.

Table 11.--Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WbB*:						
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: depth to rock.
Berks------------	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Slight---------	Moderate: small stones, depth to rock.
WbC*:						
Weikert----------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.
Berks------------	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, slope, depth to rock.
WbD*:						
Weikert----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, depth to rock.
Berks------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WkF*:						
Weikert----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, depth to rock.
Berks------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "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
At------------------ Atkins	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
BkE----------------- Blackthorn*	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.
BpE**, BpF**:					
Blackthorn*--------	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: seepage, slope.	Poor: small stones, slope.
Pecktonville*------	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, small stones.
BuB----------------- Buchanan	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too acid.	Moderate: wetness.	Poor: small stones.
BuC, BxC------------ Buchanan	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too acid.	Moderate: wetness, slope.	Poor: small stones.
BxE----------------- Buchanan	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too acid.	Severe: slope.	Poor: small stones, slope.
CaB----------------- Calvin	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
CaC----------------- Calvin	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
CaD, CaE, CaF------- Calvin	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
CbB----------------- Caneyville*	Severe: depth to rock, percs slowly.	Severe: depth to rock, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
CcC----------------- Caneyville*	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.

See footnotes at end of table.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CcD------------------ Caneyville*	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
CeB**:					
Carbo*--------------	Severe: depth to rock, percs slowly.	Severe: depth to rock, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Endcav*-------------	Severe: percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
CeC**:					
Carbo*--------------	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Endcav*-------------	Severe: percs slowly.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
CgB**:					
Carbo*--------------	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Opequon*------------	Severe: depth to rock, percs slowly.	Severe: depth to rock, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
CgC**, ChC**:					
Carbo*--------------	Severe: depth to rock.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Opequon*------------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
ChE**:					
Carbo*--------------	Severe: depth to rock, percs slowly, slope.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Opequon*------------	Severe: slope, depth to rock, percs slowly.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.

See footnotes at end of table.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CkB, CmB------------ Clearbrook	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, too clayey, large stones.
CrB**:					
Clearbrook---------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
Berks--------------	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Cs------------------ Combs	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
DaC----------------- Dekalb	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: small stones, depth to rock.
DaD, DaE------------ Dekalb	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: slope, small stones, depth to rock.
DkC----------------- Dekalb	Severe: depth to rock, poor filter.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
DrE**:					
Dekalb-------------	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop.					
DsB----------------- Downsville	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Poor: small stones.
DsC----------------- Downsville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Poor: small stones.
DsD----------------- Downsville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
DuB----------------- Duffield*	Moderate: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.

See footnotes at end of table.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DuC: Duffield*	Moderate: depth to rock, percs slowly, slope.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
DyB: Duffield*	Moderate: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
DyC: Duffield*	Moderate: depth to rock, percs slowly, slope.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Dz: Dunning	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Fa: Fairplay*	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding.
Fk: Funkstown*	Severe: flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, small stones, wetness.
FnA, FsA: Funkstown*	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness.	Severe: wetness.	Fair: too clayey, small stones, wetness.
HbA: Hagerstown*	Moderate: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey, hard to pack.
HbB: Hagerstown*	Moderate: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey, hard to pack.
HbC: Hagerstown*	Moderate: depth to rock, percs slowly, slope.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
HcB: Hagerstown*	Moderate: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey, hard to pack.
HcC: Hagerstown*	Moderate: depth to rock, percs slowly, slope.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
HcD: Hagerstown*	Severe: slope.	Severe: slope, seepage.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnotes at end of table.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HdB-----------------Hagerstown*	Moderate: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Slight-----------	Poor: too clayey, hard to pack.
HdC-----------------Hagerstown*	Moderate: depth to rock, percs slowly, slope.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
HdD-----------------Hagerstown*	Severe: slope.	Severe: slope, seepage.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
HgC**:					
Hagerstown*--------	Moderate: depth to rock, percs slowly.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: too clayey, slope.
Opequon*-----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: too clayey, hard to pack.
Rock outcrop.					
HgE**:					
Hagerstown*--------	Severe: slope.	Severe: slope, seepage.	Severe: slope, depth to rock, too clayey.	Severe: depth to rock, slope.	Poor: too clayey, slope.
Opequon*-----------	Severe: slope, depth to rock, percs slowly.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.
Rock outcrop.					
HkF**:					
Hazleton-----------	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Berks--------------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope, small stones.
HsE**:					
Hazleton-----------	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Dekalb-------------	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.

See footnotes at end of table.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HsF**:					
Hazleton	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Dekalb	Severe: depth to rock, poor filter, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Hu Huntington	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
La Lappans*	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
Ln Lindside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
MhA, MhB Monongahela	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: small stones, wetness.
MhC Monongahela	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Fair: small stones, slope, wetness.
MoB Monongahela	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: small stones, wetness.
MrB Murrill*	Moderate: percs slowly.	Severe: seepage.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
MrC Murrill*	Moderate: percs slowly, slope.	Severe: slope, seepage.	Moderate: too clayey, slope.	Moderate: slope.	Fair: too clayey, small stones, slope.
PeB Pecktonville*	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack, small stones.
PeC Pecktonville*	Severe: wetness, percs slowly.	Severe: slope, seepage.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack, small stones.
PeD Pecktonville*	Severe: wetness, percs slowly, slope.	Severe: slope, seepage.	Severe: wetness, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, small stones.

See footnotes at end of table.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PgC: Pecktonville*	Severe: wetness, percs slowly.	Severe: slope, seepage.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack, small stones.
Ph: Philo	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: small stones, wetness, thin layer.
PoA: Poorhouse*	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
PoB: Poorhouse*	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ps, Px: Pope	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
Qm**, Qs**. Quarry					
ReF**: Rock outcrop.					
Opequon*	Severe: slope, depth to rock, percs slowly.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.
RnB**:					
Ryder*	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
Nollville*	Moderate: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock.	Moderate: depth to rock.	Poor: thin layer.
RnC**:					
Ryder*	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
Nollville*	Moderate: depth to rock, percs slowly, slope.	Severe: slope, seepage.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: thin layer.
RnD**:					
Ryder*	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.

See footnotes at end of table.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RnD**:					
Nollville*	Severe: slope.	Severe: slope, seepage.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer.
RvC**:					
Ryder*	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Nollville*	Moderate: depth to rock, percs slowly, slope.	Severe: slope, seepage.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: hard to pack.
SwA, SwB Swanpond*	Severe: wetness, percs slowly.	Severe: seepage.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
TyA, TyB Tygart	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey, too acid.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ua**. Udorthents, smoothed					
Ub** Urban land	Variable	Variable	Variable	Variable	Variable.
UkC**:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Berks	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
UvC**:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Carbo*	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Endcav*	Severe: percs slowly.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
UwC**:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Hagerstown*	Moderate: depth to rock, percs slowly, slope.	Severe: slope, seepage.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnotes at end of table.

Table 12.--Sanitary Facilities--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
W**. Water					
WbB**:					
Weikert	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
Berks	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
WbC**:					
Weikert	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, seepage, small stones.
Berks	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
WbD**, WkF**:					
Weikert	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
Berks	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.

* Ground water may become polluted if the soil is underlain by cavernous limestone or pervious bedrock.
** See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
At-------------------- Atkins	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
BkE------------------- Blackthorn	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
BpE*, BpF*:				
Blackthorn-----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Pecktonville---------	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
BuB, BuC, BxC--------- Buchanan	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
BxE------------------- Buchanan	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CaB, CaC-------------- Calvin**	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
CaD------------------- Calvin**	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CaE, CaF-------------- Calvin**	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CbB, CcC-------------- Caneyville	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
CcD------------------- Caneyville	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
CeB*, CeC*:				
Carbo----------------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnotes at end of table.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CeB*, CeC*:				
Endcav	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CgB*, CgC*, ChC*:				
Carbo	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Opequon	Poor: depth to rock, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
ChE*:				
Carbo	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Opequon	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
CkB, CmB Clearbrook	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, wetness.
CrB*:				
Clearbrook**	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones.
Berks**	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Cs Combs	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
DaC Dekalb	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
DaD Dekalb	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
DaE Dekalb	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
DkC Dekalb	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones.
DrE*:				
Dekalb	Poor: depth to rock, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, slope.

See footnotes at end of table.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
DrE*:				
Rock outcrop.				
DsB, DsC Downsville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
DsD Downsville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
DuB, DuC, DyB, DyC Duffield	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
Dz Dunning	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Fa Fairplay	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Fk, FnA Funkstown	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.
FsA Funkstown	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
HbA, HbB, HbC, HcB, HcC Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HcD Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
HdB, HdC Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
HdD Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
HgC*:				
Hagerstown	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Opequon	Poor: depth to rock, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
Rock outcrop.				

See footnotes at end of table.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HgE*:				
Hagerstown	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Opequon	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
Rock outcrop.				
HkF*:				
Hazleton	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too stony, small stones, area reclaim.
Berks	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, slope.
HsE*:				
Hazleton	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too stony, small stones, area reclaim.
Dekalb	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, slope.
HsF*:				
Hazleton	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too stony, small stones, area reclaim.
Dekalb	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too stony, small stones, slope.
Hu: Huntington	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
La: Lappans	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Ln: Lindside	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
MhA, MhB, MhC, MoB: Monongahela	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
MrB, MrC: Murrill	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnotes at end of table.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PeB, PeC: Pecktonville	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
PeD: Pecktonville	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
PgC: Pecktonville	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Ph: Philo	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
PoA, PoB: Poorhouse	Poor: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Ps, Px: Pope	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Qm*, Qs*. Quarry				
ReF*: Rock outcrop.				
Opequon	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
RnB*, RnC*: Ryder	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Nollville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
RnD*: Ryder	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Nollville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
RvC*: Ryder	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Nollville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnotes at end of table.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SwA, SwB: Swanpond	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
TyA, TyB: Tygart	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Ua*. Udorthents				
Ub*: Urban land	Variable	Variable	Variable	Variable.
UkC*:				
Urban land	Variable	Variable	Variable	Variable.
Berks**	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
UvC*:				
Urban land	Variable	Variable	Variable	Variable.
Carbo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Endcav	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
UwC*:				
Urban land	Variable	Variable	Variable	Variable.
Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
W*. Water				
WbB*:				
Weikert**	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones.
Berks**	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
WbC*:				
Weikert**	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones.
Berks**	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnotes at end of table.

Table 13.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WbD*:				
Weikert**	Poor: depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Berks**	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
WkF*:				
Weikert**	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, small stones, slope.
Berks**	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.
** The rippable shale underlying this soil commonly is excavated for use as roadfill.

Table 14.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
At---------------- Atkins	Severe: seepage.	Severe: seepage, piping, wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
BkE--------------- Blackthorn*	Severe: seepage, slope.	Severe: seepage.	Deep to water----	Slope, large stones.	Large stones, slope, droughty.
BpE**, BpF**:					
Blackthorn*------	Severe: seepage, slope.	Severe: seepage.	Deep to water----	Slope, large stones.	Large stones, slope, droughty.
Pecktonville*----	Severe: seepage, slope.	Moderate: piping, hard to pack, wetness.	Deep to water----	Slope------------	Slope, large stones.
BuB--------------- Buchanan	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Large stones, wetness.	Droughty, rooting depth, percs slowly.
BuC--------------- Buchanan	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, large stones, wetness.	Slope, droughty, rooting depth.
BxC, BxE---------- Buchanan	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, large stones, wetness.	Large stones, slope, droughty.
CaB--------------- Calvin	Severe: seepage.	Severe: piping.	Deep to water----	Large stones, depth to rock.	Large stones, droughty.
CaC, CaD, CaE, CaF-------------- Calvin	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, droughty.
CbB--------------- Caneyville*	Severe: depth to rock, seepage.	Severe: thin layer, hard to pack.	Deep to water----	Depth to rock----	Depth to rock.
CcC--------------- Caneyville*	Severe: depth to rock, seepage.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
CcD--------------- Caneyville*	Severe: depth to rock, seepage, slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.

See footnotes at end of table.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
CeB**:					
Carbo*	Severe: seepage, depth to rock.	Severe: hard to pack.	Deep to water	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Endcav*	Severe: seepage.	Severe: hard to pack.	Deep to water	Erodes easily	Erodes easily.
CeC**:					
Carbo*	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Endcav*	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
CgB**:					
Carbo*	Severe: seepage.	Severe: seepage, piping.	Deep to water	Depth to rock	Depth to rock.
Opequon*	Severe: seepage, depth to rock.	Severe: hard to pack, thin layer.	Deep to water	Depth to rock, erodes easily.	Erodes easily, depth to rock, droughty.
CgC**, ChC**:					
Carbo*	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Opequon*	Severe: seepage, depth to rock, slope.	Severe: hard to pack, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
ChE*:					
Carbo*	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Opequon*	Severe: seepage, depth to rock, slope.	Severe: hard to pack, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
CkB, CmB Clearbrook	Moderate: depth to rock, slope.	Severe: large stones, wetness.	Depth to rock, large stones, slope.	Large stones, depth to rock, wetness.	Large stones, wetness.
CrB**:					
Clearbrook	Moderate: depth to rock, slope.	Severe: large stones.	Depth to rock, large stones, slope.	Large stones, depth to rock, wetness.	Large stones, wetness.
Berks	Severe: seepage.	Severe: thin layer.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
Cs Combs	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.

See footnotes at end of table.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
DaC, DaD, DaE: Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, droughty.
DkC: Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
DrE**:					
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.					
DsB: Downsville	Moderate: seepage, slope.	Moderate: piping, large stones.	Deep to water	Large stones	Large stones, droughty.
DsC, DsD: Downsville	Severe: slope.	Moderate: piping, large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
DuB: Duffield*	Severe: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Erodes easily	Erodes easily.
DuC: Duffield*	Severe: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
DyB: Duffield*	Severe: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Favorable	Favorable.
DyC: Duffield*	Severe: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope.
Dz: Dunning	Slight	Severe: wetness.	Percs slowly, flooding.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Fa: Fairplay	Severe: seepage.	Severe: piping, ponding.	Ponding, flooding.	Erodes easily, ponding.	Wetness, erodes easily.
Fk: Funkstown*	Severe: seepage.	Severe: piping.	Flooding	Wetness	Favorable.
FnA, FsA: Funkstown*	Severe: seepage.	Severe: piping.	Favorable	Wetness	Favorable.
HbA: Hagerstown*	Severe: seepage.	Moderate: hard to pack.	Deep to water	Favorable	Favorable.
HbB: Hagerstown*	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water	Favorable	Favorable.

See footnotes at end of table.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
HbC: Hagerstown*	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Slope.
HcB: Hagerstown*	Severe: seepage.	Moderate: hard to pack.	Deep to water	Favorable	Favorable.
HcC, HcD: Hagerstown*	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Slope.
HdB: Hagerstown*	Severe: seepage.	Moderate: hard to pack.	Deep to water	Favorable	Favorable.
HdC, HdD: Hagerstown*	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Slope.
HgC**, HgE**:					
Hagerstown*	Severe: depth to rock, slope, seepage.	Severe: hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Opequon*	Severe: depth to rock, slope.	Severe: hard to pack, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.					
HkF**:					
Hazleton	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
Berks.					
HsE**:					
Hazleton	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
HsF**:					
Hazleton	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Hu: Huntington	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
La: Lappans	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.

See footnotes at end of table.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Ln-----------------Lindside	Moderate: seepage.	Severe: piping.	Flooding, frost action.	Erodes easily, wetness.	Erodes easily.
MhA----------------Monongahela	Moderate: seepage.	Severe: piping.	Percs slowly-----	Erodes easily, wetness.	Erodes easily, rooting depth.
MhB----------------Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
MhC----------------Monongahela	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
MoB----------------Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
MrB----------------Murrill*	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
MrC----------------Murrill*	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope------------	Slope.
PeB----------------Pecktonville*	Severe: seepage.	Moderate: hard to pack, wetness.	Deep to water----	Percs slowly-----	Percs slowly.
PeC, PeD-----------Pecktonville*	Severe: seepage, slope.	Moderate: hard to pack, wetness.	Deep to water----	Slope, percs slowly.	Slope, percs slowly.
PgC----------------Pecktonville*	Severe: seepage, slope.	Moderate: piping, hard to pack, wetness.	Deep to water----	Slope------------	Slope.
Ph-----------------Philo	Severe: seepage.	Severe: piping, wetness.	Flooding---------	Erodes easily, wetness.	Erodes easily.
PoA----------------Poorhouse	Slight------------	Severe: hard to pack, wetness.	Percs slowly-----	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
PoB----------------Poorhouse	Moderate: slope.	Severe: hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ps-----------------Pope	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
Px-----------------Pope	Severe: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
Qm**, Qs**---------Quarry	Severe: depth to rock, slope.	Slight------------	Deep to water----	Slope, depth to rock.	Slope, depth to rock.

See footnotes at end of table.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
ReF**: Rock outcrop.					
Opequon*	Severe: depth to rock, slope.	Severe: hard to pack, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
RnB**: Ryder*	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock	Depth to rock.
Nollville*	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable	Favorable.
RnC**, RnD**: Ryder*	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Nollville*	Severe: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope	Slope.
RvC**: Ryder*	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Nollville*	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope	Slope.
SwA Swanpond*	Severe: seepage.	Severe: hard to pack.	Percs slowly	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
SwB Swanpond*	Severe: seepage, slope.	Severe: hard to pack.	Percs slowly, slope.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
TyA Tygart	Slight	Severe: hard to pack, wetness.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
TyB Tygart	Moderate: slope.	Severe: hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ua**. Udorthents, smoothed					
Ub** Urban land	Variable	Variable	Variable	Variable	Variable.
UkC**: Urban land	Variable	Variable	Variable	Variable	Variable.

See footnotes at end of table.

Table 14.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
UkC**:					
Berks	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
UvC**:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Carbo*	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Endcav*	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
UwC**:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Hagerstown*	Severe: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Slope.
W*.					
Water					
WbB**:					
Weikert	Severe: seepage, depth to rock.	Severe: seepage.	Deep to water	Large stones, depth to rock.	Large stones, depth to rock, droughty.
Berks	Severe: seepage.	Severe: thin layer.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
WbC**:					
Weikert	Severe: seepage, depth to rock, slope.	Severe: seepage.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Berks	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
WbD**, WkF**:					
Weikert	Severe: seepage, depth to rock, slope.	Severe: seepage.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Berks	Severe: seepage, slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.

* Ponds constructed in areas of this soil have a high failure rate due to crevices and solution channels in the underlying limestone bedrock or the nature of the clays in the subsoil, or both.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.--Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
At---------------- Atkins	0-4	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	60-95	20-40	3-20
	4-36	Silty clay loam, silt loam, sandy loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	65-100	45-85	20-40	3-20
	36-70	Stratified silty clay loam, gravelly sandy loam, very gravelly silty clay loam.	SM, CL, GM, ML	A-2, A-4, A-6	0-20	40-100	35-100	25-95	15-85	20-40	1-15
BkE--------------- Blackthorn	0-7	Extremely stony loam.	ML, SM, CL-ML, SC-SM	A-2, A-4, A-1	5-15	65-90	60-85	35-70	15-55	15-27	NP-7
	7-65	Channery sandy loam, very channery sandy loam, channery loam.	GM, SM, SC, SC-SM	A-2, A-4, A-1	5-30	40-90	25-90	20-60	10-45	18-30	1-9
BpE*, BpF*:											
Blackthorn------	0-6	Extremely stony loam.	ML, SM, CL-ML, SC-SM	A-2, A-4, A-1	5-15	65-90	60-85	35-70	15-55	15-27	NP-7
	6-35	Gravelly sandy loam, very gravelly sandy loam, gravelly loam.	GM, SM, SC, SC-SM	A-2, A-4, A-1	5-30	40-90	25-90	20-60	10-45	18-30	1-9
	35-90	Clay, clay loam, very gravelly silty clay loam.	CL, CH	A-6, A-7	0-10	85-100	70-100	65-95	55-90	30-65	15-40
Pecktonville----	0-7	Extremely stony loam.	GM, GC, CL, ML	A-2, A-4	15-30	35-80	30-75	25-70	20-65	15-35	3-15
	7-12	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6	0-5	65-100	60-95	45-85	40-80	15-40	3-20
	12-46	Gravelly clay, gravelly silty clay, clay loam.	CH, CL	A-6, A-7	0-5	55-100	50-95	45-90	40-90	25-60	10-40
	46-65	Gravelly clay, clay, silty clay.	CH, CL	A-6, A-7	0-5	75-100	70-100	65-100	65-95	25-60	10-40
BuB--------------- Buchanan	0-8	Gravelly loam----	GM, ML, CL, CL-ML	A-4, A-2, A-6	0-10	50-100	50-75	40-75	30-65	20-35	2-11
	8-32	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-4, A-2, A-6	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	32-65	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-4, A-2, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments >3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
BuC-------------- Buchanan	0-6	Gravelly loam----	GM, ML, CL, CL-ML	A-4, A-2, A-6	0-10	50-100	50-75	40-75	30-65	20-35	2-11
	6-21	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-4, A-2, A-6	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	21-65	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-4, A-2, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
BxC, BxE--------- Buchanan	0-4	Extremely stony loam.	GM, ML, CL, CL-ML	A-2, A-4, A-6	5-20	50-85	45-70	40-70	30-60	20-35	2-11
	4-30	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
	30-65	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
CaB, CaC--------- Calvin	0-8	Channery loam----	ML, CL-ML	A-4	0-15	70-95	70-90	65-90	55-75	15-30	2-10
	8-30	Channery silt loam, channery loam, very channery silt loam.	ML, SM, GM	A-2, A-4, A-6	0-15	70-95	55-90	40-90	30-75	22-38	2-11
	30-35	Extremely channery silt loam, very channery silt loam, very channery loam.	GM, SM, SC, GC	A-2, A-1, A-4, A-6	0-20	35-75	15-45	15-45	15-40	23-39	3-13
	35	Unweathered bedrock.	---	---	---	---	---	---	---	0-14	---
CaD-------------- Calvin	0-6	Channery loam----	ML, CL-ML	A-4	0-15	70-95	70-90	65-90	55-75	15-30	2-10
	6-30	Channery silt loam, channery loam, very channery silt loam.	ML, SM, GM	A-2, A-4, A-6	0-15	70-95	55-90	40-90	30-75	22-38	2-11
	30-35	Extremely channery silt loam, very channery silt loam, very channery loam.	GM, SM, SC, GC	A-2, A-1, A-4, A-6	0-20	35-75	15-45	15-45	15-40	23-39	3-13
	35	Unweathered bedrock.	---	---	---	---	---	---	---	0-14	---

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
CaE, CaF--------- Calvin	0-2	Channery loam----	ML, CL-ML	A-4	0-15	70-95	70-90	65-90	55-75	15-30	2-10
	2-23	Channery silt loam, channery loam, very channery silt loam.	ML, SM, GM	A-2, A-4, A-6	0-15	70-95	55-90	40-90	30-75	22-38	2-11
	23-34	Extremely channery silt loam, very channery silt loam, very channery loam.	GM, SM, SC, GC	A-2, A-1, A-4, A-6	0-20	35-75	15-45	15-45	15-40	23-39	3-13
	34	Unweathered bedrock.	---	---	---	---	---	---	---	0-14	---
CbB-------------- Caneyville	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	90-100	85-100	75-100	60-95	20-35	2-12
	7-15	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-5	90-100	85-100	75-100	65-95	42-70	20-45
	15-24	Clay, silty clay, channery silty clay.	CH	A-7	0-15	70-100	55-100	50-100	40-95	50-75	30-45
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CcC-------------- Caneyville	0-8	Silty clay loam	CL	A-6	0-5	90-100	85-100	75-100	65-95	30-40	11-20
	8-16	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-5	90-100	85-100	75-100	65-95	42-70	20-45
	16-28	Clay, silty clay, channery silty clay.	CH	A-7	0-15	70-100	55-100	50-100	40-95	50-75	30-45
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CcD-------------- Caneyville	0-6	Silty clay loam	CL	A-6	0-5	90-100	85-100	75-100	65-95	30-40	11-20
	6-14	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-5	90-100	85-100	75-100	65-95	42-70	20-45
	14-26	Clay, silty clay, channery silty clay.	CH	A-7	0-15	70-100	55-100	50-100	40-95	50-75	30-45
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CeB*:											
Carbo-----------	0-9	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-95	75-85	30-50	10-25
	9-34	Clay-------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Endcav----------	0-8	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	75-95	30-50	10-25
	8-41	Clay, silty clay	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CeC*:											
Carbo-----------	0-9	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-95	75-85	30-50	10-25
	9-34	Clay-------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
CeC*:											
Endcav----------	0-6	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	75-95	30-50	10-25
	6-41	Clay, silty clay	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CgB*:											
Carbo-----------	0-9	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-95	75-85	30-50	10-25
	9-34	Clay-------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Opequon---------	0-8	Silty clay-------	CL, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	8-17	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
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CgC*:											
Carbo-----------	0-7	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-95	75-85	30-50	10-25
	7-32	Clay-------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Opequon---------	0-6	Silty clay-------	CL, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	6-15	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.	---	---	---	---	---	---	---	---	---
ChC*:											
Carbo-----------	0-9	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-95	75-85	30-50	10-25
	9-34	Clay-------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
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
	7-17	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
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
ChE*:											
Carbo-----------	0-5	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-95	75-85	30-50	10-25
	5-30	Clay-------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Opequon---------	0-3	Silty clay-------	CL, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	3-15	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.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CkB-------------- Clearbrook	0-9	Silt loam--------	CL-ML, CL	A-4, A-6	0-15	90-100	75-90	65-85	55-75	20-30	6-15
	9-11	Channery silt loam, very channery silty clay loam, channery loam.	CL	A-6	10-50	75-90	60-85	55-75	50-70	25-40	10-20
	11-22	Very channery silty clay loam, very channery silty clay.	CL, GC, SC	A-6, A-7	10-50	60-85	50-75	50-65	45-60	35-45	15-25
	22	Weathered bedrock	---	---	---	---	---	---	---	---	---
CmB-------------- Clearbrook	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
	7-13	Channery silt loam, very channery silty clay loam, channery loam.	CL	A-6	10-50	75-90	60-85	55-75	50-70	25-40	10-20
	13-22	Very channery silty clay loam, very channery silty clay.	CL, GC, SC	A-6, A-7	10-50	60-85	50-75	50-65	45-60	35-45	15-25
	22	Weathered bedrock	---	---	---	---	---	---	---	---	---
CrB*:											
Clearbrook------	0-8	Channery silt loam.	CL-ML, CL	A-4, A-6	5-25	75-90	60-85	55-75	50-70	20-30	6-15
	8-19	Channery silt loam, very channery silty clay loam, channery loam.	CL	A-6	10-50	75-90	60-85	55-75	50-70	25-40	10-20
	19-24	Very channery silty clay loam, very channery silty clay.	CL, GC, SC	A-6, A-7	10-50	60-85	50-75	50-65	45-60	35-45	15-25
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---
Berks-----------	0-8	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	50-80	50-70	40-60	30-55	25-36	5-10
	8-16	Silt loam, loam	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	16-22	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
	22	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cs--------------- Combs	0-20	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-2, A-4	0	90-100	85-100	60-85	25-55	<25	NP-5
	20-53	Loam, fine sandy loam, silt loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0	90-100	80-100	65-100	30-80	<25	NP-5
	53-65	Loam, fine sandy loam, sandy clay loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0	90-100	75-100	65-100	30-80	<25	NP-8

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
DaC, DaD, DaE----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
	4-22	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
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
DkC--------------Dekalb	0-6	Extremely stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-35	50-90	45-80	40-75	20-55	10-32	NP-10
	6-15	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
	15-24	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
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
DrE*:											
Dekalb----------	0-6	Rubbly sandy loam	SM, GM, ML, CL-ML	A-2, A-4	50-85	50-90	45-80	40-75	20-55	15-32	NP-7
	6-24	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML	A-2, A-4	5-40	50-85	40-80	40-75	20-55	15-32	NP-7
	24-34	Channery sandy loam, flaggy sandy loam, very flaggy sandy loam.	SM, GM, SC, GC	A-2, A-4	10-50	45-85	35-75	25-65	15-40	15-32	NP-9
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
DsB--------------Downsville	0-10	Gravelly loam----	ML, SM, CL	A-2, A-4, A-6	0-10	60-85	55-80	45-70	30-65	15-30	3-11
	10-18	Gravelly loam, gravelly sandy loam, gravelly silt loam.	CL, ML, SM, GM	A-2, A-4, A-6	5-15	60-85	55-80	45-70	30-65	15-30	3-15
	18-30	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly loam.	CL, SC, GC, GM	A-2, A-4, A-6	5-20	50-80	45-80	40-75	30-70	25-45	3-20
	30-99	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly sandy loam.	CL, SC, GC, GM	A-2, A-4, A-6	0-15	50-80	45-80	40-75	30-70	15-35	3-15

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
DsC-------------- Downsville	0-5	Gravelly loam----	ML, SM, CL	A-2, A-4, A-6	0-10	60-85	55-80	45-70	30-65	15-30	3-11
	5-13	Gravelly loam, gravelly sandy loam, gravelly silt loam.	CL, ML, SM, GM	A-2, A-4, A-6	5-15	60-85	55-80	45-70	30-65	15-30	3-15
	13-25	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly loam.	CL, SC, GC, GM	A-2, A-4, A-6	5-20	50-80	45-80	40-75	30-70	25-45	3-20
	25-99	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly sandy loam.	CL, SC, GC, GM	A-2, A-4, A-6	0-15	50-80	45-80	40-75	30-70	15-35	3-15
DsD-------------- Downsville	0-5	Gravelly loam----	ML, SM, CL	A-2, A-4, A-6	0-10	60-85	55-80	45-70	30-65	15-30	3-11
	5-13	Gravelly loam, gravelly sandy loam, gravelly silt loam.	CL, ML, SM, GM	A-2, A-4, A-6	5-15	60-85	55-80	45-70	30-65	15-30	3-15
	13-25	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly loam.	CL, SC, GC, GM	A-2, A-4, A-6	5-20	50-80	45-80	40-75	30-70	25-45	3-20
	25-99	Very gravelly clay loam, very gravelly sandy clay loam, very gravelly sandy loam.	CL, SC, GC, GM	A-2, A-4, A-6	0-15	50-80	45-80	40-75	30-70	15-35	3-15
DuB-------------- Duffield	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0	85-100	85-100	80-100	70-95	20-50	5-20
	9-54	Silty clay loam, silt loam, channery loam.	ML, CL, MH, CH	A-4, A-6, A-7	0-10	65-100	60-100	55-100	55-95	30-55	8-22
	54-65	Channery silt loam, loam, clay.	MH, GM, SM, ML	A-7, A-5	0-20	65-100	50-100	45-90	40-90	40-60	9-29
DuC-------------- Duffield	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0	85-100	85-100	80-100	70-95	20-50	5-20
	7-54	Silty clay loam, silt loam, channery loam.	ML, CL, MH, CH	A-4, A-6, A-7	0-10	65-100	60-100	55-100	55-95	30-55	8-22
	54-65	Channery silt loam, loam, clay.	MH, GM, SM, ML	A-7, A-5	0-20	65-100	50-100	45-90	40-90	40-60	9-29
DyB-------------- Duffield	0-9	Gravelly silt loam.	CL	A-4, A-6, A-7	5-10	70-100	60-75	55-70	50-70	30-50	8-22
	9-65	Silty clay loam, silty clay, gravelly silt loam.	ML, CL, MH, CH	A-4, A-6, A-7	0-10	65-100	60-100	55-100	55-95	30-55	8-22

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
DyC-------------- Duffield	0-7	Gravelly silt loam.	CL	A-4, A-6, A-7	5-10	70-100	60-75	55-70	50-70	30-50	8-22
	7-65	Silty clay loam, silty clay, channery loam.	ML, CL, MH, CH	A-4, A-6, A-7	0-10	65-100	60-100	55-100	55-95	30-55	8-22
Dz--------------- Dunning	0-16	Silt loam--------	ML, CL, CL-ML	A-6, A-4	0	100	95-100	90-100	85-100	25-35	4-11
	16-70	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-5	90-100	70-100	60-100	60-100	45-70	20-40
Fa--------------- Fairplay	0-15	Marly silt loam	ML, CL-ML	A-4, A-6	0	95-100	80-100	80-95	60-85	20-30	3-11
	15-23	Marly silt loam, marly loam.	CL, CL-ML, ML	A-4, A-6	0	95-100	80-100	80-95	45-85	20-30	3-11
	23-65	Marly silt loam, marly loam, marly sandy loam.	CL, CL-ML, ML, SM	A-4, A-6, A-2	0	95-100	80-100	80-95	45-85	16-30	3-11
Fk--------------- Funkstown	0-11	Silt loam--------	ML, CL	A-4, A-6	0	95-100	85-100	80-100	65-80	15-30	3-11
	11-27	Gravelly silt loam, gravelly silty clay loam, very gravelly loam.	ML, CL, SM	A-2, A-4, A-6	0-5	65-90	60-85	55-80	30-70	15-35	3-15
	27-65	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
FnA-------------- Funkstown	0-19	Silt loam--------	ML, CL	A-4, A-6	0	95-100	85-100	80-100	65-80	15-30	3-11
	19-40	Gravelly silt loam, gravelly silty clay loam, very gravelly loam.	ML, CL, SM	A-2, A-4, A-6	0-10	65-90	60-85	55-80	30-70	15-35	3-15
	40-65	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
FsA-------------- Funkstown	0-10	Gravelly silt loam.	ML, CL	A-4, A-6	0-10	85-90	70-80	60-75	55-75	15-30	3-11
	10-26	Gravelly silt loam, gravelly silty clay loam, very gravelly loam.	ML, CL, SM	A-2, A-4, A-6	0-10	65-90	60-85	55-80	30-70	15-35	3-15
	26-65	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
HbA, HbB--------- Hagerstown	0-10	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-5	85-100	85-100	80-100	70-95	25-50	5-25
	10-17	Clay, clay loam, silt loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	17-71	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
HbC-------------- Hagerstown	0-7	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-5	85-100	85-100	80-100	70-95	25-50	5-25
	7-14	Clay, clay loam, silt loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	14-68	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
HcB-------------- Hagerstown	0-7	Silty clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	85-100	85-100	80-100	70-95	25-50	5-25
	7-65	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
HcC-------------- Hagerstown	0-6	Silty clay loam	CL, CL-ML	A-4, A-6, A-7	0-5	85-100	85-100	80-100	70-95	25-50	5-25
	6-65	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
HcD-------------- Hagerstown	0-5	Silty clay loam	CL, CL-ML	A-4, A-6, A-7	0-15	85-100	85-100	80-100	70-95	25-50	5-25
	5-65	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
HdB-------------- Hagerstown	0-9	Gravelly silt loam.	CL, CL-ML	A-4, A-6, A-7	5-20	75-95	70-90	70-90	60-85	25-50	5-25
	9-15	Clay, silty clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	15-65	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
HdC-------------- Hagerstown	0-8	Gravelly silt loam.	CL, CL-ML	A-4, A-6, A-7	5-20	75-95	70-90	70-90	60-85	25-50	5-25
	8-65	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
HdD-------------- Hagerstown	0-7	Gravelly silt loam.	CL, CL-ML	A-4, A-6, A-7	5-20	75-95	70-90	70-90	60-85	25-50	5-25
	7-71	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	71	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HgC*:											
Hagerstown------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-5	85-100	85-100	80-100	70-95	25-50	5-25
	5-9	Clay, silty clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	9-71	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	71	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Opequon---------	0-5	Silty clay loam	CL, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	5-18	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
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
HgE*:											
Hagerstown------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-5	85-100	85-100	80-100	70-95	25-50	5-25
	5-65	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
Opequon---------	0-5	Silty clay loam	CL, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	5-18	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
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
HkF*:											
Hazleton--------	0-11	Extremely stony loam.	GM, SM, ML, SC-SM	A-4	15-50	60-85	50-80	50-70	35-55	10-25	NP-8
	11-48	Channery sandy loam, very channery loam, loam.	GM, SM, ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	15-30	NP-8
	48-65	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	15-30	NP-8
Berks-----------	0-8	Extremely stony loam.	SM, SC, GM, ML	A-4	5-35	60-95	55-90	45-90	35-80	25-36	5-10
	8-36	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
	36	Weathered bedrock	---	---	---	---	---	---	---	0-14	---
HsE*:											
Hazleton--------	0-4	Extremely stony loam.	GM, SM, ML, SC-SM	A-4	15-50	60-85	50-80	50-70	35-55	10-25	NP-8
	4-11	Channery sandy loam, channery loam, loam.	GM, SM, ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	15-30	NP-8
	11-65	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	15-30	NP-8
Dekalb----------	0-4	Extremely stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-35	50-90	45-80	40-75	20-55	10-32	NP-10
	4-26	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
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
HsF*:											
Hazleton	0-4	Extremely stony loam.	GM, SM, ML, SC-SM	A-4	15-50	60-85	50-80	50-70	35-55	10-25	NP-8
	4-11	Channery sandy loam, channery loam, loam.	GM, SM, ML, SC	A-2, A-4, A-1	0-50	60-95	45-90	35-70	20-55	15-30	NP-8
	11-65	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	15-30	NP-8
Dekalb	0-4	Extremely stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-30	50-90	45-80	40-75	20-55	10-32	NP-10
	4-26	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
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hu: Huntington	0-11	Silt loam	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	11-65	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
La: Lappans	0-7	Marly loam	ML, CL-ML	A-4, A-6	0	100	95-100	85-95	50-85	20-30	3-11
	7-42	Marly loam, marly sandy loam, marly silt loam.	CL, ML, SM, CL-ML	A-4, A-6	0	100	95-100	90-100	45-85	20-30	3-11
	42-64	Marly loam, marly sandy loam, marly clay loam.	CL, ML, SM, CL-ML	A-4, A-6	0	100	95-100	85-95	45-85	15-30	3-11
	64-99	Marly loam, marly sandy loam, marly clay loam.	CL, ML, SM, CL-ML	A-4, A-6	0	100	95-100	80-95	45-85	15-30	3-11
Ln: Lindside	0-12	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	12-46	Silty clay loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
	46-66	Stratified silty clay loam to gravelly sandy loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	60-100	55-100	45-100	30-95	20-40	4-18

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
MhA: Monongahela	0-10	Silt loam	ML, SM, CL-ML, SC-SM	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	10-27	Silt loam, clay loam, gravelly loam.	CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	27-53	Silt loam, sandy clay loam, 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
	53-65	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
MhB: Monongahela	0-8	Silt loam	ML, SM, CL-ML, SC-SM	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	8-30	Silt loam, clay loam, gravelly loam.	CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	30-51	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
	51-65	Silt loam, clay loam, gravelly sandy loam, loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
MhC: Monongahela	0-6	Silt loam	ML, SM, CL-ML, SC-SM	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	6-28	Silt loam, clay loam, gravelly loam.	CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	28-49	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
	49-65	Silt loam, clay loam, gravelly sandy loam, loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
MoB: Monongahela	0-8	Gravelly loam	ML, SM, CL-ML, SC-SM	A-4	0-15	80-90	75-85	70-80	45-75	20-35	1-10
	8-30	Silt loam, clay loam, gravelly loam.	CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	30-51	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
	51-65	Silt loam, clay loam, gravelly sandy loam, loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
MrB, MrC--------- Murrill	0-9	Gravelly loam----	ML, CL, GM, SC-SM	A-4, A-6, A-2	0-5	65-80	55-70	45-65	30-65	20-45	3-15
	9-55	Gravelly clay loam, gravelly silty clay loam, sandy clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0-10	65-85	60-70	55-65	50-65	20-50	5-25
	55-72	Silty clay, very gravelly clay loam, gravelly silty clay loam.	CH, MH, CL	A-6, A-7	0-10	80-100	50-100	45-100	40-100	35-75	20-40
PeB-------------- Pecktonville	0-7	Gravelly loam----	ML, GM	A-4, A-6	0-15	60-80	50-75	40-70	35-65	20-40	3-15
	7-11	Silt loam, silty clay loam, gravelly loam.	CL-ML, CL, SC	A-4, A-6	0-5	80-100	70-95	45-85	40-80	20-40	5-20
	11-48	Silty clay loam, gravelly silty clay, clay.	CH, GC, CL, SC	A-6, A-2-6	0-5	45-100	40-95	35-90	30-90	35-60	15-40
	48-65	Clay loam, silty clay, clay.	CH, CL	A-6, A-7-6	0-5	90-100	85-100	70-100	65-95	35-60	15-40
PeC-------------- Pecktonville	0-6	Gravelly loam----	ML, GM	A-4, A-6	0-15	60-80	50-75	40-70	35-65	20-40	3-15
	6-12	Silt loam, silty clay loam, gravelly loam.	CL-ML, CL, SC	A-4, A-6	0-5	80-100	70-95	45-85	40-80	20-40	5-20
	12-43	Silty clay loam, gravelly silty clay, clay.	CH, GC, CL, SC	A-6, A-2-6	0-5	45-100	40-95	35-90	30-90	35-60	15-40
	43-65	Clay loam, silty clay, clay.	CH, CL	A-6, A-7-6	0-5	90-100	85-100	70-100	65-95	35-60	15-40
PeD-------------- Pecktonville	0-7	Gravelly loam----	ML, GM	A-4, A-6	0-15	60-80	50-75	40-70	35-65	20-40	3-15
	7-16	Silt loam, silty clay loam, gravelly loam.	CL-ML, CL, SC	A-4, A-6	0-5	80-100	70-95	45-85	40-80	20-40	5-20
	16-47	Silty clay loam, gravelly silty clay, clay.	CH, GC, CL, SC	A-6, A-2-6	0-5	45-100	40-95	35-90	30-90	35-60	15-40
	47-65	Clay loam, silty clay, clay.	CH, CL	A-6, A-7-6	0-5	90-100	85-100	70-100	65-95	35-60	15-40
PgC-------------- Pecktonville	0-7	Extremely stony loam.	GM, GC, CL, ML	A-2, A-4	15-35	35-80	30-75	25-70	20-65	15-35	3-15
	7-12	Silt loam, silty clay loam, loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-5	80-100	70-95	45-85	40-80	15-40	3-20
	12-48	Gravelly clay, gravelly silty clay, clay loam.	CH, CL	A-6, A-7	0-5	55-100	50-95	45-90	40-90	25-60	10-40
	48-65	Gravelly clay, clay, silty clay.	CH, CL	A-6, A-7	0-5	75-100	70-100	65-100	65-95	25-60	10-40
Ph--------------- Philo	0-9	Silt loam--------	ML, CL-ML	A-4	0-5	95-100	80-100	75-90	60-80	20-35	1-10
	9-29	Silt loam, loam, sandy loam.	ML, SM, CL-ML	A-4	0-5	95-100	75-100	70-90	45-80	20-35	1-10
	29-65	Stratified sand to very gravelly sandy loam.	GM, SM, ML, CL-ML	A-2, A-4, A-1	0-5	45-95	40-90	20-70	10-70	15-30	1-10

See footnote at end of table.

Table 15.--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	
PoA-------------- Poorhouse	0-12	Silt loam--------	ML, CL	A-6, A-7	0	80-100	75-100	65-100	45-95	25-45	10-20
	12-26	Silty clay, clay, channery clay loam.	CL, CH, MH	A-6, A-7	0-5	65-100	60-100	55-100	45-95	35-65	20-50
	26-65	Silty clay, clay, silty clay loam.	CL, CH, MH	A-6, A-7	0	85-100	80-100	75-100	60-95	35-65	20-50
PoB-------------- Poorhouse	0-11	Silt loam--------	ML, CL	A-6, A-7	0	80-100	75-100	65-100	45-95	25-45	10-20
	11-40	Silty clay, clay, channery clay loam.	CL, CH, MH	A-6, A-7	0-5	65-100	60-100	55-100	45-95	35-65	20-50
	40-65	Silty clay, clay, silty clay loam.	CL, CH, MH	A-6, A-7	0	85-100	80-100	75-100	60-95	35-65	20-50
Ps--------------- Pope	0-10	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-2, A-4	0	85-100	75-100	51-85	25-55	15-20	NP-5
	10-42	Fine sandy loam, sandy loam, loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	15-30	NP-7
	42-65	Sandy loam, loamy sand.	SM, SC-SM, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	15-30	NP-7
Px--------------- Pope	0-10	Silt loam--------	ML, CL, SM, CL-ML	A-4	0	85-100	75-100	70-100	45-90	15-30	NP-10
	10-40	Fine sandy loam, sandy loam, loam, silt loam.	SM, SC-SM, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	15-30	NP-7
	40-65	Sandy loam, loamy sand, loam.	SM, SC-SM, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	15-30	NP-7
Qm*, Qs* Quarry.											
ReF*: Rock outcrop.											
Opequon---------	0-2	Silty clay loam	CL, CH	A-6, A-7	0-5	85-100	80-100	80-100	75-95	30-55	10-30
	2-18	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
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
RnB*, RnC*: Ryder-----------	0-8	Channery silt loam.	ML	A-4	0	80-95	60-75	55-70	50-65	---	---
	8-30	Silt loam, loam, channery silty clay loam.	ML	A-4, A-5, A-7	0-5	70-100	60-95	55-90	50-85	30-45	3-11
	30-35	Channery loam, channery silt loam, very channery silt loam.	GM	A-1, A-2, A-4, A-6	0-30	30-65	25-60	20-55	15-50	25-40	2-11
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
RnB*, RnC*:											
Nollville-------	0-10	Channery silt loam.	CL-ML, CL, GC	A-4, A-6, A-2	0	55-80	60-75	40-75	30-70	20-35	4-12
	10-29	Silty clay loam, silt loam, channery silty clay loam.	CL, GC, SC	A-6	0	55-100	60-100	45-100	35-95	25-40	11-23
	29-41	Silty clay, silty clay loam, channery silt loam.	CL, GC, SC	A-6, A-7	0	55-100	60-100	45-100	35-95	30-50	11-30
	41-57	Very channery silty clay loam, extremely channery silt loam, channery clay.	GC, CL	A-6, A-7, A-2	0-10	25-65	20-60	20-60	15-55	30-50	11-30
	57	Weathered bedrock	---	---	---	---	---	---	---	---	---
RnD*:											
Ryder-----------	0-8	Channery silt loam.	ML	A-4	0	80-95	60-75	55-70	50-65	---	---
	8-30	Silt loam, loam, channery silty clay loam.	ML	A-4, A-5, A-7	0-5	70-100	60-95	55-90	50-85	30-45	3-11
	30-35	Channery loam, channery silt loam, very channery silt loam.	GM	A-1, A-2, A-4, A-6	0-30	30-65	25-60	20-55	15-50	25-40	2-11
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
Nollville-------	0-8	Channery silt loam.	CL-ML, CL, GC	A-4, A-6, A-2	0	55-80	50-75	40-75	30-70	20-35	4-12
	8-27	Silty clay loam, silt loam, channery silty clay loam.	CL, GC, SC	A-6	0	55-100	50-100	45-100	35-95	25-40	11-23
	27-39	Silty clay, silty clay loam, channery silt loam.	CL, GC, SC	A-6, A-7	0	55-100	50-100	45-100	35-95	30-50	11-30
	39-55	Very channery silty clay loam, extremely channery silt loam, channery clay.	GC, CL	A-6, A-7, A-2	0-10	25-65	20-60	20-60	15-55	30-50	11-30
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
RvC*:											
Ryder	0-9	Channery silt loam.	ML, CL-ML, CL, GM	A-4, A-6	0-5	55-80	50-75	45-75	35-70	21-33	2-11
	9-25	Channery silty clay loam, silt loam, loam.	ML, GM, SM	A-4, A-7-6, A-5	0-10	55-100	50-100	45-100	30-95	30-45	3-11
	25-33	Extremely channery silty clay loam, very channery silt loam, channery loam.	GM, SM, ML	A-1, A-2, A-4, A-6	10-40	30-80	25-75	20-75	15-70	25-40	2-11
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
Nollville	0-10	Channery silt loam.	ML, CL-ML	A-4, A-6, A-2	0	55-100	50-75	40-75	30-70	20-35	4-12
	10-29	Silty clay loam, silt loam, channery silty clay loam.	ML, CL, CH, GC	A-6	0	55-100	50-100	45-100	35-95	25-40	11-23
	29-41	Silty clay, silty clay loam, channery silt loam.	MH, CL, CH, GC	A-6, A-7	0	55-100	50-100	45-100	35-95	30-50	11-35
	41-57	Very channery silty clay loam, extremely channery silt loam, channery clay.	GC, CL	A-6, A-7, A-2	0-10	25-65	20-60	20-60	15-55	30-50	11-35
	57	Weathered bedrock	---	---	---	---	---	---	---	---	---
SwA Swanpond	0-7	Silt loam	CL, CL-ML	A-4, A-7	0-5	85-100	80-100	70-100	55-95	21-48	6-25
	7-32	Clay, silty clay	CH	A-7	0-10	95-100	90-100	85-100	80-100	66-84	39-53
	32-65	Clay, silty clay	CH	A-7	0-10	95-100	90-100	85-100	80-100	57-84	32-53
SwB Swanpond	0-7	Silt loam	CL, CL-ML	A-4, A-7	0-5	85-100	80-100	70-100	55-95	21-48	6-25
	7-35	Clay, silty clay	CH	A-7	0-10	95-100	90-100	85-100	80-100	66-84	39-53
	35-65	Clay, silty clay	CH	A-7	0-10	95-100	90-100	85-100	80-100	57-84	32-53
TyA Tygart	0-15	Silt loam	ML, CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	2-15
	15-59	Silty clay loam, silty clay, clay loam, clay.	CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	65-95	30-65	11-30
	59-65	Silty clay loam, silty clay, clay.	CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	70-95	30-65	11-30
TyB Tygart	0-10	Silt loam	ML, CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	2-15
	10-55	Silty clay loam, silty clay, clay loam.	CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	65-95	30-65	11-30
	55-65	Silty clay loam, silty clay, clay.	CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	70-95	30-65	11-30
Ua*. Udorthents, smoothed											
Ub*. Urban land											

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
UkC*:											
Urban land.											
Berks-----------	0-7	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	50-80	50-70	40-60	30-55	25-36	5-10
	7-21	Silt loam, loam, channery silt loam, very channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	21-25	Channery loam, very channery loam, extremely channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	25	Weathered bedrock	---	---	---	---	---	---	---	---	---
UvC*:											
Urban land.											
Carbo-----------	0-9	Silty clay loam	CL	A-6, A-7	0-5	95-100	90-100	85-95	75-85	30-50	10-25
	9-34	Clay-------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Endcav----------	0-8	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	75-95	30-50	10-25
	8-41	Clay, silty clay	CH	A-7	0	80-100	75-100	70-100	60-95	60-85	35-55
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UwC*:											
Urban land.											
Hagerstown------	0-12	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-5	85-100	80-100	80-100	70-95	25-50	5-25
	12-20	Clay, clay loam, loam, silt loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	20-71	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	71	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
W*.											
Water											
WbB*:											
Weikert---------	0-6	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
	6-18	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
	18	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
WbB*:											
Berks	0-6	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	60-80	45-70	40-60	30-55	25-36	5-10
	6-26	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
	26-36	Channery loam, very channery loam, extremely channery silt loam.	GM, SM, GM-GC	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
WbC*:											
Weikert	0-6	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	65-70	55-70	40-65	30-55	30-40	4-10
	6-18	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
	18	Weathered bedrock	---	---	---	---	---	---	---	---	---
Berks	0-6	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	60-80	55-70	40-60	30-55	25-36	5-10
	6-26	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
	26-36	Channery loam, very channery loam, channery silt loam.	GM, SM, GM-GC	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
WbD*:											
Weikert	0-4	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	10-25	60-80	55-70	40-65	30-55	30-40	4-10
	4-18	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
	18	Weathered bedrock	---	---	---	---	---	---	---	---	---
Berks	0-4	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-20	60-80	55-70	40-60	30-55	25-36	5-10
	4-26	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
	26-36	Channery loam, very channery loam, channery silt loam.	GM, SM, GM-GC	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments >3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
WkF*:											
Weikert	0-2	Very channery silt loam.	GM, ML, SM	A-1, A-2, A-4	10-25	35-70	25-60	25-55	20-45	30-40	4-10
	2-13	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	---	---	---	---	---	---	---	---	---
Berks	0-2	Very channery silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-70	35-60	25-50	20-45	25-36	5-10
	2-24	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
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
At---------------- Atkins	0-4	18-27	1.20-1.40	0.6-2.0	0.14-0.22	4.5-5.5	Low----------	0.32	4	2-4
	4-36	18-35	1.20-1.50	0.06-2.0	0.14-0.18	4.5-5.5	Low----------	0.32		
	36-70	10-35	1.20-1.50	0.2-6.0	0.08-0.18	4.5-6.0	Low----------	0.28		
BkE-------------- Blackthorn	0-7	7-10	1.20-1.40	0.6-6.0	0.10-0.15	4.5-6.0	Low----------	0.20	4	2-5
	7-65	7-18	1.20-1.50	0.6-6.0	0.08-0.12	4.5-6.0	Low----------	0.20		
BpE*, BpF*:										
Blackthorn------	0-6	7-10	1.20-1.40	0.6-6.0	0.10-0.15	4.5-6.0	Low----------	0.20	4	2-5
	6-35	7-18	1.20-1.50	0.6-6.0	0.08-0.12	4.5-6.0	Low----------	0.20		
	35-90	27-60	1.30-1.60	0.2-2.0	0.14-0.18	4.5-5.5	Moderate-----	0.28		
Pecktonville----	0-7	13-27	1.30-1.50	2.0-6.0	0.09-0.15	4.5-6.0	Low----------	0.28	4	2-4
	7-12	15-32	1.25-1.60	0.6-2.0	0.14-0.17	4.5-6.0	Moderate-----	0.32		
	12-46	27-55	1.20-1.60	0.2-0.6	0.12-0.18	4.5-6.0	High---------	0.24		
	46-65	27-55	1.20-1.60	0.06-0.6	0.14-0.18	4.5-6.0	High---------	0.24		
BuB-------------- Buchanan	0-8	10-27	1.20-1.40	0.6-2.0	0.12-0.18	3.5-5.5	Low----------	0.24	4	1-3
	8-32	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.5-5.5	Low----------	0.24		
	32-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.5-5.5	Low----------	0.17		
BuC-------------- Buchanan	0-6	10-27	1.20-1.40	0.6-2.0	0.12-0.18	3.5-5.5	Low----------	0.24	4	1-3
	6-21	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.5-5.5	Low----------	0.24		
	21-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.5-5.5	Low----------	0.17		
BxC, BxE--------- Buchanan	0-4	10-27	1.20-1.40	0.6-2.0	0.11-0.16	3.5-5.5	Low----------	0.24	4	1-4
	4-30	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.5-5.5	Low----------	0.24		
	30-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.5-5.5	Low----------	0.17		
CaB, CaC--------- Calvin	0-8	10-25	1.20-1.40	2.0-6.0	0.10-0.16	5.1-6.5	Low----------	0.20	3	1-3
	8-30	10-25	1.40-1.60	2.0-6.0	0.08-0.16	4.5-5.5	Low----------	0.20		
	30-35	10-25	1.40-1.60	2.0-6.0	0.06-0.10	4.5-5.5	Low----------	0.20		
	35	---	---	---	---	---	-------------	----		
CaD-------------- Calvin	0-6	10-25	1.20-1.40	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.20	3	1-3
	6-30	10-25	1.40-1.60	2.0-6.0	0.08-0.16	4.5-5.5	Low----------	0.20		
	30-35	10-25	1.40-1.60	2.0-6.0	0.06-0.10	4.5-5.5	Low----------	0.20		
	35	---	---	---	---	---	-------------	----		
CaE, CaF--------- Calvin	0-2	10-25	1.20-1.40	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.20	3	1-3
	2-23	10-25	1.40-1.60	2.0-6.0	0.08-0.16	4.5-5.5	Low----------	0.20		
	23-34	10-25	1.40-1.60	2.0-6.0	0.06-0.10	4.5-5.5	Low----------	0.20		
	34	---	---	---	---	---	-------------	----		
CbB-------------- Caneyville	0-7	10-25	1.20-1.40	0.6-2.0	0.15-0.22	5.1-7.3	Low----------	0.43	3	2-4
	7-15	36-60	1.35-1.60	0.2-0.6	0.12-0.18	5.1-7.3	Moderate-----	0.28		
	15-24	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate-----	0.28		
	24	---	---	---	---	---	-------------	----		
CcC-------------- Caneyville	0-8	27-40	1.20-1.40	0.6-2.0	0.17-0.22	5.1-7.3	Low----------	0.43	3	2-4
	8-16	36-60	1.35-1.60	0.2-0.6	0.12-0.18	5.1-7.3	Moderate-----	0.28		
	16-28	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate-----	0.28		
	28	---	---	---	---	---	-------------	----		

See footnote at end of table.

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
CcD-------------- Caneyville	0-6	27-40	1.20-1.40	0.6-2.0	0.17-0.22	5.1-7.3	Low----------	0.43	3	2-4
	6-14	36-60	1.35-1.60	0.2-0.6	0.12-0.18	5.1-7.3	Moderate-----	0.28		
	14-26	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate-----	0.28		
	26	---	---	---	---	---	-------------	----		
CeB*:										
Carbo-----------	0-9	27-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate-----	0.37	2	.5-3
	9-34	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	34	---	---	---	---	---	-------------	----		
Endcav----------	0-8	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-7.3	Moderate-----	0.37	3	.5-2
	8-41	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.20		
	41	---	---	---	---	---	-------------	----		
CeC*:										
Carbo-----------	0-9	27-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate-----	0.37	2	.5-3
	9-34	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	34	---	---	---	---	---	-------------	----		
Endcav----------	0-6	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-7.3	Moderate-----	0.37	3	.5-2
	6-41	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.20		
	41	---	---	---	---	---	-------------	----		
CgB*:										
Carbo-----------	0-9	27-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate-----	0.37	2	.5-3
	9-34	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	34	---	---	---	---	---	-------------	----		
Opequon---------	0-8	40-45	1.20-1.50	0.2-2.0	0.16-0.21	5.6-7.8	High---------	0.37	1	1-4
	8-17	35-75	1.35-1.60	0.2-2.0	0.07-0.16	5.6-7.8	High---------	0.32		
	17	---	---	---	---	---	-------------	----		
CgC*:										
Carbo-----------	0-7	27-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate-----	0.37	2	.5-3
	7-32	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	32	---	---	---	---	---	-------------	----		
Opequon---------	0-6	40-45	1.20-1.50	0.2-2.0	0.16-0.21	5.6-7.8	High---------	0.37	1	1-4
	6-15	35-75	1.35-1.60	0.2-2.0	0.07-0.16	5.6-7.8	High---------	0.32		
	15	---	---	---	---	---	-------------	----		
ChC*:										
Carbo-----------	0-9	27-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate-----	0.37	2	.5-3
	9-34	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	34	---	---	---	---	---	-------------	----		
Opequon---------	0-7	40-45	1.20-1.50	0.2-2.0	0.16-0.21	5.6-7.8	High---------	0.37	1	1-4
	7-17	35-75	1.35-1.60	0.2-2.0	0.07-0.16	5.6-7.8	High---------	0.32		
	17	---	---	---	---	---	-------------	----		
ChE*:										
Carbo-----------	0-5	27-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate-----	0.37	2	.5-3
	5-30	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	30	---	---	---	---	---	-------------	----		
Opequon---------	0-3	40-45	1.20-1.50	0.2-2.0	0.16-0.21	5.6-7.8	High---------	0.37	1	1-4
	3-15	35-75	1.35-1.60	0.2-2.0	0.07-0.16	5.6-7.8	High---------	0.32		
	15	---	---	---	---	---	-------------	----		

See footnote at end of table.

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
CkB-------------- Clearbrook	0-9	15-27	1.25-1.55	0.6-2.0	0.14-0.18	5.1-6.5	Low----------	0.37	3	1-4
	9-11	20-35	1.35-1.55	0.2-0.6	0.08-0.12	4.5-5.5	Moderate-----	0.28		
	11-22	30-50	1.35-1.55	0.2-0.6	0.06-0.10	4.5-5.5	Moderate-----	0.28		
	22	---	---	---	---	---	-------------	----		
CmB-------------- Clearbrook	0-7	15-27	1.25-1.55	0.6-2.0	0.08-0.12	5.1-6.5	Low----------	0.32	3	1-4
	7-13	20-35	1.35-1.55	0.2-0.6	0.08-0.12	4.5-5.5	Moderate-----	0.28		
	13-22	30-50	1.35-1.55	0.2-0.6	0.06-0.10	4.5-5.5	Moderate-----	0.28		
	22	---	---	---	---	---	-------------	----		
CrB*:										
Clearbrook------	0-8	15-27	1.25-1.55	0.6-2.0	0.08-0.12	5.1-6.5	Low----------	0.32	3	1-4
	8-19	20-35	1.35-1.55	0.2-0.6	0.08-0.12	4.5-5.5	Moderate-----	0.28		
	19-24	30-50	1.35-1.55	0.2-0.6	0.06-0.10	4.5-5.5	Moderate-----	0.28		
	24	---	---	---	---	---	-------------	----		
Berks-----------	0-8	5-23	1.20-1.50	0.6-6.0	0.08-0.12	5.1-6.5	Low----------	0.17	3	.5-3
	8-16	5-32	1.20-1.60	0.6-6.0	0.04-0.10	4.5-6.5	Low----------	0.17		
	16-22	5-20	1.20-1.60	0.6-6.0	0.04-0.10	4.5-6.5	Low----------	0.17		
	22	---	---	---	---	---	-------------	----		
Cs--------------- Combs	0-20	5-18	1.20-1.50	0.6-6.0	0.12-0.20	5.6-7.3	Low----------	0.24	5	2-5
	20-53	5-18	1.20-1.50	0.6-6.0	0.12-0.20	5.6-7.3	Low----------	0.28		
	53-65	5-35	1.20-1.50	0.6-6.0	0.12-0.20	5.6-7.3	Low----------	0.28		
DaC, DaD, DaE---- Dekalb	0-4	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low----------	0.17	2	2-4
	4-22	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	22	---	---	---	---	---	-------------	----		
DkC-------------- Dekalb	0-6	10-20	1.20-1.50	6.0-20	0.08-0.12	3.5-4.4	Low----------	0.17	2	2-4
	6-15	7-18	1.20-1.50	6.0-20	0.06-0.12	3.5-5.5	Low----------	0.17		
	15-24	5-15	1.20-1.50	6.0-20	0.05-0.10	3.5-5.5	Low----------	0.17		
	24	---	---	---	---	---	-------------	----		
DrE*:										
Dekalb----------	0-6	10-20	1.20-1.50	6.0-20	0.08-0.12	3.5-4.4	Low----------	0.17	2	2-4
	6-24	10-20	1.20-1.50	6.0-20	0.06-0.12	3.5-5.5	Low----------	0.17		
	24-34	7-18	1.20-1.50	>6.0	0.05-0.10	3.5-5.5	Low----------	0.17		
	34	5-15	1.20-1.50	---	---	---	-------------	----		
Rock outcrop.										
DsB-------------- Downsville	0-10	12-18	1.20-1.40	2.0-6.0	0.14-0.17	5.6-7.3	Low----------	0.28	5	1-4
	10-18	12-18	1.40-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low----------	0.28		
	18-30	20-35	1.40-1.55	0.6-2.0	0.06-0.17	4.5-5.5	Low----------	0.20		
	30-99	18-35	1.40-1.55	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.20		
DsC-------------- Downsville	0-5	12-18	1.20-1.40	2.0-6.0	0.14-0.17	5.6-7.3	Low----------	0.28	5	1-4
	5-13	12-18	1.40-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low----------	0.28		
	13-25	20-35	1.40-1.55	0.6-2.0	0.06-0.17	4.5-5.5	Low----------	0.20		
	25-99	18-35	1.40-1.55	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.20		
DsD-------------- Downsville	0-5	12-18	1.20-1.40	2.0-6.0	0.14-0.17	5.6-7.3	Low----------	0.28	5	1-4
	5-13	12-18	1.40-1.55	0.6-2.0	0.14-0.17	4.5-5.5	Low----------	0.28		
	13-25	20-35	1.40-1.55	0.6-2.0	0.06-0.17	4.5-5.5	Low----------	0.20		
	25-99	18-35	1.40-1.55	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.20		
DuB-------------- Duffield	0-9	15-27	1.10-1.40	0.6-2.0	0.16-0.22	6.1-7.3	Low----------	0.37	4	2-4
	9-54	20-42	1.30-1.60	0.6-2.0	0.14-0.20	5.1-7.3	Moderate-----	0.28		
	54-65	18-41	1.30-1.60	0.6-2.0	0.14-0.20	5.1-6.5	Moderate-----	0.28		

See footnote at end of table.

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
DuC--------------	0-7	15-27	1.10-1.40	0.6-2.0	0.16-0.22	6.1-7.3	Low----------	0.37	4	2-4
Duffield	7-54	20-42	1.30-1.60	0.6-2.0	0.14-0.20	5.1-7.3	Moderate-----	0.28		
	54-65	18-41	1.30-1.60	0.6-2.0	0.14-0.20	5.1-6.5	Moderate-----	0.28		
DyB--------------	0-9	15-27	1.10-1.40	0.6-2.0	0.14-0.20	6.1-7.3	Low----------	0.32	4	2-4
Duffield	9-65	20-42	1.30-1.60	0.6-2.0	0.14-0.20	5.1-7.3	Moderate-----	0.28		
DyC--------------	0-7	15-27	1.10-1.40	0.6-2.0	0.14-0.20	6.1-7.3	Low----------	0.32	4	2-4
Duffield	7-65	20-42	1.30-1.60	0.6-2.0	0.14-0.20	5.1-7.3	Moderate-----	0.28		
Dz---------------	0-16	12-27	1.20-1.40	0.6-2.0	0.19-0.23	5.6-7.8	Low----------	0.37	5	2-10
Dunning	16-70	35-60	1.40-1.65	0.06-0.2	0.14-0.18	5.6-7.8	Moderate-----	0.28		
Fa---------------	0-15	18-26	1.00-1.20	0.6-20	0.17-0.22	6.6-8.4	Low----------	0.43	5	2-6
Fairplay	15-23	15-25	1.00-1.20	0.6-20	0.14-0.20	7.4-8.4	Low----------	0.43		
	23-65	10-25	1.00-1.20	0.06-2.0	0.14-0.20	7.4-8.4	Low----------	0.43		
Fk---------------	0-11	15-25	1.10-1.30	0.6-2.0	0.17-0.20	6.6-7.3	Low----------	0.32	5	1-5
Funkstown	11-27	20-30	1.30-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low----------	0.24		
	27-65	27-60	1.20-1.60	0.6-2.0	0.10-0.20	5.6-7.3	Moderate-----	0.20		
FnA--------------	0-19	15-25	1.10-1.30	0.6-2.0	0.17-0.20	6.6-7.3	Low----------	0.32	5	1-5
Funkstown	19-40	20-30	1.30-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low----------	0.24		
	40-65	27-60	1.20-1.60	0.6-2.0	0.10-0.20	5.6-7.3	Moderate-----	0.20		
FsA--------------	0-10	15-25	1.10-1.30	0.6-2.0	0.14-0.17	6.6-7.3	Low----------	0.24	5	1-5
Funkstown	10-26	20-30	1.30-1.50	0.6-2.0	0.14-0.17	5.6-7.3	Low----------	0.24		
	26-65	27-60	1.20-1.60	0.6-2.0	0.10-0.20	5.6-7.3	Moderate-----	0.20		
HbA, HbB---------	0-10	15-27	1.20-1.40	0.6-6.0	0.16-0.24	5.1-7.3	Low----------	0.32	4	1-5
Hagerstown	10-17	25-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
	17-71	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
HbC--------------	0-7	15-27	1.20-1.40	0.6-6.0	0.16-0.24	5.1-7.3	Low----------	0.32	4	1-4
Hagerstown	7-14	25-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
	14-68	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
HcB--------------	0-7	27-35	1.20-1.40	0.6-6.0	0.16-0.24	5.1-7.3	Low----------	0.32	4	1-3
Hagerstown	7-65	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
HcC--------------	0-6	27-35	1.20-1.40	0.6-6.0	0.16-0.24	5.1-7.3	Low----------	0.32	4	1-3
Hagerstown	6-65	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
HcD--------------	0-5	27-35	1.20-1.40	0.6-6.0	0.16-0.24	5.1-7.3	Low----------	0.32	4	1-2
Hagerstown	5-65	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
HdB--------------	0-9	15-27	1.20-1.40	0.6-6.0	0.12-0.20	5.1-7.3	Low----------	0.28	4	1-5
Hagerstown	9-15	25-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
	15-65	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
HdC--------------	0-8	15-27	1.20-1.40	0.6-6.0	0.12-0.20	5.1-7.3	Low----------	0.28	4	1-4
Hagerstown	8-65	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
HdD--------------	0-7	15-35	1.20-1.40	0.6-6.0	0.12-0.20	5.1-7.3	Low----------	0.28	4	1-3
Hagerstown	7-71	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
	71	---	---	---	---	---	-------------	----		

See footnote at end of table.

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
HgC*:										
Hagerstown------	0-5	15-27	1.20-1.40	0.6-6.0	0.16-0.24	5.1-7.3	Low----------	0.32	4	1-5
	5-9	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
	9-71	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
	71	---	---	---	---	---	-------------	----		
Opequon---------	0-5	27-45	1.20-1.50	0.2-2.0	0.16-0.21	5.6-7.8	High---------	0.37	1	1-4
	5-18	35-75	1.35-1.60	0.2-2.0	0.07-0.16	5.6-7.8	High---------	0.32		
	18	---	---	---	---	---	-------------	----		
Rock outcrop.										
HgE*:										
Hagerstown------	0-5	15-27	1.20-1.40	0.6-6.0	0.16-0.24	5.1-7.3	Low----------	0.32	4	1-5
	5-65	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
Opequon---------	0-5	27-40	1.20-1.50	0.2-2.0	0.16-0.21	5.6-7.8	High---------	0.37	1	1-4
	5-18	35-75	1.35-1.60	0.2-2.0	0.07-0.16	5.6-7.8	High---------	0.32		
	18	---	---	---	---	---	-------------	----		
Rock outcrop.										
HkF*:										
Hazleton--------	0-11	7-18	1.20-1.40	2.0-6.0	0.10-0.16	3.5-5.5	Low----------	0.15	3	2-4
	11-48	7-18	1.20-1.40	2.0-20	0.08-0.12	3.5-5.5	Low----------	0.15		
	48-65	5-15	1.20-1.40	2.0-20	0.06-0.12	3.5-5.5	Low----------	0.15		
Berks-----------	0-8	7-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-5.5	Low----------	0.17	3	2-4
	8-36	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-5.5	Low----------	0.17		
	36	---	---	---	---	---	-------------	----		
HsE*:										
Hazleton--------	0-4	7-18	1.20-1.40	2.0-6.0	0.10-0.16	3.5-5.5	Low----------	0.15	3	2-4
	4-11	7-18	1.20-1.40	2.0-20	0.08-0.12	3.5-5.5	Low----------	0.15		
	11-65	5-15	1.20-1.40	2.0-20	0.06-0.12	3.5-5.5	Low----------	0.15		
Dekalb----------	0-4	10-20	1.20-1.50	6.0-20	0.08-0.12	3.5-4.4	Low----------	0.17	2	2-5
	4-26	7-18	1.20-1.50	6.0-20	0.06-0.12	3.5-5.5	Low----------	0.17		
	26	---	---	---	---	---	-------------	----		
HsF*:										
Hazleton--------	0-4	7-18	1.20-1.40	2.0-6.0	0.10-0.16	3.5-5.5	Low----------	0.15	3	2-4
	4-11	7-18	1.20-1.40	2.0-20	0.08-0.12	3.5-5.5	Low----------	0.15		
	11-65	5-15	1.20-1.40	2.0-20	0.06-0.12	3.5-5.5	Low----------	0.15		
Dekalb----------	0-4	10-20	1.20-1.50	6.0-20	0.08-0.12	3.5-4.4	Low----------	0.17	2	2-5
	4-26	7-18	1.20-1.50	6.0-20	0.06-0.12	3.5-5.5	Low----------	0.17		
	26	---	---	---	---	---	-------------	----		
Hu--------------- Huntington	0-11	18-27	1.10-1.30	0.6-2.0	0.18-0.24	6.1-7.8	Low----------	0.28	5	3-6
	11-65	18-30	1.30-1.50	0.6-2.0	0.16-0.22	5.6-7.8	Low----------	0.32		
La--------------- Lappans	0-7	15-27	1.05-1.10	0.6-6.0	0.17-0.20	7.4-8.4	Low----------	0.37	5	3-6
	7-42	15-27	1.05-1.20	2.0-20	0.14-0.20	7.4-8.4	Low----------	0.37		
	42-64	20-35	1.10-1.30	2.0-20	0.14-0.17	7.4-8.4	Low----------	0.37		
	64-99	15-35	1.20-1.40	2.0-6.0	0.14-0.17	7.4-8.4	Low----------	0.28		
Ln--------------- Lindside	0-12	15-27	1.20-1.40	0.6-2.0	0.20-0.26	6.1-7.8	Low----------	0.32	5	2-4
	12-46	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.1-7.8	Low----------	0.37		
	46-66	18-35	1.20-1.40	0.2-6.0	0.12-0.18	5.6-7.8	Low----------	0.32		

See footnote at end of table.

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
MhA-------------- Monongahela	0-10	10-27	1.20-1.40	0.6-2.0	0.18-0.24	5.6-7.3	Low----------	0.43	3	2-4
	10-27	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43		
	27-53	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43		
	53-65	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
MhB-------------- Monongahela	0-8	10-27	1.20-1.40	0.6-2.0	0.18-0.24	5.6-7.3	Low----------	0.43	3	2-4
	8-30	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43		
	30-51	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43		
	51-65	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
MhC-------------- Monongahela	0-6	10-27	1.20-1.40	0.6-2.0	0.18-0.24	5.6-7.3	Low----------	0.43	3	2-4
	6-28	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43		
	28-49	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43		
	49-65	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
MoB-------------- Monongahela	0-8	10-27	1.20-1.40	0.6-2.0	0.16-0.22	5.6-7.3	Low----------	0.37	3	2-4
	8-30	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43		
	30-51	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43		
	51-65	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
MrB, MrC--------- Murrill	0-9	15-25	1.20-1.50	0.6-2.0	0.12-0.16	5.1-7.3	Low----------	0.28	5	1-4
	9-55	18-35	1.40-1.60	0.6-2.0	0.10-0.14	4.5-6.0	Low----------	0.24		
	55-72	27-55	1.40-1.70	0.6-2.0	0.08-0.12	4.5-6.0	Moderate-----	0.28		
PeB-------------- Pecktonville	0-7	13-27	1.30-1.50	2.0-6.0	0.12-0.16	5.1-6.0	Low----------	0.28	5	2-4
	7-11	13-35	1.25-1.60	0.6-2.0	0.14-0.20	4.5-6.0	Moderate-----	0.24		
	11-48	27-55	1.20-1.60	0.2-0.6	0.12-0.18	4.5-6.0	High---------	0.24		
	48-65	27-55	1.20-1.60	0.06-0.6	0.14-0.20	4.5-6.0	High---------	0.24		
PeC-------------- Pecktonville	0-6	13-27	1.30-1.50	2.0-6.0	0.12-0.16	5.1-6.0	Low----------	0.28	5	2-4
	6-12	13-35	1.25-1.60	0.6-2.0	0.14-0.20	4.5-6.0	Moderate-----	0.24		
	12-43	27-55	1.20-1.60	0.2-0.6	0.12-0.18	4.5-6.0	High---------	0.24		
	43-65	27-55	1.20-1.60	0.06-0.6	0.14-0.20	4.5-6.0	High---------	0.24		
PeD-------------- Pecktonville	0-7	13-27	1.30-1.50	2.0-6.0	0.12-0.16	5.1-6.0	Low----------	0.28	5	2-4
	7-16	13-35	1.25-1.60	0.6-2.0	0.14-0.20	4.5-6.0	Moderate-----	0.24		
	16-47	27-55	1.20-1.60	0.2-0.6	0.12-0.18	4.5-6.0	High---------	0.24		
	47-65	27-55	1.20-1.60	0.06-0.6	0.14-0.20	4.5-6.0	High---------	0.24		
PgC-------------- Pecktonville	0-7	13-27	1.30-1.50	2.0-6.0	0.09-0.15	4.5-6.0	Low----------	0.28	4	2-4
	7-12	15-32	1.25-1.60	0.6-2.0	0.14-0.17	4.5-6.0	Moderate-----	0.32		
	12-48	27-55	1.20-1.60	0.2-0.6	0.12-0.18	4.5-6.0	High---------	0.24		
	48-65	27-55	1.20-1.60	0.06-0.6	0.14-0.18	4.5-6.0	High---------	0.24		
Ph--------------- Philo	0-9	10-18	1.20-1.40	0.6-2.0	0.14-0.20	4.5-6.0	Low----------	0.37	4	2-4
	9-29	10-18	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	Low----------	0.32		
	29-65	5-18	1.20-1.40	0.6-2.0	0.06-0.10	4.5-6.0	Low----------	0.10		
PoA-------------- Poorhouse	0-27	20-27	1.20-1.40	0.2-2.0	0.17-0.20	5.1-7.3	Low----------	0.37	5	1-4
	12-26	35-60	1.40-1.60	0.06-0.2	0.11-0.20	4.5-7.3	High---------	0.28		
	26-65	35-60	1.40-1.60	0.06-0.2	0.11-0.20	5.6-7.8	High---------	0.28		
PoB-------------- Poorhouse	0-27	20-27	1.20-1.40	0.2-2.0	0.17-0.20	5.1-7.3	Low----------	0.37	5	1-4
	11-40	35-60	1.40-1.60	0.06-0.2	0.11-0.20	4.5-7.3	High---------	0.28		
	40-65	35-60	1.40-1.60	0.06-0.2	0.11-0.20	5.6-7.8	High---------	0.28		
Ps--------------- Pope	0-10	5-15	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.28	5	1-4
	10-42	5-18	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low----------	0.28		
	42-65	5-20	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low----------	0.28		

See footnote at end of table.

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Px: Pope	0-10	5-15	1.20-1.40	0.6-2.0	0.14-0.23	4.5-5.5	Low	0.37	5	1-4
	10-40	5-18	1.30-1.60	0.6-2.0	0.10-0.18	4.5-5.5	Low	0.28		
	40-65	5-20	1.30-1.60	0.6-2.0	0.10-0.18	4.5-5.5	Low	0.28		
Qm*, Qs*. Quarry										
ReF*: Rock outcrop.										
Opequon	0-2	27-40	1.20-1.50	0.2-2.0	0.16-0.21	5.6-7.8	High	0.37	1	1-2
	2-18	35-75	1.35-1.60	0.2-2.0	0.07-0.16	5.6-7.8	High	0.32		
	18	---	---	---	---	---	-------------	----		
RnB*, RnC*: Ryder	0-8	15-27	1.20-1.40	0.6-2.0	0.16-0.20	5.1-7.3	Low	0.28	3	1-3
	8-30	18-35	1.40-1.60	0.6-2.0	0.14-0.18	5.1-7.3	Low	0.37		
	30-35	18-35	1.40-1.60	0.6-2.0	0.06-0.12	5.6-7.3	Low	0.24		
	35	---	---	---	---	---	-------------	----		
Nollville	0-10	15-27	1.10-1.40	0.6-2.0	0.14-0.20	5.1-7.3	Low	0.28	3	1-4
	10-29	25-35	1.30-1.50	0.6-2.0	0.14-0.20	5.1-7.3	Moderate	0.28		
	29-41	25-45	1.30-1.50	0.6-2.0	0.14-0.20	5.1-7.3	Moderate	0.28		
	41-57	25-45	1.30-1.60	0.6-2.0	0.12-0.16	5.1-7.3	Moderate	0.28		
	57	---	---	---	---	---	-------------	----		
RnD*: Ryder	0-8	15-27	1.20-1.40	0.6-2.0	0.16-0.20	5.1-7.3	Low	0.28	3	1-3
	8-30	18-35	1.40-1.60	0.6-2.0	0.14-0.18	5.1-7.3	Low	0.37		
	30-35	18-35	1.40-1.60	0.6-2.0	0.06-0.12	5.6-7.3	Low	0.24		
	35	---	---	---	---	---	-------------	----		
Nollville	0-8	15-27	1.10-1.40	0.6-2.0	0.14-0.20	5.1-7.3	Low	0.28	3	1-4
	8-27	25-35	1.30-1.50	0.6-2.0	0.14-0.20	5.1-7.3	Moderate	0.28		
	27-39	25-45	1.30-1.50	0.6-2.0	0.14-0.20	5.1-7.3	Moderate	0.28		
	39-55	25-45	1.30-1.60	0.6-2.0	0.12-0.16	5.1-7.3	Moderate	0.28		
	55	---	---	---	---	---	-------------	----		
RvC*: Ryder	0-9	15-27	1.20-1.40	0.6-2.0	0.16-0.20	5.1-7.3	Low	0.28	3	1-3
	9-25	18-35	1.40-1.60	0.6-2.0	0.11-0.18	5.1-7.3	Low	0.32		
	25-33	18-35	1.40-1.60	0.6-2.0	0.04-0.08	5.6-7.3	Low	0.32		
	33	---	---	---	---	---	-------------	----		
Nollville	0-10	15-27	1.10-1.40	0.6-2.0	0.14-0.20	5.1-7.3	Low	0.28	4	1-4
	10-29	25-35	1.30-1.50	0.6-2.0	0.14-0.20	5.1-7.3	Moderate	0.28		
	29-41	25-45	1.30-1.50	0.6-2.0	0.14-0.20	5.1-7.3	Moderate	0.28		
	41-57	25-45	1.30-1.60	0.6-2.0	0.12-0.16	5.1-7.3	Moderate	0.28		
	57	---	---	---	---	---	-------------	----		
SwA: Swanpond	0-7	16-27	1.20-1.40	0.6-2.0	0.16-0.18	5.1-7.8	Low	0.37	3	1-2
	7-32	60-80	1.30-1.60	0.06-0.2	0.14-0.18	5.1-7.8	High	0.24		
	32-65	50-80	1.30-1.60	0.06-0.2	0.14-0.18	5.1-7.8	High	0.32		
SwB: Swanpond	0-7	16-27	1.20-1.40	0.6-2.0	0.16-0.18	5.1-7.8	Low	0.37	3	1-2
	7-35	60-80	1.30-1.60	0.06-0.2	0.14-0.18	5.1-7.8	High	0.24		
	35-65	50-80	1.30-1.60	0.06-0.2	0.14-0.18	5.1-7.8	High	0.32		
TyA: Tygart	0-15	15-27	1.20-1.40	0.6-2.0	0.18-0.22	5.1-6.0	Low	0.43	3	2-4
	15-59	35-50	1.20-1.50	0.06-0.2	0.10-0.14	4.5-6.0	Moderate	0.32		
	59-65	35-50	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.0	Moderate	0.32		

See footnote at end of table.

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
TyB-------------- Tygart	0-10	15-27	1.20-1.40	0.6-2.0	0.18-0.22	4.5-6.0	Low----------	0.43	3	2-4
	10-55	35-50	1.20-1.50	0.06-0.2	0.10-0.14	4.5-6.0	Moderate-----	0.32		
	55-65	35-50	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.0	Moderate-----	0.32		
Ua*. Udorthents, smoothed										
Ub*. Urban land										
UkC*: Urban land.										
Berks-----------	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	5.1-6.5	Low----------	0.17	3	2-4
	7-21	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.5-6.5	Low----------	0.17		
	21-25	5-20	1.20-1.60	0.6-6.0	0.04-0.10	3.5-6.5	Low----------	0.17		
	25	---	---	---	---	---	-------------	----		
UvC*: Urban land.										
Carbo-----------	0-9	27-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate-----	0.37	2	.5-3
	9-34	60-80	1.30-1.45	0.06-0.2	0.10-0.14	5.6-7.8	High---------	0.24		
	34	---	---	---	---	---	-------------	----		
Endcav----------	0-8	30-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-7.3	Moderate-----	0.37	3	.5-2
	8-41	35-80	1.30-1.50	0.06-0.2	0.10-0.14	5.1-7.8	High---------	0.20		
	41	---	---	---	---	---	-------------	----		
UwC*: Urban land.										
Hagerstown------	0-12	15-27	1.20-1.40	0.6-6.0	0.16-0.24	5.1-7.3	Low----------	0.32	4	1-5
	12-20	25-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
	20-71	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
	71	---	---	---	---	---	-------------	----		
W*. Water										
WbB*: Weikert---------	0-6	15-27	1.20-1.40	2.0-6.0	0.08-0.14	3.5-6.0	Low----------	0.20	2	.5-3
	6-18	15-27	1.20-1.40	2.0-6.0	0.04-0.08	3.5-6.0	Low----------	0.20		
	18	---	---	---	---	---	-------------	----		
Berks-----------	0-6	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.0	Low----------	0.17	3	.5-3
	6-26	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.0	Low----------	0.17		
	26-36	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.0	Low----------	0.17		
	36	---	---	---	---	---	-------------	----		
WbC*: Weikert---------	0-6	15-27	1.20-1.40	2.0-6.0	0.08-0.14	3.5-6.0	Low----------	0.20	2	.5-3
	6-18	15-27	1.20-1.40	2.0-6.0	0.04-0.08	3.5-6.0	Low----------	0.20		
	18	---	---	---	---	---	-------------	----		
Berks-----------	0-6	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.0	Low----------	0.17	3	.5-3
	6-26	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.0	Low----------	0.17		
	26-36	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.0	Low----------	0.17		
	36	---	---	---	---	---	-------------	----		

See footnote at end of table.

Table 16.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
WbD*:										
Weikert---------	0-4	15-27	1.20-1.40	2.0-6.0	0.06-0.12	3.5-6.0	Low----------	0.17	2	.5-3
	4-18	15-27	1.20-1.40	2.0-6.0	0.04-0.08	3.5-6.0	Low----------	0.20		
	18	---	---	---	---	---	-------------	----		
Berks-----------	0-4	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.0	Low----------	0.17	3	.5-3
	4-26	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.0	Low----------	0.17		
	26-36	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.0	Low----------	0.17		
	36	---	---	---	---	---	-------------	----		
WkF*:										
Weikert---------	0-2	15-27	1.20-1.40	2.0-6.0	0.06-0.12	3.5-6.0	Low----------	0.17	2	.5-3
	2-13	15-27	1.20-1.40	2.0-6.0	0.04-0.08	3.5-6.0	Low----------	0.20		
	13	---	---	---	---	---	-------------	----		
Berks-----------	0-2	5-23	1.20-1.50	0.6-6.0	0.04-0.10	3.6-6.0	Low----------	0.17	3	.5-3
	2-24	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.0	Low----------	0.17		
	24	---	---	---	---	---	-------------	----		

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.--Soil and Water Features

("Flooding" and "water table" and terms such as "frequent," "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	Frequency of flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
At: Atkins	D	Frequent	0-1.0	Apparent	Nov-Jun	>60	---	High	High	Moderate.
BkE: Blackthorn	B	None	>6.0	---	---	>60	---	Low	Moderate	High.
BpE*, BpF*:										
Blackthorn	B	None	>6.0	---	---	>60	---	Low	Moderate	High.
Pecktonville	C	None	3.5-6.0	Perched	Dec-Apr	>60	---	Moderate	Moderate	High.
BuB, BuC, BxC, BxE: Buchanan	C	None	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	High	High.
CaB, CaC, CaD, CaE, CaF: Calvin	C	None	>6.0	---	---	20-40	Soft	Moderate	Low	Moderate.
CbB, CcC, CcD: Caneyville	C	None	>6.0	---	---	20-40	Hard	---	High	Moderate.
CeB*, CeC*:										
Carbo	C	None	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Endcav	C	None	>6.0	---	---	40-60	Hard	Moderate	High	Low.
CgB*:										
Carbo	C	None	>6.0	---	---	20-40	Hard	Moderate	High	High.
Opequon	C	None	>6.0	---	---	12-20	Hard	Moderate	Moderate	Low.
CgC*, ChC*:										
Carbo	C	None	>6.0	---	---	20-40	Hard	Moderate	High	High.
Opequon	C	None	>6.0	---	---	12-20	Hard	Moderate	Moderate	Low.

See footnotes at end of table.

Table 17.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Frequency of flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
ChE*:										
Carbo	C	None	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Opequon	C	None	>6.0	---	---	12-20	Hard	Moderate	Moderate	Low.
CkB, CmB: Clearbrook	D	None	0.5-1.5	Perched	Oct-Apr	20-40	Soft	Moderate	High	Moderate.
CrB*:										
Clearbrook	D	None	1.0-2.5	Perched	Dec-Apr	20-40	Soft	Moderate	High	Moderate.
Berks	C	None	>6.0	---	---	20-40	Soft	Low	Low	High.
Cs: Combs	B	Occasional	>6.0	---	---	>60	---	---	Low	Low.
DaC, DaD, DaE: Dekalb	B**	None	>6.0	---	---	20-40	Hard	Low	Low	High.
DkC: Dekalb	B**	None	>6.0	---	---	20-40	Hard	Low	Low	High.
DrE*:										
Dekalb	B**	None	>6.0	---	---	20-40	Hard	Low	Low	High.
Rock outcrop.										
DsB, DsC, DsD: Downsville	B	None	>6.0	---	---	>60	---	Moderate	Low	High.
DuB, DuC, DyB, DyC: Duffield	B	None	>6.0	---	---	60-99	---	Moderate	Moderate	Moderate.
Dz: Dunning	D	Occasional	0-0.5	Apparent	Jan-Apr	>60	---	High	High	Moderate.
Fa: Fairplay	D	Frequent	+.5-0.5	Apparent	Nov-May	>60	---	High	Moderate	Low.
Fk: Funkstown	B	Occasional	2.0-3.5	Apparent	Dec-Apr	>60	---	Moderate	Moderate	Low.

See footnotes at end of table.

Table 17.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Frequency of flooding	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
			Ft			In				
FnA, FsA---------- Funkstown	B	None------------	2.0-3.5	Apparent	Dec-Apr	>60	---	Moderate	Moderate	Low.
HbA, HbB, HbC, HcB, HcC, HcD, HdB, HdC, HdD---- Hagerstown	B	None------------	>6.0	---	---	>60	---	Moderate	Moderate	Low.
HgC*, HgE*:										
Hagerstown-------	B	None------------	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Opequon----------	C	None------------	>6.0	---	---	12-20	Hard	Moderate	Moderate	Low.
Rock outcrop.										
HkF*:										
Hazleton---------	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	High.
Berks------------	C	None------------	>6.0	---	---	20-40	Soft	Low------	Low------	High.
HsE*:										
Hazleton---------	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	High.
Dekalb-----------	B**	None------------	>6.0	---	---	20-40	Hard	Low------	Low------	High.
HsF*:										
Hazleton---------	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	High.
Dekalb-----------	B**	None------------	>6.0	---	---	20-40	Hard	Low------	Low------	High.
Hu---------------- Huntington	B	Occasional------	>6.0	---	---	>60	---	High-----	Low------	Moderate.
La---------------- Lappans	A	Occasional------	4.0-6.0	Apparent	Dec-Mar	>60	---	Moderate	Low------	Low.
Ln---------------- Lindside	C	Frequent--------	1.5-3.0	Apparent	Dec-Apr	>60	---	High-----	Moderate	Low.
MhA, MhB, MhC, MoB-------------- Monongahela	C	None------------	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High-----	High.

See footnotes at end of table.

Table 17.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Frequency of flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
MrB, MrC: Murrill	B	None	>6.0	---	---	>60	---	Moderate	High	Moderate.
PeB, PeC, PeD, PgC: Pecktonville	C	None	3.5-6.0	Perched	Dec-Apr	>60	---	Moderate	Moderate	High.
Ph: Philo	B	Occasional	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low	High.
PoA, PoB: Poorhouse	D	None	0.5-1.5	Apparent	Dec-Apr	>60	---	Moderate	Moderate	Low.
Ps: Pope	B	Frequent	>6.0	---	---	>60	---	Moderate	Low	High.
Px: Pope	B	Occasional	>6.0	---	---	>60	---	Moderate	Low	High.
Qm*, Qs*. Quarry										
ReF*: Rock outcrop.										
Opequon	C	None	>6.0	---	---	12-20	Hard	Moderate	Moderate	Low.
RnB*, RnC*, RnD*: Ryder	C	None	>6.0	---	---	24-40	Hard	Moderate	Low	Moderate.
Nollville	B	None	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.
RvC*: Ryder	C	None	>6.0	---	---	24-40	Hard	Moderate	Low	Moderate.
Nollville	B	None	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.
SwA, SwB: Swanpond	C	None	2.5-3.5	Perched	Dec-Apr	>60	---	Moderate	High	Low.
TyA, TyB: Tygart	D	None	0.5-1.5	Apparent	Dec-May	>60	---	Moderate	High	High.

See footnotes at end of table.

Table 17.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Frequency of flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
Ua*. Udorthents, smoothed										
Ub*. Urban land										
UkC*: Urban land.										
Berks	C	None	>6.0	---	---	20-40	Soft	Low	Low	High.
UvC*: Urban land.										
Carbo	C	None	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Endcav	C	None	>6.0	---	---	40-60	Hard	Moderate	High	Low.
UwC*: Urban land.										
Hagerstown	B	None	>6.0	---	---	>60	---	Moderate	Moderate	Low.
W*. Water										
WbB*: Weikert	C/D	None	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
Berks	C	None	>6.0	---	---	20-40	Soft	Low	Low	High.
WbC*: Weikert	C/D	None	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
Berks	C	None	>6.0	---	---	20-40	Soft	Low	Low	High.
WbD*, WkF*: Weikert	C/D	None	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
Berks	C	None	>6.0	---	---	20-40	Soft	Low	Low	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

** The Dekalb soil is assigned to hydrologic group B if the underlying bedrock is folded, crushed, or fractured.

Table 18.--Classification of the Soils

Soil name	Family or higher taxonomic class
Atkins	Fine-loamy, mixed, acid, mesic Typic Fluvaquents
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Blackthorn	Loamy-skeletal, mixed, mesic Typic Hapludults
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Calvin	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Caneyville	Fine, mixed, mesic Typic Hapludalfs
Carbo	Very fine, mixed, mesic Typic Hapludalfs
Clearbrook	Loamy-skeletal, mixed, mesic Aeric Epiaquults
Combs	Coarse-loamy, mixed, mesic Fluventic Hapludolls
Dekalb	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Downsville	Loamy-skeletal, mixed, mesic Typic Paleudults
Duffield	Fine-loamy, mixed, mesic Ultic Hapludalfs
Dunning	Fine, mixed, mesic Fluvaquentic Endoaquolls
Endcav	Very fine, mixed, mesic Typic Hapludalfs
Fairplay	Fine-loamy, carbonatic, mesic Fluvaquentic Endoaquolls
Funkstown	Fine-loamy, mixed, mesic Oxyaquic Hapludalfs
Hagerstown	Fine, mixed, mesic Typic Hapludalfs
Hazleton	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
Lappans	Fine-loamy, carbonatic, mesic Typic Calciudolls
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Murrill	Fine-loamy, mixed, mesic Typic Hapludults
Nollville	Fine-loamy, mixed, mesic Typic Hapludalfs
Opequon	Clayey, mixed, mesic Lithic Hapludalfs
Pecktonville	Clayey, mixed, mesic Typic Paleudults
Philo	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Poorhouse	Fine, mixed, mesic Aquic Hapludalfs
Pope	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Ryder	Fine-loamy, mixed, mesic Ultic Hapludalfs
Swanpond	Very fine, mixed, active, mesic Vertic Paleudalfs
Tygart	Clayey, mixed, mesic Aeric Endoaquults
Udorthents	Udorthents
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts