United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Board of County Commissioners of Frederick County, Catoctin Soil Conservation District, Frederick Soil Conservation District, and Maryland Agricultural Experiment Station (University of Maryland)

Soil Survey of Frederick County, Maryland

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.

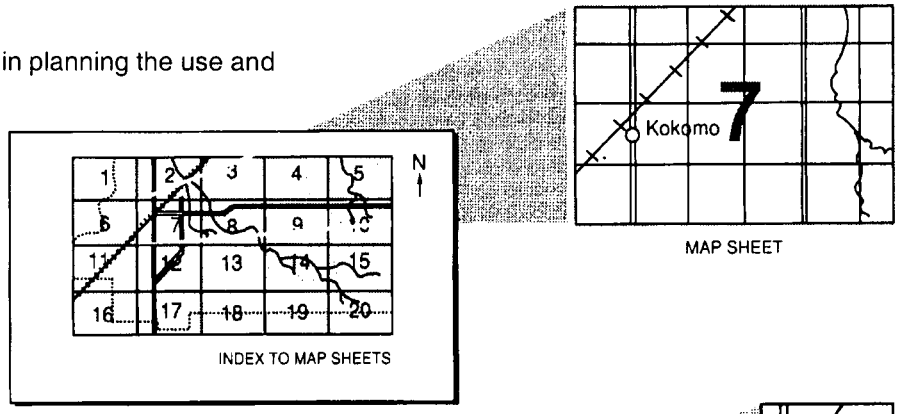
Detailed Soil Maps

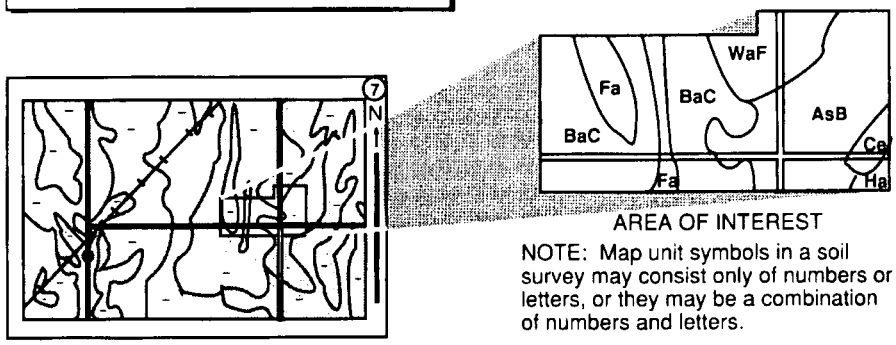
The detailed soil maps can be useful in planning the use and management of small areas.

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.





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 1998. Soil names and descriptions were approved in 2001. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1998. This survey was made cooperatively by the Natural Resources Conservation Service, the Board of County Commissioners of Frederick County, the Catoctin Soil Conservation District, the Frederick Soil Conservation District, and the Maryland Agricultural Experiment Station (University of Maryland). The survey is part of the technical assistance furnished to the Frederick and Catoctin Soil Conservation Districts.

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

Cover: Stripcropping in an area of Benevola silty clay loam (in the valley) and in an area of Glenelg gravelly loam (on the side slopes).

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 2002

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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

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

David P. Doss
State Conservationist
Natural Resources Conservation Service

Soil Survey of Frederick County, Maryland

By Joseph S. Kraft, Natural Resources Conservation Service

Fieldwork by Joseph S. Kraft, Jared Beard, Valerie Cohen, Phil King, Andy K. Piri, Carl Robinette, and David Verdone, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
Board of County Commissioners of Frederick County, Catoctin Soil Conservation District, Frederick Soil Conservation District, and Maryland Agricultural Experiment Station (University of Maryland)

FREDERICK COUNTY is the largest county in the state of Maryland (fig. 1). It encompasses 663 square miles, or 424,200 acres. It is in the north-central part of the state and located approximately 42 miles west of Baltimore and 52 miles northwest of Washington, D.C. It borders the State of Pennsylvania to the north and is separated from the State of Virginia by the Potomac River to the south.

This soil survey updates the survey of Frederick County, Maryland, published in 1960 *(19)*. It provides updated and additional information. The soil maps have been stored and are available as computerized digitized information that can be accessed through a Geographic Information System.

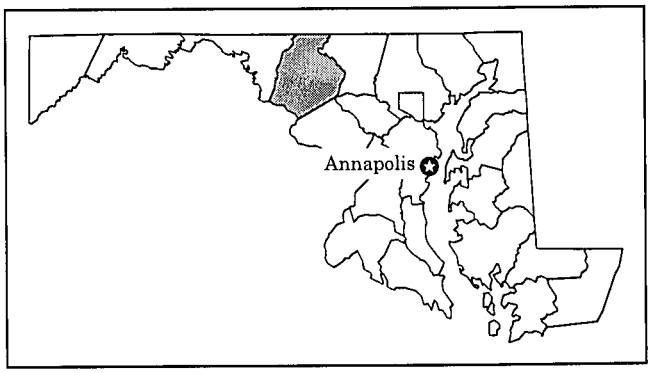


Figure 1.—Location of Frederick County in Maryland.

General Nature of the County

The following paragraphs describe the history and development, industry and transportation, physiography and relief, water supply, agriculture, mineral resources, and climate of the survey area.

History and Development

Dating back to 6000 B.C., the first inhabitants of the survey area were Native American Indians who established camps along the Monocacy and Potomac Rivers and the adjoining creeks. Their camps were located near water because the animals they hunted came to drink there. These people were primarily engaged in hunting, fishing, and gathering berries. Archaeologic evidence, such as stone tools, weapons, and utensils, has been found alongside the Monocacy and Potomac Rivers *(10)*.

Frederick County was established in 1748. It was originally part of Prince George's County and was known as Fredericktown. In the early 1700's a few English settlers were scattered among the farms in the southern part of the county. In 1746, the next wave of immigrants, the Germans, arrived. The location of Fredericktown as a market town was ideal. A businessman named Daniel Delaney purchased 8,000 acres along Carroll Creek between the mountains and the Monocacy River. He spread the word to Germany about opportunities in Fredericktown. Soon afterwards, German immigrants seeking farmland, business

opportunities, and religious freedom arrived in Fredericktown and the town flourished. Mills of all kinds sprang up, a newspaper was printed in English and German, and fine artisans, such as clock makers and cabinetmakers, were attracted to this bustling town *(10)*.

The population of Frederick County has steadily risen from 114,792 in 1980 to 150,208 in 1990. It is estimated that by the year 2000, the population will be 184,000. Frederick County employs approximately 49,531 workers. It is Maryland's largest dairy producer, providing one-third of the state's milk production *(10)*.

Industry and Transportation

Frederick County is part of the Washington Metropolitan Area. In 1997, its population ranked eighth in the State with 183,099 people. In 1997, the county had a per capita personal income (PCPI) of $26,270. This PCPI ranked seventh in the state and was 92 percent of the state average *(11)*.

In 1997, the largest industries in the county were service industries, making up 28.1 percent of the earnings; construction industries, making up 12.2 percent; and retail trade, making up 10.5 percent. The county's largest employers include the National Cancer Institute at Fort Dietrick, State Farm Insurance, Frederick Memorial Hospital, and Eastalco Aluminum *(11)*.

Frederick County has an excellent transportation infrastructure, consisting of Highways I-70 and I-270 and U.S. Highways 15, 40, and 340. As a result of this highway infrastructure, the county is served by more than 30 motor freight lines. Rail transportation is available and includes short line service and commuter rail. Air transportation is provided by the Frederick Municipal Airport, which offers charter service. Larger air service is available at the Baltimore-Washington International Airport and the Washington National and Washington Dulles International Airports.

Physiography and Relief

Scott Southworth, U.S. Geological Survey, helped write this section.

Frederick County lies within two physiographic provinces: the Blue Ridge, in the west, and the Piedmont, in the east. The Piedmont, meaning "foot of the hill," is characterized by gently rolling hills with some deeply cut valleys. The Piedmont province in the survey area is comprised of several distinct physiographic sections. From west to east, these are the Culpeper and Gettysburg basins (Mesozoic basins), the Frederick Valley, and the Westminster terrain.

The Blue Ridge province is mountainous, having linear ridges (South Mountain and Catoctin Mountain) surrounding the intermountain Middletown Valley. The highest elevation in the county is 1,917 feet above sea level south of Foxville, and the maximum relief is about 1,500 feet.

The Piedmont province generally has low relief. The Frederick Valley forms a low valley, and the Gettysburg and Culpeper basins are slightly higher. Most of the area east of the Westminster terrain consists of a dissected plateau that rises in elevation eastward to Parrs Ridge at the boundary with Carroll County. From New Market north to Union Bridge are abundant amounts of marble, limestone, greenstone, and quartzite that have weathered to form a topography that is characterized by hills and swales. Sugarloaf Mountain, an isolated highland formed as an erosional remnant, rises to an altitude of 1,282 feet above sea level. Excluding Sugarloaf Mountain, the topographic relief is about 600 feet.

Blue Ridge province

The Blue Ridge province consists of the South Mountain-Blue Ridge anticlinorium. Clastic sedimentary rocks, such as the Loudoun, Weverton, Harpers, and Antietam Formations, underlie South Mountain. The Loudoun Formation is generally thin and consists of phyllite and coarse pebble conglomerate. The Weverton Formation consists mostly of quartzite and metasiltstone. The Harpers Formation is predominantly metasiltstone and minor phyllite. The Anteitam Formation contains metasandstone, quartzite, and metasiltstone. Soils such as Edgemont, Leetonia, Stumptown, Dekalb, Weverton, Bagtown, and Hazel are mapped in these rock formations. Catoctin Mountain is underlain by the metamorphosed volcanic Catoctin Formation. Rocks of the Catoctin Formation are mostly greenstone (metamorphosed basalt) with some phyllite and rhyolite. In the highlands north of Middletown, soils such as Highfield, Ravenrock, Catoctin, Mt. Zion, Rohrersville, and Lantz are mapped. The valley core of the anticlinorium south of Middletown consists of granitic gneiss intruded by greenstone dikes. Burkittsville, Catoctin, Mt. Zion, Myersville, Rohrersville, and Spoolsville soils are mapped in this area. Locally, there are pods of clastic rocks (Swift Run Formation) that intervene between the gneiss and greenstone.

Piedmont province

Mesozoic basins.—Along the eastern border of the Blue Ridge province are red shales, siltstone, sandstone (Balls Bluff Siltstone and Manassas Sandstone), and limestone conglomerate (the Tuscarora Creek Member of the Manassas Sandstone and the Leesburg Member of the Balls Bluff Siltstone) of the Culpeper and Gettysburg basins. These rocks were faulted down along the base of Catoctin Mountain and Sugarloaf Mountain but also overlapped onto the underlying limestone of Frederick Valley. Where erosion has removed the overlapping rocks west of Frederick, the southern belt is called the Culpeper basin and the northern belt is called the Gettysburg basin. Penn, Readington, Croton, Brentsville, Abbottstown, and Klinesville soils are mapped on the shale and siltstone, and Athol, Morven, and Springwood soils formed on the limestone conglomerate. North of Frederick on the lower slope of Catoctin Mountain, Braddock, Trego, Airmont, and Thurmont soils are mapped on the deep colluvium. Murrill and Dryrun soils are mapped in the valley where the colluvium is thinner, as is evidenced by the presence of limestone bedrock.

Frederick Valley.—Limestone and minor shale and sandstone of the Frederick Valley (Frederick and Grove Formations) are beneath the Triassic rocks on the west and above the metasiltstone of the Araby Formation on the east. The limestone is overlain by Hagerstown, Adamstown, Buckeystown, Duffield, Funkstown, and Ryder soils. Cardiff, Whiteford, and Glenville soils are mapped on the Araby Formation.

Soils that form over limestone are subject to sinkhole development on the purity of the geology and contacts with other geologies. The Frederick Valley has numerous sinkholes due to the karst nature of the limestone geology *(4, 12)*. Tables 1 and 2 provide information on the potential for sinkhole development for selected soil series based on geologic formation.

Westminster terrain.—East of the Araby and Frederick Formations, the Martic fault has emplaced a complex assemblage of rocks called the Westminster terrain. The Sugarloaf Mountain Quartzite (quartzite and minor siltstone) and Urbana Phyllite Formation (siltstone, quartzite, calcareous sandstone, and minor marble) form the Sugarloaf Mountain anticlinorium within the Westminster terrain. Stumptown, Weverton, Hazel, Edgemont, Airmont, and Bagtown soils occur on the summit and upper slopes. Ravenrock, Highfield, and Rohrersville soils occur on the steeper backslopes of Sugarloaf Mountain. Mt. Airy, Glenelg, Brinklow, and Blocktown soils developed on the lower footslopes and valley uplands of the Urbana Formation.

The far eastern part of the county is underlain by metasiltstone and phyllite (both impregnated with vein quartz) of the Marburg Formation, sometimes referred to as the Gillis Group. Hazel, Blocktown, Brinklow, Glenelg, Glenville, Mt. Airy, Baile, and Edgemont soils are mapped on these sheared rocks. Between the rocks of the Marburg Formation and the Martic fault is a mixture (both sedimentary and tectonic) of Ijamsville Phyllite, the Sam Creek Formation, and Wakefield Marble. Ijamsville Phyllite consists of phyllite, slate, and quartzite. The Sam Creek Formation consists of phyllite, quarzite, greenstone, limestone, marble, and metasiltstone, forming soils such as Mt. Zion, Rohrersville, Linganore, Hyattstown, Conestoga, and Myersville. The Wakefield Marble has some phyllite and limestone associated with it. Benevola, Conestoga, Letort, Wiltshire, and Funkstown soils developed on these rocks.

Water Supply

Carole Larsen, Principal Planner, Frederick County Planning Commission, helped prepare this section.

Frederick County is part of the Potomac River Basin which empties into the Chesapeake Bay Watershed. Two major drainage basins that empty into the Potomac River are the Monocacy River and Catoctin Creek. In Frederick County, the Monocacy River has a number of smaller tributaries which empty into it, including Owens Creek, Bennett Creek, Linganore Creek, Little Pipe Creek, Friends Creek, Fishing Creek, Hunting Creek, and Piney Creek. Catoctin Creek has a number of smaller tributaries which empty into it, including Broad Run, Hallow Road Creek, Middle Creek, Grindstone Run, and Little Catoctin Creek. Smaller tributaries, such as Washington Run and Tuscarora Creek South, drain directly into the Potomac River. Most of these streams provide potentially good habitat for trout, and all of these streams are a good recreational resource. The streams are fed by approximately 43 inches of annual precipitation in the form of both rain and snow. Discharge from springs is another major source of recharge, especially in the limestone regions. Potable water for the various cities and towns and individual landowners is supplied by means of surface reservoirs, wells, springs, streams, creeks, and rivers. The water sources for the city of Frederick and surrounding towns and villages are Linganore Creek, the Monocacy River, and Fishing Creek Reservoir. Linganore Creek supplies approximately 3.8 million gallons per day, the Monocacy River supplies approximately 1.8 million gallons per day, and Fishing Creek Reservoir supplies approximately 0.8 million

gallons per day. Plans are currently under way to have the Potomac River supply additional water. The current system supplies approximately 53,000 to 56,000 gallons in and around the City of Frederick. The communities of Linganore and Spring Ridge rely on Lake Linganore for their water supply, and Middletown and Myersville rely in part on the Catoctin Creek for their water supply. Individual wells supply the remainder of the water service throughout the county, serving approximately 56 percent of the current population. The average depth and production of wells vary depending on the geologic formation in which they occur. Contamination of wells is of particular concern, especially in the limestone and marble regions of the county.

Agriculture

Terry E. Poole, Extension Agent, Agriculture and Natural Resources, and Stanley W. Fultz, Extension Agent, Dairy Science, Maryland Cooperative Extension, Frederick County, helped prepare this section.

Many of the soils in Frederick County, such as Benevola, Conestoga, Duffield, Glenelg, Hagerstown, and Myersville soils, are well suited to intensive agricultural production. They support the dairy industry, fruit and vegetable production, and grain production. Shallower soils, such as Blocktown, Brinklow, Cardiff, Catoctin, Hyattstown, Klinesville, and Mt. Airy soils, are better suited to the production of perennial hay and pasture grasses and legumes.

Most of the county orchards are in the Thurmont area on the footslopes of Catoctin Mountain and on the valley floor. Soils associated with this area include Braddock, Catoctin, Mt. Airy, Murrill, and Thurmont. Fruit trees grown in this area benefit from the movement of circulating air coming off the ridges of Catoctin Mountain down into the foothills and the valley.

Soils around the Thurmont area are known as Triassic red soils. These soils include Abbottstown, Croton, Penn, Readington, and Reaville. They are difficult to work because of a tendency to be too wet or too droughty. Timing is essential in working with these soils, and intensive management is needed if crop yields are to be productive.

Soils derived from diabase dikes can also be difficult to manage. These soils include Montalto and Legore. The large amount of boulders on the surface can make the use of equipment difficult. Soils such as Catoctin, Hyattstown, Linganore, and Mt. Airy can be droughty due to the large amount of rock fragments in the soil. These soils may be better suited to the production of pasture or hay crops. Braddock, Murrill, Trego, and Thurmont soils can be difficult to manage due to stones and cobbles on the surface.

Water erosion, soil blowing, and the contamination of ground water and surface water with excess plant nutrients, principally nitrogen and phosphorus, are common concerns when maximizing the agricultural productivity of soils. The increased use of buffers such as hedgerows and wood lots can minimize soil loss. Fall plowing is not recommended due to the high potential for soil erosion. The use of conservation tillage practices, such as reduced till or no-till, in conjunction with a cover crop is strongly recommended for controlling erosion. The use of stripcropping in conjunction with diversions and waterways helps to control the flow of water moving over the soil surface by breaking up the total slope length. Stripcropping can be accomplished by rotating and alternating the vegetative cover, such as corn with small grain, hay, or soybeans. Diversions break up the long slope lengths and divert the surface flow of water off fields to a controlled waterway or outlet. Developing nutrient management programs for crop fields helps to ensure that the exact amount of fertilizer and animal manure are used for plant nutrition, thereby protecting surface water and ground water from excess nitrogen and potassium. Additional benefits of erosion control and nutrient management include increased amounts of organic matter in the soil, improved water infiltration, better soil moisture retention, reduced fuel and fertilizer costs, and higher profits.

Organic matter is essential in improving soil tilth and water infiltration. In Frederick County, the organic matter content in the surface layer ranges, on average, from 2 to 4 percent. In some severely eroded areas on steep slopes and around rock outcrops, the organic matter content is less than 1 percent. In recent years, with the removal of small grain residues for use as straw or silage, the utilization of field corn as silage, and the use of corn stubble grazing as a feed source, the overall content of organic matter has decreased. Organic matter content can be increased by planting a green manure crop, such as a winter cover crop; utilizing animal manure; and adopting no-till crop production practices. An increased organic matter content improves the soil water-holding capacity and nutrient-holding capacity, minimizes soil compaction, helps to prevent some plant diseases, and helps to control soil erosion.

Contour strip farming is not recommended, nor is it practical, on soils that have a rocky surface or that are mapped in a complex with Rock outcrop. The survey has identified the following soil units with these limitations: Springwood, Edgemont, Hazel-Edgemont, Duffield-Ryder, Dekalb, Hyattstown, Stumptown,

Stumptown-Bagtown, Ravenrock-Highfield, Klinesville, and Myersville-Catoctin. The rock outcrops make it impractical to establish contour strips.

Crops

Due to the extensive dairy and livestock production in the county, field and forage crops are the dominant crops produced (see table 3). Corn and soybeans are the primary crops grown for grain. The percentage of the corn crop harvested for grain or chopped for silage varies somewhat seasonally depending on the producer's need for feed and the weather. In dry years when the corn yield is depressed and feed supplies are low, more acres of corn are chopped. Small grains such as wheat, barley, and oats are harvested for grain and silage and occasionally used for pasture. The nursery and greenhouse industry, as well as vegetable production, has increased over the past decade due in part the urbanization of the county and region (see table 4). The 1997, according to the U.S. Census of Agriculture, the county harvested crops on 134,457 acres. This is 36 percent less than what was harvested in 1987. Droughty conditions in 1997, increased acres enrolled in government set-aside programs, and land lost to urbanization all contributed to this decrease in acreage. In 1997, cropland utilized for field and forage crops totaled 105,978 acres.

Livestock

Raising cattle, especially dairy stock, is the principal agricultural livestock enterprise in Frederick County (see table 5). The county leads the state in number of cattle per farm and in numbers sold as well as in dairy products marketed. The number of dairy farms and cows has decreased steadily over the past 50 years. Milk production, however, continues to increase gradually; 433 million pounds of milk was sold in 1999. The Census of Agriculture no longer reports the number of horses; however, it is commonly accepted that the numbers are increasing. Likewise, several large integrated turkey and hog operations have been constructed during the past 5 years.

Types and size of farms

According to the 1997 U.S. Census of Agriculture, farmland in Frederick County decreased 9 percent, from 236,350 acres in 1987 to 215,927 acres in 1997. While the number of farms declined 9.4 percent, from 1,439 farms in 1978 to 1,304 farms in 1997, the average size of farms, 165 acres, essentially remained unchanged. Census data trends have observed that the county's farmland base is decreasing by approximately 1,368 acres per year.

In 1997, the county had 463 farms that ranged in size from 50 to 179 acres, 372 farms that ranged in size from 10 to 49 acres, and 96 farms that ranged in size from 1 to 9 acres. Larger farms consisting of 180 to 499 acres totaled 300. There were 50 farms that ranged in size from 500 to 999 acres and 23 farms that were more than 1,000 acres in size. The median sales in farm products from an average farm in the county were between $10,000 and $24,000 per year. The majority of these farm cash receipts were from livestock, dairy, and poultry sales. The county has had an overall decrease in farming over the past several years. Full-time farmers have decreased 12 percent; there were 754 farms in 1992 and 667 farms in 1997. The farming trend seems to be headed towards smaller, part-time farms which produce specialty, nontraditional agricultural products, such as organically raised produce. According to the 1997 U.S. Census of Agriculture, only 51 percent of all farm operators in the county list farming as a primary occupation.

Mineral Resources

Many of the geologic formations in Frederick County are presently mined, and there is ample opportunity for other operations. Eight of the 28 active sites in the state for limestone, shale, and stone aggregate are located in Frederick County. Iron ore and copper were mined in the past in rather small and scattered locations *(7)*.

The most abundant mineral resource of the county is limestone. The large limestone quarries throughout the county are associated with the Grove Formation. There are smaller operations associated with the Frederick Formation. Some members of this formation contain impurities such as shale, siltstone, and mudstone. Products developed from limestone operations are agricultural supplies, stone for construction uses, concrete aggregate, and building stone. The Wakefield Marble near Union Bridge is mined for both building stone and road base material.

The Gettysburg Formation is the most promising source of material for brick and tile production. This is a Triassic red shale formation that is mined near Rocky Ridge for brick manufacturing. Local beds of quartzite which were once mined for the production of glass occur throughout the county. One site was the Amelung Glass Work near Sugarloaf Mountain. However, most of the quartzite is either too impure for modern glass manufacturing or too hard and tightly cemented to be crushed economically *(7)*.

Other minerals such as copper, lead, zinc, barite, and iron ore were mined in the county. A number of small mines, such as the Liberty Mine, the Dolly Hyde

Mine, and the New London Mine, operated in the 19th century but are not economically workable at present because deposits are small *(7)*. Iron ore was mined extensively during the 18th and 19th centuries. Most of the larger mines were located along the base of Catoctin Mountain at the Catoctin Furnace. This ore was mined for the production of steel products such as railroad rails, structural steel, cannon barrels, and cannonballs during the Civil War. However, the small size of these deposits and the low grade of the ores resulted in the gradual decline of the iron industry in Frederick County.

Climate

Table 6 gives data on temperature and precipitation for the survey area as recorded at Emmitsburg, Maryland, in the period 1961 to 1990. Table 7 shows probable dates of the first freeze in fall and the last freeze in spring. Table 8 provides data on length of the growing season.

In winter, the average temperature is 31.7 degrees F and the average daily minimum temperature is 22.1 degrees. The lowest temperature on record, which occurred on January 21, 1994, is -27 degrees. In summer, the average temperature is 72.2 degrees and the average daily maximum temperature is 84.6 degrees. The highest recorded temperature, which occurred on August 20, 1983, is 103 degrees.

Growing degree days are shown in table 6. 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 42.97 inches. Of this, 19.10 inches, or about 44 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 1.9 inches. The heaviest 1-day rainfall during the period of record was 7.50 inches on September 14, 1996. Thunderstorms occur on about 28 days each year, and most occur in July.

The average seasonal snowfall is about 35.2 inches. The greatest snow depth at any one time during the period of record was 40 inches. On the average, 32 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 77 percent. Humidity is higher at night, and the average at dawn is about 54 percent. The sun shines 63 percent of the time possible in summer and 48 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 11 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

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

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

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

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

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

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

This survey updates the soil survey of Frederick County published in 1960 *(19)*. It provides additional data and soil interpretations and larger maps, which show the soils in greater detail. The soils in this survey are described to a greater depth than in the previous survey. Many of the soil series and map unit names have been changed because of new information and changes in the national system for soil classification. Although some soil boundaries have been readjusted, many are essentially the same as those in the original survey.

The general procedures followed in making the survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service *(22)*. The previous soil survey of Frederick County, Maryland, the geology map of the county, and other references were used to prepare the manuscript and to plan the soil transects.

Before fieldwork began, color infrared aerial photographs taken in March and April of 1988 at a scale of 1:1,000 feet were studied. These aerial photographs provided information that was significant in determining the location of certain soil boundaries in woodland areas. They were also used to locate representative areas for transects and sampling sites. All the soil profile descriptions from the 1960 report representing the modal, or central concept, of the soil series were investigated and described using new terminology and nomenclature. They were used as a starting point for evaluating the old map units. A reconnaissance was made by vehicle before the landscape was traversed on foot. The field transects were used to identify any changes needed in the central concept of the series and to determine map unit composition. Some areas required remapping, particularly those near South Mountain, Catoctin Mountain, and Sugarloaf Mountain and those on alluvial flood plains. In the previous soil survey, many of these areas were mapped with less detail and at a less accurate level of soil classification. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretation.

Some of the soil series in the 1960 survey could not be used. New information on soil temperature, particle-size distribution, and water tables indicated the need for the establishment of new series. Many of the new series and some of the older series were sampled for chemical and physical analyses and for

analyses of engineering properties. Full characterization analyses were made by the Soil Survey Laboratory in Lincoln, Nebraska. Particle-size distribution, mineralogy analyses, and special studies related to soils throughout the county were made by the Pedology Research Laboratory, Department of Agronomy, University of Maryland. A description of laboratory procedures can be obtained on request from the laboratories or from the State Office of the Natural Resources Conservation Service.

Formation of the Soils

This section describes the factors of soil formation as they relate to the soils in Frederick County. It also explains the morphology of the soils and the major processes in their development.

Factors of Soil Formation

Soils are a three-dimensional body consisting of organic matter, mineral matter, air, and water. Soils formed through the chemical and physical weathering of geologic materials. The extent of the weathering and the characteristics of any soil depend on the nature of the parent rock, the kind of climate, the relief (or lay of the land), the plant and animal life in and on the soil, and the length of time that these factors have affected development.

In a small area, such as Frederick County, the vegetation, climate, and time factors vary only slightly. The nature of the parent material and the relief are responsible for most of the differences in soil properties. The nature of the parent rock determines the texture and mineral content of the soils. Relief affects drainage, aeration, runoff, erosion, and exposure to sun and wind. Plant and animal life influences soil characteristics by physical and chemical removals and additions. Climate influences the nature and extent of the weathering processes. Time is required for the processes responsible for soil development. Long periods are generally needed for soil development.

Parent Material

Parent material is the unconsolidated mass from which the soils formed. It determines the mineralogical and chemical composition of the soil and, to a large extent, the rate at which soil-forming processes take place. In the early stages of soil formation, the mineralogical, physical, and chemical properties of the soil closely resemble those of the parent material. For example, the composition of Glenelg soils is similar to the acid phyllite from which they formed. As a soil ages, the processes of soil formation alter rocks and minerals and the resulting soils typically have different characteristics. For example, the properties of Duffield soils differ from the original limestone parent material.

Many soils in Frederick County have formed in place in residuum directly over the original bedrock. Dekalb soils on the major ridges of South Mountain formed from hard metagraywacke and quartzite of the Weverton Formation. Glenelg, Mt. Airy, Brinklow, and Blocktown soils formed from tan, light silvery gray, and dull purple phyllite and schist of the Ijamsville and Gillis Formations. Penn and Klinesville soils formed from dark reddish brown to red mudstone, siltstone, and argillaceous silty sandstone of the Triassic-age Gettysburg and New Oxford Formations. Conestoga and Letort soils formed from calcareous phyllite and schist materials of the Sams Creek Formation. Duffield, Ryder, Hagerstown, and Buckeystown soils formed from limestone of the Frederick and Grove Limestone Formations. Murrill, Dryrun, and Braddock soils formed in transported quartzite and phyllite colluvium deposited over limestone. Thurmont, Trego, Weverton, and Bagtown soils formed in colluvium from a mixture of acid quartzite, phyllite, siltstone, and sandstone. Combs, Lindside, and Melvin soils formed from calcareous alluvium.

Parent material and rock type have also had a major influence on the topography of the survey area. Some rock types are much more susceptible to erosion and weathering than others. Quartzite and sandstone of the Weverton and Loudoun Formations generally underlie mountains and ridges, as in areas of South Mountain, Catoctin Mountain, and Sugarloaf Mountain. The lower hills and valleys are underlain by phyllite, schist, shale, and limestone from the Frederick, Grove, Ijamsville, Gillis, Sams Creek, and Urbana Formations and other formations.

Climate

Frederick County has a humid-temperate continental climate. Some characteristics of the soils in the county indicate that this climate prevailed when the soils were forming and that it affected soil formation. Many of the soils are acid and strongly leached. The effect of climate on the formation of soils has been

nearly uniform throughout the county. The formation of some soils, however, may have been affected by a microclimate caused by differences in relief.

Plants and Animals

Vegetation, animals, bacteria, and fungi affect soil formation. The vegetation is generally responsible for the amount of nutrients in the soil. Animals such as earthworms and cicadas and other burrowing animals help to keep the soil open and releasing nutrients for plant food. The native forests in Frederick County have had more influence on soil formation than any other living organism. Humans, however, have greatly influenced the surface layer by clearing forests and plowing. They have added fertilizers, mixed some of the soil horizons, and moved soil materials from place to place.

Relief

The relief in Frederick County is dominated by narrow to broad rolling valleys and steep ridges. It has been influenced by the strongly folded and faulted metamorphic and sedimentary rocks and their degree of resistance or susceptibility to physical and chemical weathering and erosion. Dekalb and Stumptown soils occur on the highest ridges and formed in sandstone and quartzite, which are highly resistant to weathering. Cardiff, Whiteford, Glenelg, and Linganore soils are on the lower hills and ridges and formed in phyllite and schist, which are intermediate in weathering resistance. Soils in the broad rolling valleys, such as Duffield and Hagerstown soils, formed from limestone, which is readily weathered. Combs, Hatboro, Codorus, and Bowmansville soils formed in recently deposited alluvium adjacent to streams, and Downsville and Walkersville soils developed in the older water deposits on terraces.

Time

The length of time the soil formation factors have acted on the weathered mineral material is indicated to some extent by the degree of development in the soil profile. Soils that formed in alluvium, such as Combs, Hatboro, Codorus, and Bowmansville soils, are considered young or recent because their parent material has been in place for a short period of time compared to other soils in the county. These soils have less distinct horizonation than older soils on uplands. Duffield, Ryder, Buckeystown, and Hagerstown soils have well developed profiles. The parent material of these soils has been in place long enough that distinct horizons have had time to develop.

Morphology of the Soils

The morphological features of soil are the result of the soil-forming factors. They are expressed in the development of different layers, or horizons, which makeup a soil profile. The soil profile extends from the surface down to material that is little altered by the soil-forming processes.

Most soils have three major horizons—the A, B, and C horizons. Some soils, particularly those in forests also have an O horizon at the surface. Numbers or lowercase letters indicate subdivisions of the major horizons. The Bt horizon, for example, has accumulated clay from the overlying horizons and is the most developed part of a B horizon. Hagerstown soils have a Bt horizon.

The O horizon is an organic layer. It consists of organic material, such as twigs, leaves, dead roots, or humified organic matter, mixed with a small amount of mineral material. Soils in forested areas, such as Bagtown, Dekalb, and Weverton soils, have a thin O horizon.

The A horizon is a mineral surface layer. It is darkened by humified organic matter. In cultivated areas, the material in this horizon is mixed with material from the underlying horizons and the result is a plow layer, or an Ap horizon. The amount of humus or organic matter in the horizon varies in different soils and ranges from very low to very high. The organic matter content in the Ap horizon of Duffield and Hagerstown soils can range to as much as 4 percent in places.

The E horizon, which commonly occurs in well developed, undisturbed soils, is a mineral subsurface layer. It is characterized by intense leaching, or eluviation, of clay and iron. An E horizon occurs if considerable leaching has taken place and organic matter has not darkened the material. This horizon is normally lighter in color that any other horizon in the profile. In cultivated areas, the material of this horizon is commonly mixed with the overlying A horizon and an E horizon may not occur.

The B horizon is a mineral subsoil layer and normally underlies an Ap or E horizon. It is characterized by the accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils, such as Myersville and Burkittsville soils, the B horizon formed through alteration of the original material and through accumulation or illuviation. The alteration can result

from weathering of the parent material; the release of iron, which results in rusty colors; and the development of a soil structure in place of the structure of the original unconsolidated sediments. The B horizon commonly has blocky or prismatic structure. It generally is firmer and lighter in color than the A horizon and is darker than the C and E horizons. Almost all of the soils in Frederick County have a B horizon.

The C horizon is a mineral substratum layer below an A or B horizon. It consists of material that is little altered by the soil-forming processes, but it may be modified by weathering. When the soil material of a C horizon is different than the parent material from which the overlying A and B horizons developed, the C horizon is labeled as a 2C horizon. Ravenrock soils have a 2C horizon. Most of the soils in Frederick County have a C or 2C horizon. In some young soils, such as those that formed in recent alluvium, the C horizon extends to or nearly to the surface. These soils do not have an E or B horizon. Hatboro soils are an example.

Processes of Soil Formation

Soil forms through complex processes that can be grouped into four general categories: additions; removals, or losses; transfers (from one horizon to another); and transformations. These processes affect soil formation in differing degrees.

The accumulation and incorporation of organic matter in the surface layer is an example of an addition. This addition is responsible for the formation of the A horizon and is the main reason for the dark color of surface horizons in the mineral soils of Frederick County. Heat from the sun and water from precipitation are also considered additions. These additions assist with chemical and physical reactions and affect other processes in the soil.

Carbonates, soluble salts, and the soluble products of mineral weathering that are leached from the soil profile are examples of removals. In the soils of Frederick County, some of the compounds were removed before the parent materials were deposited. Another example of a removal is erosion. On sloping soils most of the surface layer may be lost and redeposited at the bottom of the slope or in a waterway. The deposited materials are considered an addition.

The translocation of clay from the A and E horizons to the B horizon, which occurs in many soils in the county, is an example of a transfer. In this process, clay is dispersed in the upper horizons and subsequently moved with percolating water into the lower horizons, where it may be deposited by filtering, flocculation, or both. Thus, the A or E horizon becomes a zone of eluviation, or loss, and the B horizon becomes a zone of illuviation, or gain. In Hagerstown, Duffield, Myersville, and Highfield soils, the B horizon has more clay than the parent material and the A and E horizons have less clay. In the B horizon of most soils, thin clay films are in pores and on faces of peds. The clay has been transferred from the A and E horizons.

Another important example of a transfer is the leaching or diffusion of iron in the soil. This process takes place under saturated soil conditions where there is no molecular oxygen. The naturally well drained soils in the county have a yellowish brown or reddish brown subsoil. The color results from finely divided iron oxide minerals (ferric iron) that coat the sand, silt, and clay particles. Under saturated conditions, as in the poorly drained soils in the county, the iron oxide minerals are chemically reduced to a more soluble form (ferrous iron). This form of iron is transported with water and can be transported completely out of the horizon. The remaining uncoated soil particles have a dominantly gray color. Normally, part of the iron is reoxidized and segregated into the form of stains, concretions, or bright yellow and red soft masses within the horizon. In the poorly drained Melvin and Hatboro soils, this type of transfer has occurred throughout the profile. Other examples of transfers include the physical mixing of soil by animals, plants (as when trees tip over), and humans. Nutrient recycling (bringing mineral elements to the soil surface) by plants is also considered a transfer.

The weathering of primary materials to clay minerals in the soil is an example of a transformation. It occurs by physical and chemical means, such as by the transformation of micas and feldspars to clays. This process can increase the content of clay during soil formation. Another kind of transformation occurs when clay is derived from primary materials. Some iron generally is freed as a hydrated oxide. Depending on the degree of hydration, the oxide is generally red. Even a small amount of the oxide causes the subsoil to be reddish. Iron oxide colors the subsoil even in soils where not enough clay minerals have accumulated to form a textural B horizon, as in Spoolsville soils.

General Soil Map Units

The general soil map in 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 or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to 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.

1. Highfield-Ravenrock

Gently sloping to steep, very deep, well drained soils that formed from a mixture of greenstone schist and metabasalt

This map unit occurs in the region of the Blue Ridge that lies between South and Catoctin Mountains and, to a lesser extent, in scattered areas near Sugarloaf Mountain. Slopes range from 3 to 65 percent but are commonly less than 25 percent.

This map unit makes up about 12 percent of the county. It is approximately 45 percent Highfield soils, 28 percent Ravenrock soils, and 27 percent minor soils. Highfield soils have a gravelly subsoil. Ravenrock soils have a wet substratum and a gravelly loamy subsoil.

Soils of minor extent include Catoctin and Rohrersville soils. Catoctin soils are moderately deep and are on convex ridges and side slopes. Rohrersville soils are somewhat poorly drained and on concave footslopes and in drainageways.

2. Bagtown-Stumptown-Edgemont

Gently sloping to very steep, moderately deep and very deep, well drained and moderately well drained soils that formed from quartzite, metagraywacke, schist, and phyllite

This map unit occurs on the mountain ridges and backslopes of Catoctin and South Mountains (fig. 2). Slopes range from 0 to 65 percent but are dominantly less than 45 percent.

This map unit makes up about 9 percent of the county. It is approximately 28 percent Bagtown soils, 23 percent Stumptown soils, 26 percent Edgemont soils, and 23 percent minor soils.

Bagtown soils are well drained and have a seasonal high water table between depths of 3.5 and 5 feet. They are very deep and have a loamy subsoil. Stumptown soils are moderately deep, are well drained, and have a very loamy subsoil. In areas of Stumptown soils, as much as 15 percent of the soil surface is covered with stones and boulders. Edgemont soils are very deep, are well drained, and have a gravelly loamy subsoil.

Soils of minor extent include Dekalb, Hazel, Leetonia, and Weverton soils. Dekalb and Hazel soils are moderately deep, and Weverton soils are deep. Leetonia soils contain a spodic horizon.

3. Myersville-Catoctin-Mt. Zion

Nearly level to steep, moderately deep and very deep, well drained and moderately well drained soils that formed from a mixture of colluvium and alluvium of quartzite, metabasalt, meta-andesite, and other rocks of the Blue Ridge

This map unit occurs on summits, on backslopes, on footslopes, and in drainageways of the Blue Ridge between South and Catoctin Mountains (fig. 3). Slopes range from 0 to 45 percent.

This map unit makes up about 16 percent of the county. It is approximately 44 percent Myersville soils,

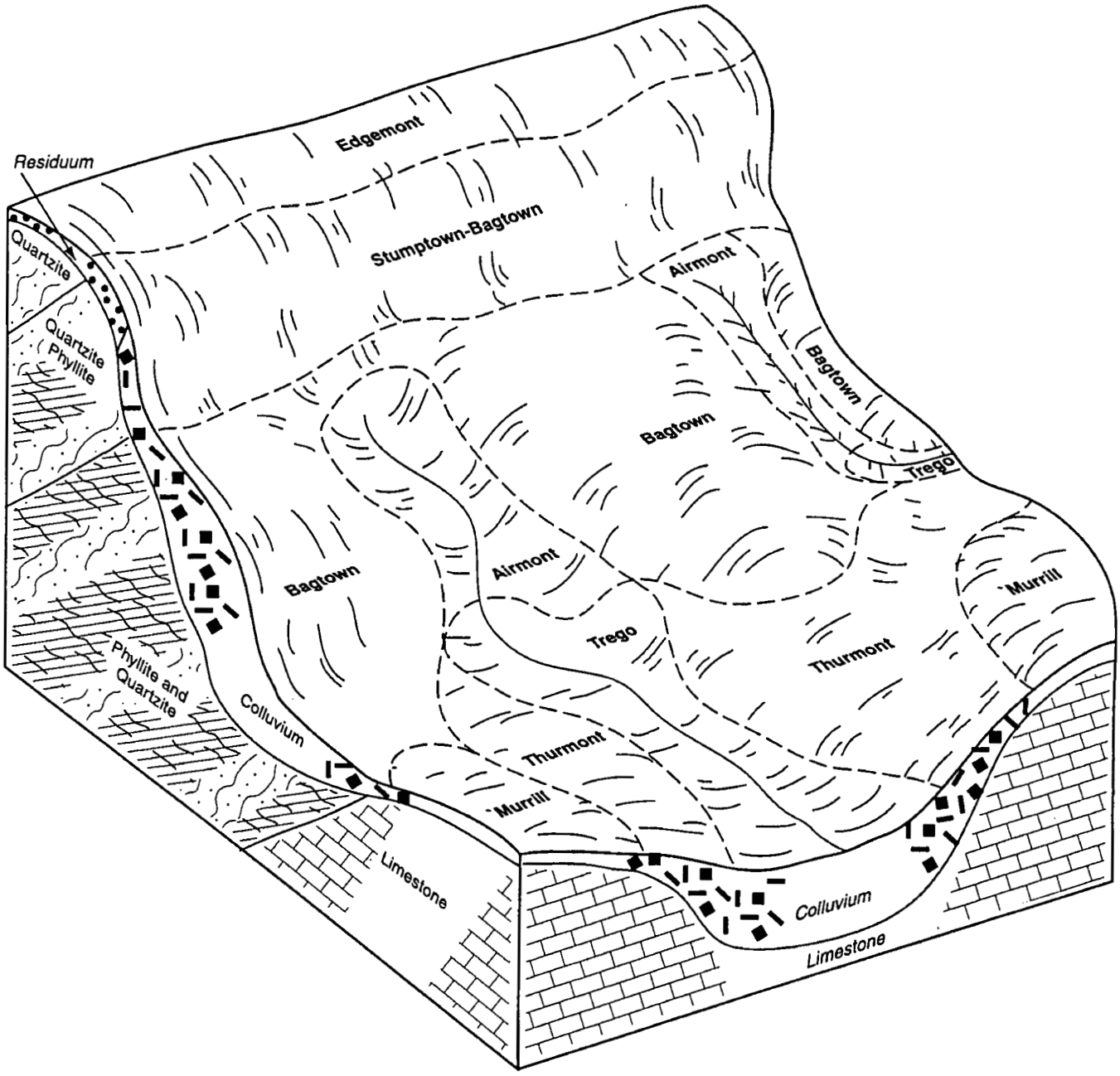


Figure 2.—Relationship of soils, topography, and underlying material in the Bagtown-Stumptown-Edgemont general soil map unit.

17 percent Catoctin soils, 16 percent Mt. Zion soils, and 23 percent minor soils.

Myersville soils are very deep, are well drained, and have a loamy subsoil. Catoctin soils are moderately deep, are well drained, and have a gravelly loamy subsoil. They are on convex knobs and eroded backslopes. Mt. Zion soils are very deep and moderately well drained. They are on the lower backslopes, footslopes, and concave uplands.

Soils of minor extent include Rohrersville and Lantz soils. Rohrersville soils are very deep and somewhat poorly drained and occur on footslopes and in drainageways. Lantz soils are very poorly drained and occur in upland depressions and drainageways.

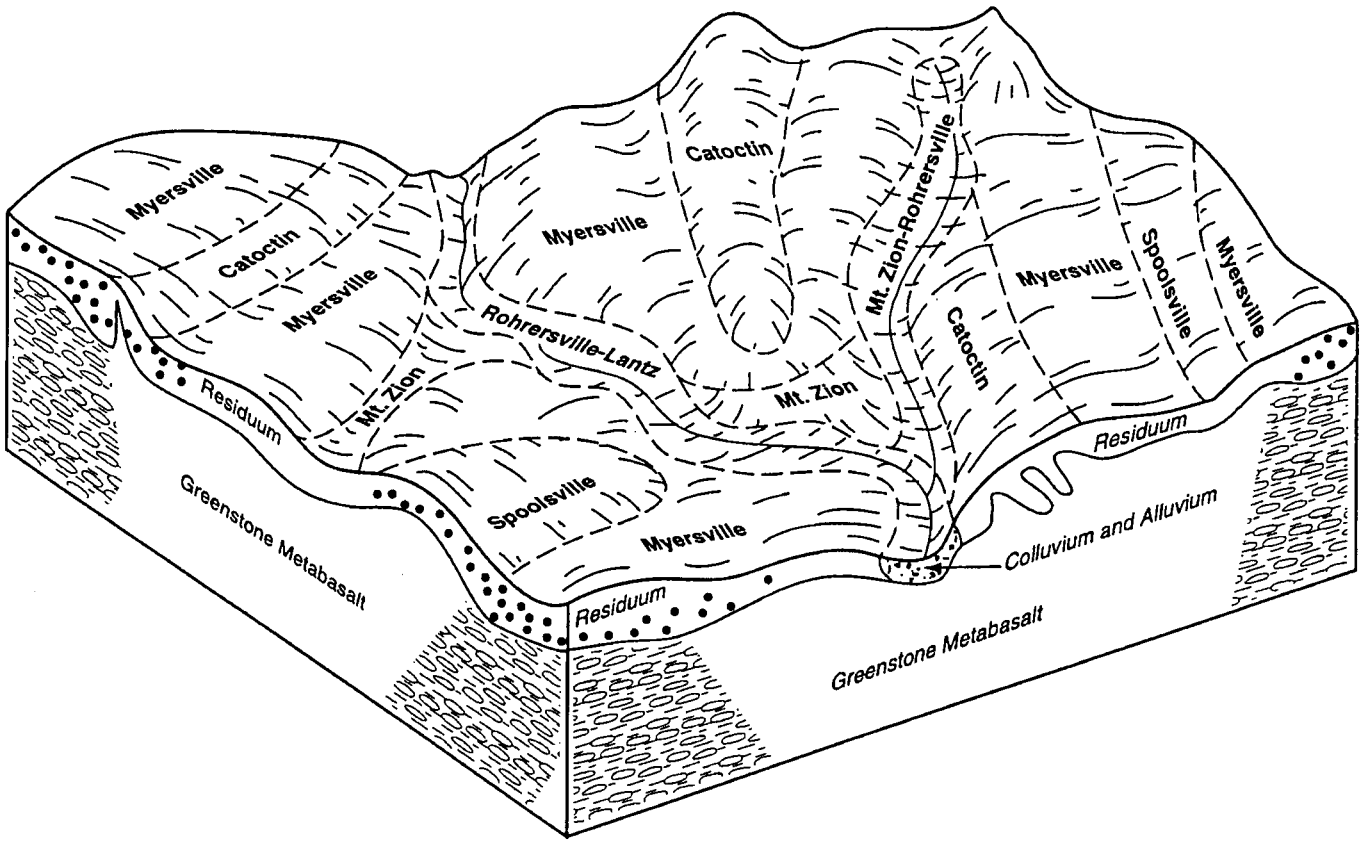


Figure 3.—Relationship of soils, topography, and underlying material in the Myersville-Catoctin-Mt. Zion general soil map unit.

4. Trego-Foxville-Thurmont

Nearly level to moderately steep, very deep, well drained to somewhat poorly drained soils that formed from alluvium and colluvium of phyllite and quartzite and, to a lesser extent, greenstone and greenstone schist

This map unit occurs on the lower mountain backslopes and footslopes of South and Catoctin Mountains in the Blue Ridge region. Slopes range from 0 to 15 percent but are commonly less than 15 percent.

This map unit makes up about 3 percent of the county. It is approximately 37 percent Trego soils, 24 percent Foxville soils, 13 percent Thurmont soils, and 26 percent minor soils.

Trego soils are moderately well drained and have a seasonal high water table between depths of 1.5 and 3.5 feet. They formed in colluvium from sandstone or quartzite and have a gravelly loamy subsoil. Foxville soils are somewhat poorly drained and have a loamy subsoil. They formed mainly from greenstone and quartzite. Thurmont soils are well drained and have a loamy subsoil. They are on footslopes, colluvial fans, benches, and terraces.

Soils of minor extent include Airmont and Braddock soils. Airmont soils are on concave mountain side slopes and in drainageways and contain more than 35 percent coarse fragments. Braddock soils are on colluvial fans.

5. Mt. Airy-Glenelg-Blocktown

Nearly level to very steep, shallow, moderately deep, and very deep, well drained soils that formed from residuum of micaceous schist and phyllite

This map unit occurs on ridges and side slopes of highly dissected landforms of the eastern Piedmont Plateau (fig. 4). Slopes range from 0 to 65 percent but are commonly less than 50 percent.

This map unit makes up about 19 percent of the county. It is approximately 40 percent Mt. Airy soils, 28 percent Glenelg soils, 21 percent Blocktown soils, and 11 percent minor soils.

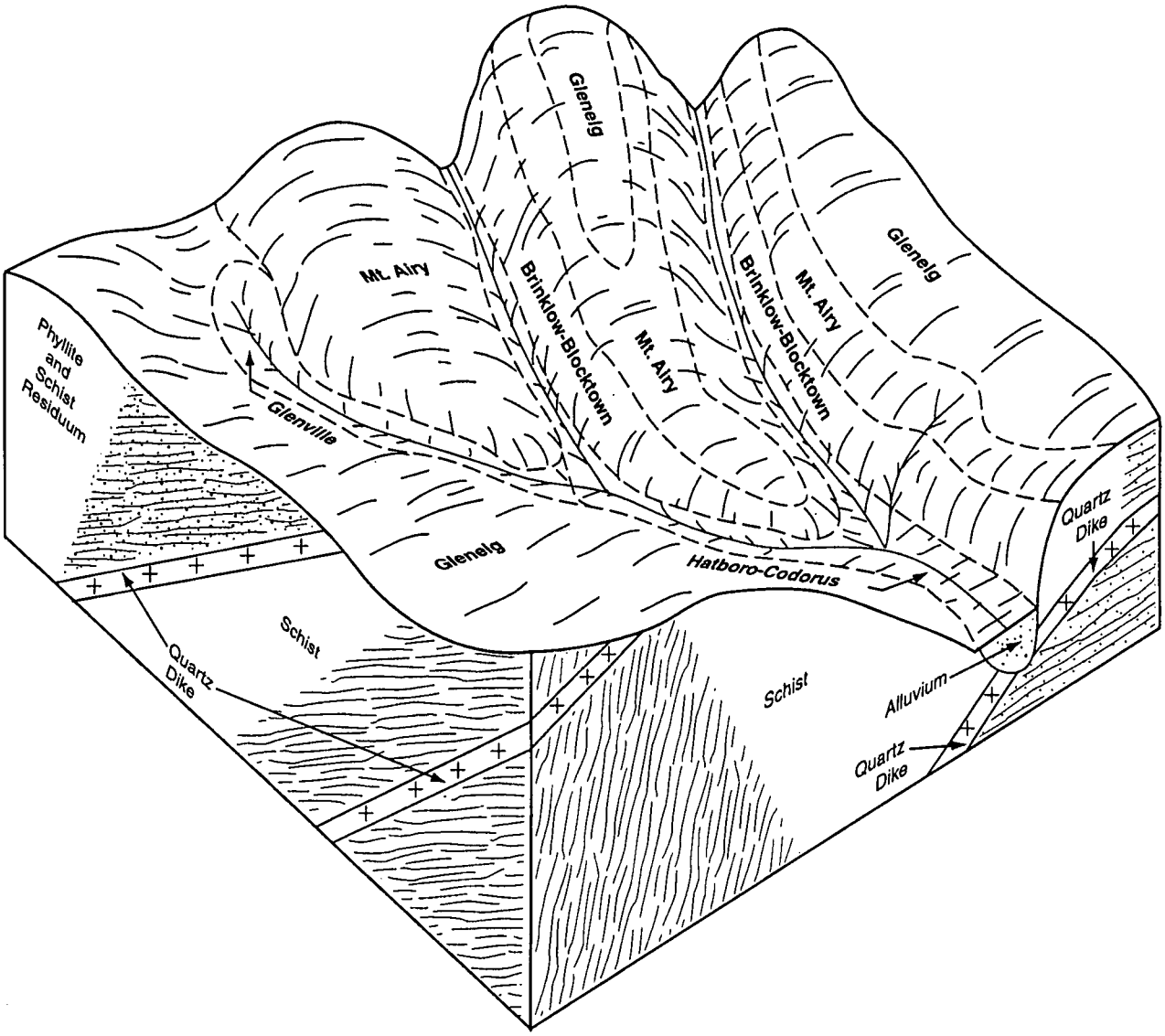


Figure 4.—Relationship of soils, topography, and underlying material in the Mt. Airy-Glenelg-Blocktown general soil map unit.

Mt. Airy soils are moderately deep and have a very channery loamy subsoil. Glenelg soils are very deep and have a loamy subsoil. They formed in residuum from micaceous schist. Blocktown soils are shallow and have a very channery loamy subsoil.

Minor soils include Baile, Glenville, Occoquan, and Gaila soils. Baile and Glenville soils are in drainageways, on footslopes, and in slight depressions. Baile soils are poorly drained, and Glenville soils are moderately well drained. Occoquan and Gaila soils have a solum less than 11 inches thick. Occoquan soils are deep to bedrock.

6. Penn-Klinesville-Reaville

Nearly level to steep, moderately well drained and well drained, shallow and moderately deep soils that formed in residuum from Triassic red shale, siltstone, and sandstone

This map unit occurs on the part of the Frederick Valley known as the Triassic Basin (fig. 5). Slopes range from 0 to 65 percent but are commonly less than 30 percent.

This map unit makes up about 16 percent of the county. It is approximately 40 percent Penn soils, 22

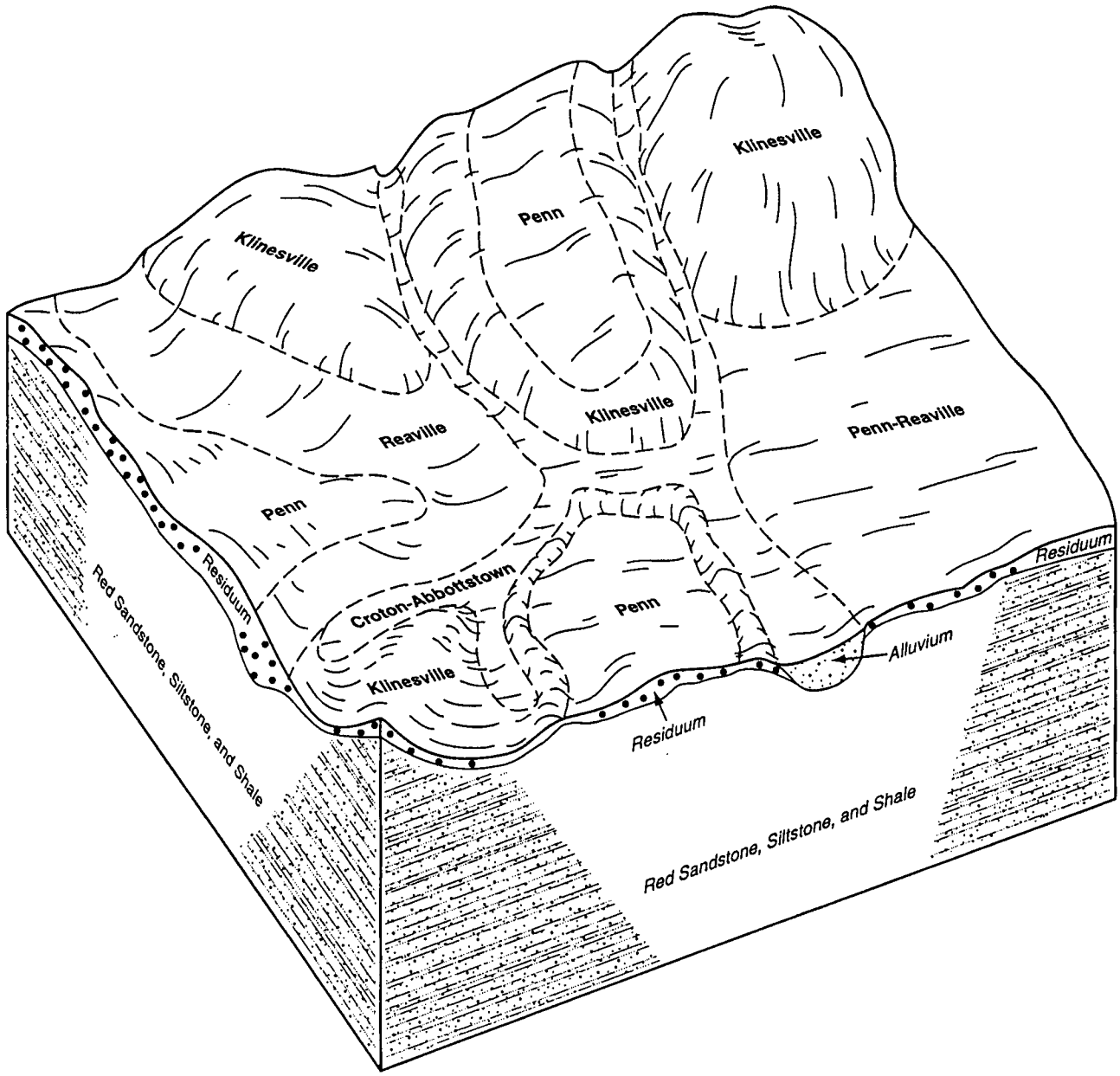


Figure 5.—Relationship of soils, topography, and underlying material in the Penn-Klinesville-Reaville general soil map unit.

percent Klinesville soils, 9 percent Reaville soils, and 29 percent minor soils.

Penn soils are moderately deep, are well drained, and have a very channery loamy subsoil. Klinesville soils are shallow and have a very channery loamy subsoil. They are on convex knobs and steep side slopes. Reaville soils are moderately well drained and have a silty subsoil.

Soils of minor extent include Legore, Montalto, Springwood, and Readington soils. Legore and Montalto soils formed from igneous rocks such as diabase. Springwood soils are well drained and contain more than 35 percent clay in the solum. Readington soils are moderately well drained and have bedrock at a depth of more than 40 inches.

7. Duffield-Hagerstown-Ryder

Nearly level to steep, moderately deep to very deep, well drained soils that formed from limestone

This map unit occurs in the Frederick Valley from about 1 mile west of the city of Frederick to the Araby Ridge in the east and at the Potomac River as a

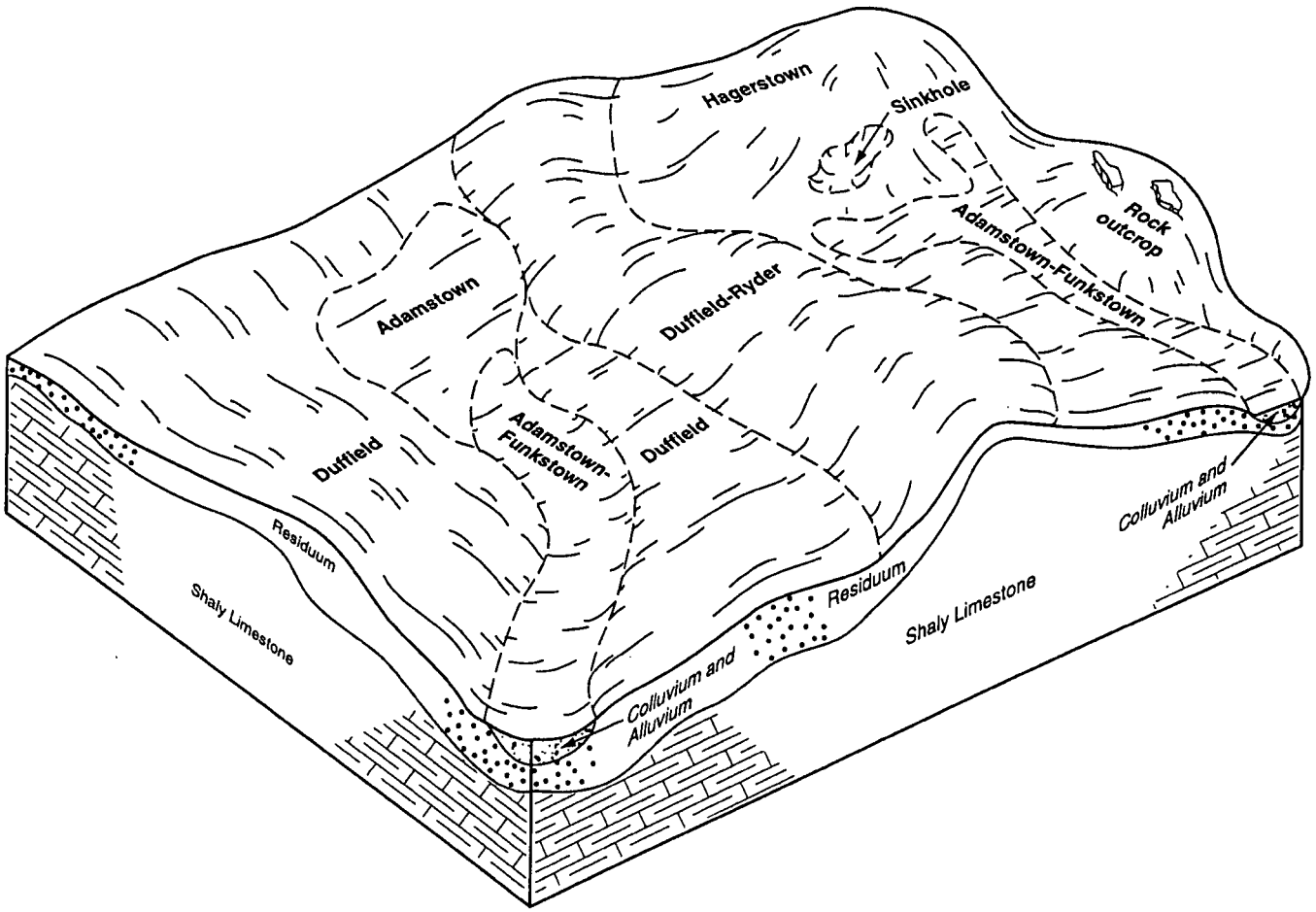


Figure 6.—Relationship of soils, topography, and underlying material in the Duffield-Hagerstown-Ryder general soil map unit.

narrow band that widens to the northeast as far as Woodsboro (fig. 6). Slopes range from 0 to 25 percent.

This map unit makes up about 10 percent of the county. It is approximately 25 percent Duffield soils, 21 percent Hagerstown soils, 16 percent Ryder soils, and 38 percent minor soils.

Duffield soils are very deep and have a loamy subsoil. They formed from impure limestone. Hagerstown soils are very deep and have a clayey subsoil. They formed from hard gray pure limestone. Ryder soils are moderately deep and have a loamy subsoil. They formed from shaly limestone.

Soils of minor extent include Adamstown, Funkstown, and Buckeystown soils. Adamstown and Funkstown soils are moderately well drained, are in swales and drainageways, and formed from alluvium and colluvium from the surrounding uplands. Buckeystown soils are well drained and formed from sandy limestone. Due to the nature of the limestone, sinkhole development is common in this map unit.

8. Linganore-Hyattstown-Conestoga

Nearly level to steep, shallow, moderately deep, and very deep, well drained soils that formed from micaceous and calcareous schist, phyllite, slate, and limestone

This map unit occurs in the area that is centered around Urbana and runs from the southwest, at the Montgomery County line, to the northeast near Clemsonville. It is interfingered and bordered irregularly by other soil map units (fig. 7). Slopes range from 3 to 65 percent.

This map unit makes up about 5 percent of the county. It is approximately 66 percent Linganore soils, 18 percent Hyattstown soils, 11 percent Conestoga soils, and about 5 percent minor soils.

Linganore soils are moderately deep and have a very channery loamy subsoil. Hyattstown soils are shallow and have a very channery loamy subsoil. They

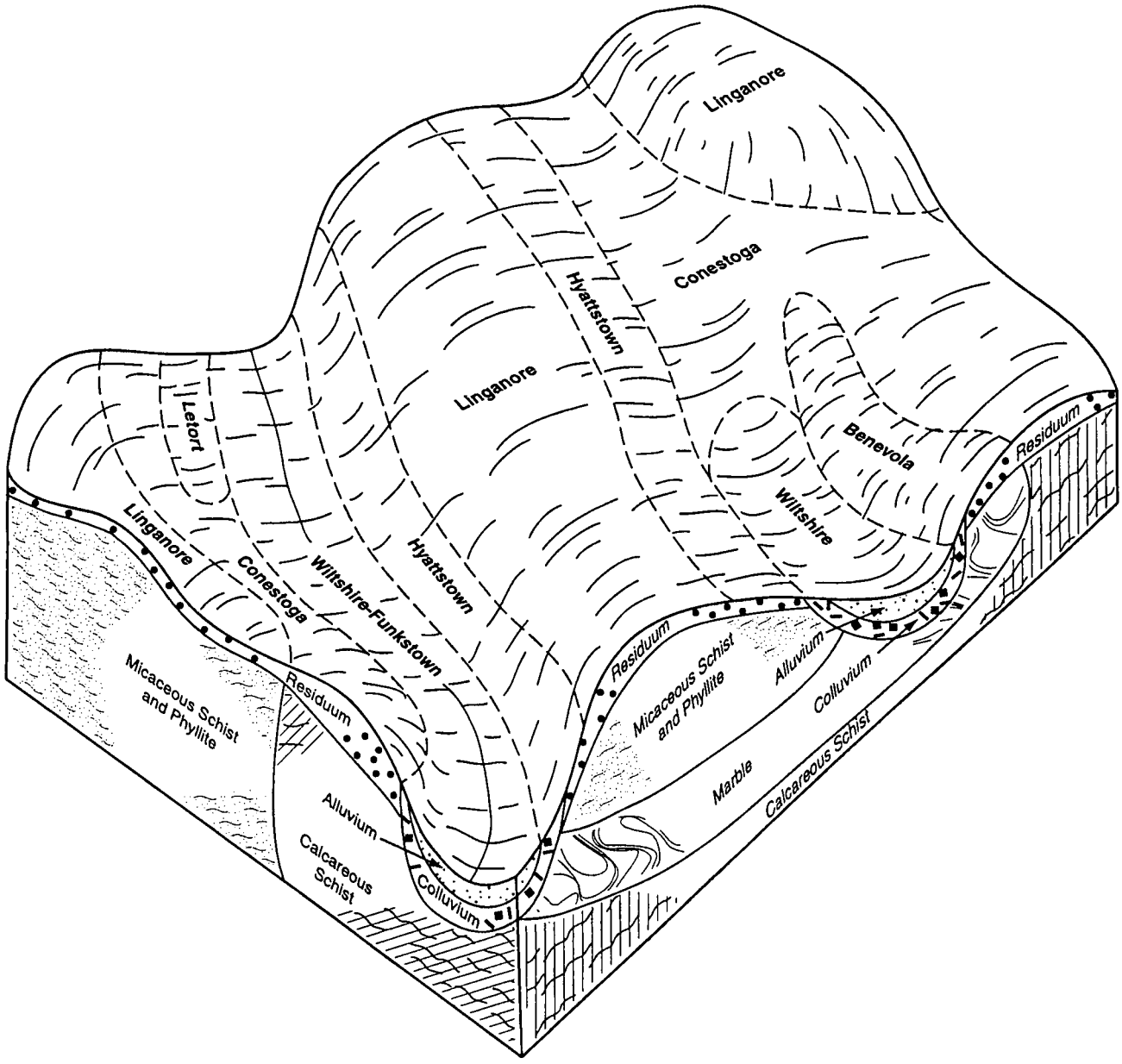


Figure 7.—Relationship of soils, topography, and underlying material in the Linganore-Hyattstown-Conestoga general soil map unit.

formed in residuum from phyllite. Conestoga soils are very deep and have a loamy subsoil. They formed in residuum from micaceous limestone and calcareous schist.

Soils of minor extent include Benevola, Wiltshire, and Letort soils. Benevola and Wiltshire soils formed from marble. Benevola soils are well drained, and Wiltshire soils are moderately well drained. Letort soils are dark brown to black throughout.

9. Cardiff-Whiteford

Nearly level to steep, moderately deep and deep, well drained soils that formed from slate and phyllite

This map unit occurs on a narrow ridge known as the Araby Ridge that runs from Woodsboro in the north to the Potomac River in the south. Slopes range from 3 to 65 percent but are commonly less than 40 percent.

This map unit makes up about 2 percent of the county. It is approximately 64 percent Cardiff soils and 36 percent Whiteford soils.

Cardiff soils are moderately deep and have an extremely channery loamy subsoil. In some areas of these soils, as much as 10 percent of the surface is covered with flagstones. Whiteford soils are deep and have a loamy subsoil. They are on convex summits and contain clay coatings in the solum.

10. Codorus-Hatboro-Combs

Nearly level and gently sloping, very deep, well drained, moderately well drained, and poorly drained soils that formed in alluvium from limestone and mica bearing igneous and metamorphic rocks

This map unit is located around perennial streams and major rivers. The unit makes up about 6 percent of the county. It is approximately 30 percent Codorus soils, 25 percent Hatboro soils, 13 percent Combs soils, and 32 percent minor soils.

Codorus soils are moderately well drained and have a loamy substratum. Hatboro soils are poorly drained and have a loamy substratum. They are in backwater and depressional areas. Combs soils are well drained and formed in areas that have been built up from sedimentation and that flood less frequently. Approximately 12 percent of this map unit, or 3,000 acres, is water, dominantly major waterways, including the Potomac and Monocacy Rivers.

Soils of minor extent include Melvin, Lindside, Wheeling, and Walkersville soils. Melvin and Lindside soils are on flood plains. Melvin soils are poorly drained, and Lindside soils are moderately well drained. Wheeling soils are on river terraces and formed from old alluvium underlain by sand and gravel deposits. Walkersville soils are on river terraces and formed from old alluvium underlain by limestone residuum.

11. Rowland-Bermudian-Bowmansville

Nearly level, very deep, well drained, moderately well drained, and poorly drained soils that formed in alluvium from red shale, sandstone, and conglomerate

This map unit is located along perennial streams in the part of the Frederick Valley known as the Triassic Basin. The unit makes up about 2 percent of the county. It is approximately 41 percent Rowland soils, 32 percent Bermudian soils, 20 percent Bowmansville soils, and 7 percent minor soils.

Rowland soils are moderately well drained and have a stratified subsoil that is part loamy and part sandy and gravelly. Bermudian soils are well drained. They are loamy or sandy in the subsoil below a depth of 40 inches. Bowmansville soils are poorly drained and have a dominantly loamy subsoil. Approximately 18 percent of this map unit, or 1,645 acres, is water, mainly major streams.

Soils of minor extent include Birdsboro soils. They are well drained and on terraces and alluvial fans. They formed in alluvium from red shale, siltstone, and sandstone.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(15, 16)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 9 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is 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; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is 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 subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic 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, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, semiactive, mesic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Detailed Soil Map Units

In this section, arranged in alphabetical order, each soil series recognized in the survey area is described. Each description is followed by the detailed map units associated with the series.

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" *(14)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(16)* and in "Keys to Soil Taxonomy" *(15)*. Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, 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,

Buckeystown sandy loam, 3 to 8 percent slopes, is a phase of the Buckeystown series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Catoctin-Spoolsville complex, 3 to 8 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Codorus and Hatboro silt loams, 0 to 3 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The Rock outcrop part of Stumptown-Rock outcrop complex, 0 to 8 percent slopes, is an example.

Table 10 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Abbottstown Series

The Abbottstown series consists of deep, somewhat poorly drained soils. Permeability is slow. These soils formed in residuum mostly from acid red shale, siltstone, and sandstone. They are in concave upland drainage swales and on concave upland flats. Slopes range from 0 to 8 percent.

Abbottstown soils are similar to Croton soils and are commonly adjacent to Reaville, Klinesville, Penn, and Readington soils. Klinesville and Penn soils are well drained and have bedrock within a depth of 40 inches. Croton soils are poorly drained. Readington soils are moderately well drained. Reaville soils have bedrock within a depth of 40 inches and do not have a fragipan.

Typical pedon of Abbottstown silt loam, 3 to 8 percent slopes; Montgomery County, Pennsylvania; 1/4 mile south of the intersection of Mt. Airy and Heckler Roads, on a concave east-facing slope in a cultivated field; lat. 40 degrees 12 minutes 38.5 seconds N. and long. 75 degrees 25 minutes 22 seconds W.

Ap—0 to 10 inches; dark reddish gray (5YR 4/2) silt loam; weak fine granular structure; friable; slightly sticky; slightly plastic; 5 percent channers; moderately acid; abrupt smooth boundary.

Bt—10 to 13 inches; reddish brown (5YR 4/3) silt loam; moderate medium subangular blocky structure; friable; slightly sticky; slightly plastic; common faint clay films on faces of peds; 5 percent channers; common fine distinct yellowish red (5YR 5/6) iron accumulations and common fine faint reddish gray (5YR 5/2) iron depletions; strongly acid; clear wavy boundary.

Btg—13 to 20 inches; reddish gray (5YR 5/2) silt loam; moderate very coarse prismatic structure parting to moderate medium blocky; firm; slightly sticky; plastic; common distinct clay films on faces of peds; 10 percent channers; many medium prominent red (2.5YR 5/6) iron accumlations and many medium distinct gray (5YR 6/1) iron depletions; very strongly acid; abrupt wavy boundary.

Bxg—20 to 39 inches; weak red (2.5YR 4/2) channery loam; weak very coarse prismatic structure parting to weak medium platy; very firm and brittle; slightly sticky; slightly plastic; common thin clay films on faces of peds; few distinct black coatings; 15 percent channers; many medium prominent reddish brown (5YR 5/4) and yellowish red (5YR 5/6) iron accumlations and pinkish gray (7.5YR 6/2) iron depletions; moderately acid; clear wavy boundary.

BCg—39 to 48 inches; weak red (2.5YR 4/2) channery silt loam; weak medium platy structure; firm; slightly sticky; slightly plastic; very few faint clay films and few distinct black coatings on faces of peds; 20 percent channers; many medium gray (5YR 5/1) and pale red (2.5YR 6/2) iron depletions and reddish brown (5YR 5/4) iron accumulations; moderately acid; clear wavy boundary.

R—48 inches; dusky red (2.5YR 3/2) very strongly cemented, fractured shale.

The thickness of the solum ranges from 30 to 60 inches. Depth to bedrock ranges from 40 to 60 inches. Depth to the fragipan ranges from 15 to 30 inches. The content of rock fragments, consisting of shale, siltstone, sandstone, and, in some pedons, quartzite gravel, ranges from 0 to 15 percent in the upper part of the solum, from 10 to 30 percent in the lower part of the solum, and from 10 to 65 percent in the C horizon. Reaction in unlimed areas ranges from extremely acid

to strongly acid in the upper part of the solum and from strongly acid to slightly acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 2.5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is loam or silt loam in the fine-earth fraction.

The Bt horizon has hue of 10R to 5YR. It has value of 4 or 5 and chroma of 3 or 4 in the upper part and value of 4 to 6 and chroma of 1 or 2 in the lower part. Texture is loam, silt loam, or silty clay loam in the fine-earth fraction.

The Bx horizon is neutral in hue or has hue of 10R to 5YR, has value of 4 or 5, and has chroma of 0 to 4. Texture is loam, silt loam, or silty clay loam in the fine-earth fraction.

The BC horizon has hue of 10R to 5YR, value of 4 to 6, and chroma of 1 to 4. Texture is loam or silt loam in the fine-earth fraction.

Some pedons have a C horizon. This horizon has hue of 10R to 5YR, value of 4 to 6, and chroma of 1 to 4. Texture is loam or silt loam in the fine-earth fraction.

Adamstown Series

The Adamstown series consists of very deep, moderately well drained soils. Permeability is slow or moderately slow. These soils formed in local colluvium over limestone residuum. They occur on slightly concave upland flats of the northern Piedmont Plateau. Slopes range from 0 to 8 percent.

Adamstown soils are similar to Funkstown soils and are commonly adjacent to Buckeystown, Dryrun, Duffield, Hagerstown, Murrill, Opequon, and Ryder soils. Funkstown soils formed in concave upland drainageways and swales. Buckeystown, Duffield, Hagerstown, Opequon, and Ryder soils derived from limestone residuum and are well drained. Dryrun and Murrill soils formed from colluvium over limestone residuum.

Typical pedon of Adamstown silt loam, 0 to 3 percent slopes; 600 feet east of Mountville Road, 2,000 feet south of where the railroad track crosses Mountville Road in Adamstown, in a cultivated field; lat. 39 degrees 18 minutes 21 seconds N. and long. 77 degrees 28 minutes 07 seconds W.

Ap1—0 to 9 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable; nonsticky; nonplastic; many fine roots throughout; 2 percent subangular quartzite gravel; slightly acid; clear smooth boundary.

Ap2—9 to 16 inches; brown (10YR 4/3) silt loam; moderate coarse and very coarse subangular blocky structure; friable; nonsticky; nonplastic; common fine roots throughout; 3 percent quartzite and limestone gravel; neutral; abrupt wavy boundary.

Bt1—16 to 22 inches; yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; nonsticky; slightly plastic; many fine roots throughout; few fine and few medium tubular pores and common fine vesicular pores; few faint continuous yellowish brown (10YR 5/4) clay films on faces of peds; 3 percent subrounded quartzite gravel; slightly acid; clear wavy boundary.

Bt2—22 to 30 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; slightly sticky; slightly plastic; many fine roots between peds; common fine tubular and vesicular pores and few medium tubular pores; few distinct continuous yellowish brown (10YR 5/6) clay films on faces of peds; 2 percent subangular quartzite gravel; moderately acid; diffuse wavy boundary.

2Bt3—30 to 38 inches; strong brown (7.5YR 4/6) clay loam; moderate fine subangular blocky structure; firm; slightly sticky; slightly plastic; common fine clay skins on faces of peds; few fine tubular pores and common fine vesicular pores; 15 percent limestone channers; many medium distinct pinkish gray (7.5YR 6/2) iron depletions and common fine prominent light brownish gray (2.5Y 6/2) iron depletions; moderately acid; clear wavy boundary.

2BC—38 to 53 inches; yellowish red (5YR 5/6) and light yellowish brown (2.5Y 6/4) channery clay loam; weak thin platy structure parting to moderate very fine subangular blocky; very sticky; very plastic; common fine vesicular pores; yellowish brown (10YR 5/6) clay films on faces of peds and very few faint patchy black (10YR 2/1) iron and manganese stains on faces of peds; 30 percent limestone channers; few medium distinct pinkish gray (7.5YR 6/2) iron depletions; neutral; abrupt wavy boundary.

2C—53 to 76 inches; yellowish red (5YR 5/6) very channery clay loam; weak very thin platy structure; friable; moderately sticky; moderately plastic; 40 percent limestone channers of which 30 percent are crushable; common fine and few coarse vesicular pores; few faint patchy yellowish red (5YR 4/6) clay films on faces of peds; common fine distinct pinkish gray (7.5YR 6/2) iron depletions; neutral.

The thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 60 inches. In

the A and B horizons, the content of rock fragments, consisting of quartzite gravel and some channers, ranges from 0 to 25 percent. In the BC and C horizons, the content of rock fragments, consisting of shaly limestone channers, ranges from 5 to 40 percent. Reaction ranges from moderately acid to neutral. Depth to redoximorphic features ranges from 30 to 40 inches.

The A horizon has hue of 10YR to 7.5YR, value of 3 or 4, and chroma of 3 to 5. Texture is silt loam or loam.

The B, BC, 2Bt, and 2BC horizons have hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 8. Texture is silt loam, loam, clay loam, or silty clay loam.

The C horizon has hue of 7.5YR to 5YR, value of 4 to 6, and chroma of 4 to 8. Texture is clay loam, silty clay loam, loam, or clay. In some pedons the horizon has isolated deposits of sandy loam.

AdA—Adamstown silt loam, 0 to 3 percent slopes

Setting

Landscape: Karst land

Component Description

Adamstown and similar soils

Composition of map unit: 85 percent
Landform: Swales, saddles, upland flats, and mountains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.5 feet (fig. 8)
Parent material: Colluvium over residuum weathered from limestone
Flooding: None
Available water capacity: Average of 8.1 inches

Additional Components

Funkstown and similar soils

Composition of map unit: 15 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

AdB—Adamstown silt loam, 3 to 8 percent slopes

Setting

Landscape: Karst land
Note: Somewhat poorly drained or poorly drained included soils may occur in areas around Lewistown.

Component Description

Adamstown and similar soils

Composition of map unit: 85 percent
Landform: Swales, saddles, and upland flats
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.5 feet
Parent material: Colluvium over residuum weathered from limestone
Flooding: None
Available water capacity: Average of 8.1 inches

Additional Components

Funkstown and similar soils

Composition of map unit: 15 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

AfB—Adamstown-Funkstown complex, 0 to 8 percent slopes

Setting

Landscape: Karst land
Note: In some areas the soils have poorly expressed argillic horizons. Somewhat poorly drained or poorly drained included soils may occur in areas mapped around Lewistown. In some areas recent deposition is as much as 25 inches thick.

Figure 8.—A pit in an area of Adamstown silt loam, 0 to 3 percent slopes, showing the seasonal high water table. This soil has severe limitations affecting some urban uses because of the seasonal high water table.

Component Description

Adamstown and similar soils

Composition of map unit: 55 percent
Landform: Swales, saddles, and upland flats
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.5 feet
Parent material: Colluvium over residuum weathered from limestone
Flooding: Frequent
Available water capacity: Average of 8.1 inches

Funkstown and similar soils

Composition of map unit: 35 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.5 feet
Parent material: Colluvium over residuum weathered from limestone
Flooding: Frequent
Available water capacity: Average of 9.6 inches

Figure 9.—A pit showing the highly variable nature of the soils in the Myersville-Burkittsville complex. The Myersville soil (to the left) is highly fertile and productive and has a high water-holding capacity. The Burkittsville soil (to the right) has low natural fertility and a low water-holding capacity and is slowly permeable. Areas of this complex are common in the Jefferson and Broad Run areas of Frederick County.

Additional Components

Duffield and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Airmont Series

The Airmont series consists of very deep, moderately well drained soils. Permeability is moderately rapid above the fragipan and slow in the fragipan. These soils formed in acid colluvium from quartzite, phyllite, and siltstone. They are on strongly sloping and moderately steep concave mountain backslopes and footslopes. Slopes range from 3 to 25 percent.

Airmont soils are similar to Trego soils and are commonly adjacent to Bagtown, Dekalb, Hazel, Thurmont, and Weverton soils. Trego soils occur on the lower colluvial footslopes and alluvial fans and have less than 35 percent rock fragments throughout. Bagtown, Thurmont, and Weverton soils do not have a fragipan. Bagtown soils are moderately well drained, and Thurmont and Weverton soils are well drained. Dekalb soils occur on summits of ridges, have bedrock at shallower depths than the Airmont soils, and do not have a fragipan. Hazel soils formed in residuum from phyllite, do not have a fragipan, and are well drained.

Typical pedon of Airmont cobbly loam, 8 to 25 percent slopes, extremely stony; Washington County, Maryland; 3,000 feet east of the intersection of Burnside Bridge Road and Mills Road, 600 feet south of Burnside Bridge Road, in the Chestnut Grove area, in a forest; lat. 39 degrees 25 minutes 53 seconds N. and long. 77 degrees 42 minutes 41 seconds W.

Oi—0 to 1 inch; leaf and twig matter; 5 percent stones.
A—1 to 2 inches; dark grayish brown (10YR 4/2) cobbly loam; weak fine granular structure; friable; many fine and medium and few coarse roots; few fine tubular pores; 20 percent cobbles, 5 percent gravel, and 10 percent stones; moderately acid; clear irregular boundary.
EA—2 to 7 inches; light yellowish brown (10YR 6/4) very cobbly loam; weak fine granular structure parting to weak very fine platy; very friable; many fine, common medium, and few coarse roots; few fine vesicular and tubular pores; 25 percent cobbles, 20 percent gravel, and 5 percent stones; many coarse distinct brown (10YR 5/3) organic stains or films; strongly acid; clear wavy boundary.
BE—7 to 15 inches; brownish yellow (10YR 6/6) cobbly sandy loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; common fine and few medium vesicular and tubular pores; 20 cobbles and 15 gravel; strongly acid; clear wavy boundary.
Bt1—15 to 25 inches; brownish yellow (10YR 6/6) cobbly sandy clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; common fine and few medium roots; many fine and common medium vesicular and tubular pores; common distinct clay films on faces of peds; 20 percent cobbles and 15 percent gravel; strongly acid; clear wavy boundary.
Bt2—25 to 31 inches; brownish yellow (10YR 6/6) very cobbly sandy clay loam; weak very coarse prismatic structure parting to moderate medium subangular blocky; very firm; few fine roots restricted to structural units; many fine vesicular and tubular pores; common distinct clay skins on faces of peds and lining pores; 25 percent cobbles and 15 percent gravel; common medium prominent strong brown (7.5YR 5/8) vertical streaks of iron accumulations between prism faces; common medium distinct light gray (10YR 7/1) vertical streaks of iron depletions between prism faces; common fine distinct dusky red (2.5YR 3/2) iron and manganese stains; strongly acid; abrupt wavy boundary.
Bt3—31 to 39 inches; brownish yellow (10YR 6/6) cobbly loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; friable; few fine and medium roots restricted to structural units; common fine and few medium vesicular and tubular pores; many distinct clay skins on faces of peds and lining pores; 25 percent cobbles and 10 percent gravel; common coarse distinct light gray (10YR 7/1) and very pale brown (10YR 7/3) iron depletions and common coarse distinct strong brown (7.5YR 5/8) iron accumulations; very strongly acid; abrupt wavy boundary.

Btx1—39 to 51 inches; brownish yellow (10YR 6/6) very gravelly sandy loam; moderate very coarse prismatic structure parting to moderate medium platy; very firm; few fine and medium roots confined to prism faces; few fine and medium vesicular and tubular pores; common distinct clay films on faces of peds and lining pores; 15 percent cobbles and 30 percent gravel; common coarse prominent strong brown (7.5YR 5/8) vertical streaks of iron accumulations between prism faces; common coarse prominent gray (10YR 6/1) vertical streaks of iron depletions between prism faces; common fine prominent dark reddish brown (2.5YR 3/2) iron and manganese stains; very strongly acid; gradual wavy boundary.

Btx2—51 to 64 inches; yellow (2.5Y 7/6) gravelly sandy loam; moderate very coarse prismatic structure parting to moderate medium platy; very firm; few fine roots confined to prism faces; many fine and medium vesicular and tubular pores; 5 percent cobbles and 30 percent gravel; common coarse prominent light gray (10YR 7/1) iron depletions and common coarse prominent strong brown (7.5YR 5/8) iron accumulations; common coarse prominent reddish brown (2.5YR 3/2) iron and manganese stains on faces of peds; very strongly acid.

The thickness of the solum ranges from 30 to 60 inches. Bedrock is unconforming and occurs at depths of 6 to 20 feet or more. Depth to the fragipan ranges from 24 to 50 inches. The coverage of surface stones ranges from 1 to 15 percent. The content and size of rock fragments increases as depth increases. The content of rock fragments ranges from 35 to 50 percent in the solum and fragipan and from 35 to 55 percent in the C horizon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 6. Texture is loam or sandy loam in the fine-earth fraction.

The EA and BE horizons have hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. Texture is loam or sandy loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. Texture is loam, sandy clay loam, or fine sandy loam in the fine-earth fraction.

The Btx horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture is sandy loam or loam.

The C horizon, if it occurs, has hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 5 to 8. Texture is sandy loam, loam, sandy clay loam, or clay loam.

ArB—Airmont cobbly loam, 3 to 8 percent slopes, extremely stony

Setting

Landscape: Mountains
Note: In some areas the soil has rubbly or stony surface layers. In some areas the soil does not have well expressed fragic characteristics. Small areas of poorly drained soils may occur along the center drainageways.

Component Description

Airmont and similar soils

Composition of map unit: 85 percent
Landform: Drainageways on head slopes and base slopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: 24 to 40 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Gravelly colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 4.6 inches

Additional Components

Bagtown and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ArD—Airmont cobbly loam, 8 to 25 percent slopes, extremely stony

Setting

Landscape: Mountains
Note: In some areas the soil has rubbly or stony surface layers. Small areas of poorly drained soils may occur along the center of drainageways.

Component Description

Airmont and similar soils

Composition of map unit: 85 percent
Landform: Drainageways
Surface layer texture: Cobbly loam
Depth to restrictive feature: 24 to 40 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Gravelly colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 4.6 inches

Additional Components

Bagtown and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Athol Series

The Athol series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum mostly from Triassic conglomerate or breccia. They are on nearly level to moderately steep, convex uplands. Slopes range from 3 to 15 percent.

Athol soils are similar to Springwood soils and are commonly adjacent to Croton, Duffield, Hagerstown, Klinesville, Penn, Morven, Readington, and Reaville soils. Springwood soils have more than 35 percent clay throughout. Morven soils formed in calcareous conglomerate. Croton soils are poorly drained and have a fragipan. Duffield and Hagerstown soils formed in residuum from limestone. Klinesville, Penn, and Reaville soils have bedrock within a depth of 40 inches. Readington soils are moderately well drained.

Typical pedon of Athol gravelly loam, 8 to 15 percent slopes; about 1.25 miles west of Woodsboro, about 1,000 feet north of Gravel Hill Road on Chestnut Hill, on a convex northwest-facing slope in a wood lot; lat. 39 degrees 32 minutes 30 seconds N. and long. 77 degrees 20 minutes 00 seconds W.

Oi—0 to 1.5 inches; partially decomposed leaf and twig material.
A—1.5 to 2.5 inches; dark brown (7.5YR 2/1) gravelly loam; weak fine granular structure; friable; 20 percent gravel; very strongly acid; clear wavy boundary.
BE—2.5 to 7 inches; brown (7.5YR 4/4) gravelly loam; weak coarse subangular blocky structure; friable; many fine and common medium roots; many fine and medium tubular and many fine vesicular pores; few medium prominent black (10YR 2/1) organic coatings in root channels and pores; 34 percent conglomerate gravel; very strongly acid; clear wavy boundary.
Bt1—7 to 13 inches; strong brown (7.5YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable; many fine and medium and common coarse roots; many fine and common medium tubular and many medium vesicular pores; few medium faint reddish yellow (7.5YR 6/6) clay films on faces of peds and in pores; 25 percent conglomerate gravel and 5 percent conglomerate cobbles; strongly acid; clear wavy boundary.
Bt2—13 to 23 inches; yellowish red (5YR 4/6) gravelly clay loam; moderate medium subangular blocky structure parting to moderate fine subangular blocky; friable; many medium and common fine and coarse roots; many fine and medium tubular and many fine vesicular pores; few medium faint yellowish red (5YR 5/6) clay films on faces of peds and in pores; 25 percent conglomerate gravel and 5 percent conglomerate cobbles; strongly acid; clear wavy boundary.
Bt3—23 to 35 inches; reddish brown (5YR 4/4)

gravelly clay loam; common fine prominent brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure parting to moderate fine subangular blocky; friable; many medium and common fine roots; many fine and medium tubular and many fine vesicular pores; few fine distinct red (2.5YR 4/6) clay films on faces of peds and in pores; 30 percent conglomerate gravel and 1 percent conglomerate stones; moderately acid; clear wavy boundary.

Bt4—35 to 47 inches; reddish brown (5YR 4/4) very gravelly clay loam; common fine and medium prominent brownish yellow (10YR 6/6) and common medium and coarse prominent strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure parting to moderate fine subangular blocky; friable; common fine roots; many fine vesicular pores; few medium faint yellowish red (5YR 5/6) clay films on faces of peds and in pores; 35 percent conglomerate gravel; strongly acid; clear wavy boundary.

BCt—47 to 61 inches; reddish brown (5YR 5/4) very gravelly loam; common fine and medium prominent yellowish brown (10YR 5/6) and common medium prominent red (10R 4/8) mottles; weak medium subangular blocky structure; friable; common fine roots; 30 percent conglomerate gravel; moderately acid; clear wavy boundary.

C—61 to 72 inches; reddish brown (2.5YR 4/4) and brown (7.5YR 4/4) gravelly clay loam; massive; friable; common fine roots; 35 percent conglomerate gravel; moderately acid.

The thickness of the solum ranges from 40 to 75 inches. Depth to bedrock is more than 5 feet. The content of rock fragments ranges from 10 to 20 percent in the Ap horizon, from 5 to 35 percent in the B horizon, and from 15 to 50 percent in the C horizon. Reaction in unlimed areas is very strongly acid or strongly acid in the upper part of the solum, is strongly acid or moderately acid in the lower part of the solum, and ranges from strongly acid to slightly acid in the C horizon.

The Ap horizon has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 2 to 6. Texture is silt loam or loam in the fine-earth fraction.

The B horizon has hue of 2.5YR and 5YR, value of 3 to 5, and chroma of 2 to 4. Texture is loam, silt loam, silty clay loam, or clay loam in the fine-earth fraction.

The C horizon has hue of 10R to 7.5YR, value of 3 to 5, and chroma of 2 to 4. Texture is loam, silt loam, or clay loam in the fine-earth fraction.

AtB—Athol gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Note: In some areas near Chestnut Hill, the map unit has inclusions of sandier material deeper in the profile and has a higher content of gravel. There is a moderate potential for sinkhole development.

Component Description

Athol and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from Triassic conglomerate
Flooding: None
Available water capacity: Average of 8.0 inches

Additional Components

Morven and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

Springwood and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

AtC—Athol gravelly loam, 8 to 15 percent slopes

Setting

Landscape: Valleys

Note: In some areas near Chestnut Hill, the map unit has inclusions with slopes steeper than 15

percent. In some areas the map unit has inclusions of sandier material deeper in the profile and has a higher content of gravel. There is a potential for sinkhole development.

Component Description

Athol and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum weathered from Triassic conglomerate
Flooding: None
Available water capacity: Average of 8.0 inches

Additional Components

Springwood and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Brentsville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Bagtown Series

The Bagtown series consists of very deep, well drained soils. Permeability is moderately slow or slow. These soils formed in colluvial materials on mountain backslopes, footslopes, colluvial fans, and benches. Slopes range from 3 to 45 percent.

Bagtown soils are similar to Airmont soils and are commonly adjacent to Dekalb, Edgemont, Thurmont, Trego, and Braddock soils. Airmont soils have a fragipan and average more than 35 percent rock fragments throughout. Dekalb and Edgemont soils are well drained and formed in residuum from quartzite. Dekalb soils are moderately deep, and Edgemont soils are very deep. Braddock and Thurmont soils are in the lower landform positions and are well drained. Braddock soils average more than 35 percent clay throughout. Trego soils are moderately well drained, have a fragipan, and are in the lower landform positions.

Typical pedon of Bagtown cobbly loam, 15 to 25 percent slopes, extremely stony; Washington County, Maryland; approximately 0.8 mile east of Crystal Falls Road, 600 feet north of the intersection of Mt. Aetna Road and Crystal Falls Road; lat. 39 degrees 35 minutes 56 seconds N. and long. 77 degrees 35 minutes 13 seconds W.

Oi—0 to 3 inches; leaf and twig matter; 4 percent stone cover.
A—3 to 8 inches; black (N 2/0) cobbly loam; weak fine subangular blocky structure parting to weak fine granular; very friable; many fine, common medium, and few coarse roots; few fine vesicular pores; 6 percent gravel, 15 percent cobbles, and 4 percent stones; very strongly acid; clear wavy boundary.
BE—8 to 15 inches; light yellowish brown (10YR 6/4) gravelly loam; weak medium subangular blocky structure; very friable; many fine and common medium roots; many fine tubular pores and few medium tubular and vesicular pores; 15 percent gravel and 1 percent stones; very strongly acid; clear wavy boundary.
Bt1—15 to 31 inches; strong brown (7.5YR 4/6) gravelly loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; common fine and few medium tubular pores and common medium vesicular pores; common faint thin discontinuous clay skins in pores, on faces of peds, and around coarse fragments; 20 percent gravel and 5 percent channers; very strongly acid; clear wavy boundary.
Bt2—31 to 48 inches; 70 percent yellowish brown (10YR 5/4) gravelly loam and 30 percent brownish yellow (10YR 6/6) gravelly sandy loam; weak medium subangular blocky structure; friable; firm in place; few fine roots; common fine tubular pores and few fine vesicular pores in the loam part of horizon; many fine tubular and vesicular pores and common medium and few coarse vesicular pores in the sandy loam part of horizon; common faint clay skins; 17 percent gravel; common fine prominent yellowish red (5YR 5/8) and few medium prominent light yellowish brown (2.5Y 6/3) depletions; common medium distinct strong brown (7.5YR 5/8) accumulations; very strongly acid; diffuse wavy boundary.

Bt3—48 to 60 inches; yellowish brown (10YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable; few fine roots; common medium vesicular pores and few medium tubular pores; common distinct clay skins; 20 percent gravel; few medium distinct iron and manganese stains; common fine prominent light yellowish brown (2.5Y 6/3) depletions; common fine distinct strong brown (7.5YR 5/6) accumulations; very strongly acid; clear wavy boundary.

BC—60 to 73 inches; brownish yellow (10YR 6/6) gravelly loam; many coarse prominent pale yellow (2.5Y 7/4) and many medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine tubular pores and few fine vesicular pores; few fine clay skins in pores; 20 percent gravel, 5 percent cobbles, and 2 percent channers; very strongly acid; clear wavy boundary.

C—73 to 93 inches; brownish yellow (10YR 6/6) very channery loam; massive; many medium clay films; 40 percent channers, 10 percent gravel, and 5 percent cobbles; very strongly acid; abrupt wavy boundary.

R—93 inches; indurated sandstone of the Weverton Formation.

The thickness of the solum ranges from 50 to 65 inches. The content of rock fragments, consisting of gravel, cobbles, stones, and channers, ranges from 15 to 45 percent in the surface layer and subsoil and from 15 to 50 percent in the substratum. Reaction is strongly acid or very strongly acid except in limed areas.

The A horizon has hue of 10YR to 7.5YR, value of 3 or 4, and chroma of 2 to 6. Texture is silt loam, loam, or sandy loam in the fine-earth fraction.

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

The Bt and BC horizons have hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, clay loam, sandy loam, or sandy clay loam in the fine-earth fraction. In some pedons the horizons have weak medium platy structure in isolated areas. This pedon exhibited fragic characteristics in places but these characteristics were not expressed strongly enough to classify as a fragipan according to current standards.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, sandy loam, or clay loam in the fine-earth fraction.

The R layer is variegated with hue of 2.5YR, 5YR, 10YR, and 2.5Y. The rock appears to have a high iron content and is very hard.

BaB—Bagtown cobbly loam, 3 to 8 percent slopes, extremely stony

Setting

Landscape: Mountains
Note: In some areas the soil has rubbly or stony surface layers. Small areas of poorly drained soils may occur along the center of drainageways. The difficulty of excavation is extremely high.

Component Description

Bagtown and similar soils

Composition of map unit: 85 percent
Landform: Backslopes and footslopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: More than 72 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy colluvium derived from quartzite or sandstone
Flooding: None
Available water capacity: Average of 10.2 inches

Additional Components

Airmont and similar soils

Composition of map unit: 5 percent
Landform: Drainageways on head slopes and base slopes on mountains

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BaC—Bagtown cobbly loam, 8 to 15 percent slopes, extremely stony

Setting

Landscape: Mountains
Note: In some areas the soil has rubbly or stony surface layers. Small areas of poorly drained soils may occur along the center of drainageways. The difficulty of excavation is extremely high.

Component Description

Bagtown and similar soils

Composition of map unit: 85 percent
Landform: Backslopes and footslopes
Surface layer texture: Extremely stony loam
Depth to restrictive feature: More than 72 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy colluvium derived from quartzite or sandstone
Flooding: None
Available water capacity: Average of 10.2 inches

Additional Components

Airmont and similar soils

Composition of map unit: 5 percent
Landform: Drainageways on head slopes and base slopes on mountains

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BaD—Bagtown cobbly loam, 15 to 25 percent slopes, extremely stony

Setting

Landscape: Mountains
Note: In some areas the soil has rubbly or stony surface layers. Small areas of poorly drained soils may occur along the center of drainageways.

Component Description

Bagtown and similar soils

Composition of map unit: 85 percent
Landform: Backslopes and footslopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: More than 72 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy colluvium derived from sandstone or quartzite
Flooding: None
Available water capacity: Average of 10.2 inches

Additional Components

Airmont and similar soils

Composition of map unit: 5 percent
Landform: Drainageways on mountains

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BbD—Bagtown cobbly loam, 15 to 25 percent slopes, rubbly

Setting

Landscape: Mountains
Note: Areas are generally narrow and located below Rock outcrop complexes.

Component Description

Bagtown and similar soils

Composition of map unit: 85 percent
Landform: Backslopes and footslopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: More than 72 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy colluvium derived from quartzite or sandstone
Flooding: None
Available water capacity: Average of 10.2 inches

Additional Components

Dekalb and similar soils

Composition of map unit: 5 percent
Landform: Mountain summits and shoulders

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BbE—Bagtown cobbly loam, 25 to 45 percent slopes, rubbly

Setting

Landscape: Mountains

Component Description

Bagtown and similar soils

Composition of map unit: 85 percent
Landform: Backslopes and footslopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: More than 72 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy colluvium derived from sandstone or quartzite
Flooding: None
Available water capacity: Average of 10.2 inches

Additional Components

Dekalb and similar soils

Composition of map unit: 5 percent
Landform: Mountain summits and shoulders

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Baile Series

The Baile series consists of very deep, poorly drained soils. Permeability is slow or moderately slow. These soils formed in local alluvium and colluvium over residuum from acid crystalline rocks. They are on upland depressions, on footslopes, and in drainageways of the northern Piedmont Plateau. Slopes range from 0 to 8 percent.

Baile soils are similar to Lantz soils and are commonly adjacent to Mt. Airy, Blocktown, Brinklow, Cardiff, Glenelg, and Glenville soils. Lantz soils formed from metabasalt, average more than 35 percent base saturation in the control section, and have bedrock at

a depth of more than 60 inches. Glenville soils are moderately well drained, have fragic properties, and have bedrock at a depth of more than 60 inches. Blocktown, Brinklow, Cardiff, and Mt. Airy soils are in upland positions, have bedrock at a depth of less than 40 inches, and are well drained. Glenelg soils are in upland positions, are well drained, and have bedrock at a depth of more than 60 inches.

Typical pedon of Baile silt loam in an area Baile-Glenville silt loams, 0 to 8 percent slopes; in the Johnsville area, 200 feet south of the intersection of Clover Road and Route 75, about 100 feet east of Route 75; lat. 39 degrees 32 minutes 20 seconds N. and long. 77 degrees 13 minutes 47 seconds W.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; moderately sticky; nonplastic; many fine roots throughout; common fine and medium yellowish red (5YR 4/6) hard iron masses throughout; slightly acid; clear wavy boundary.

Ap1—2 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; firm; moderately sticky; nonplastic; many fine roots throughout; common fine and medium dark brown (7.5YR 3/4) iron masses throughout and common coarse dark red (2.5YR 3/6) hard iron masses between peds; slightly acid; clear wavy boundary.

Ap2—7 to 11 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium subangular blocky structure; firm; moderately sticky; nonplastic; many fine and common fine roots throughout; many fine vesicular pores; common fine grayish brown (10YR 5/2) iron depletions throughout and common fine dark brown (7.5YR 3/4) hard iron masses throughout; 2 percent gravel; neutral; abrupt wavy boundary.

Ag—11 to 14 inches; gray (10YR 5/1) silt loam; weak coarse prismatic structure; friable; moderately sticky; nonplastic; many fine roots throughout; many fine vesicular pores; many fine dark reddish brown (5YR 3/3) hard iron and manganese masses throughout and common fine strong brown (7.5YR 5/8) iron masses throughout; 2 percent gravel; neutral; clear smooth boundary.

Btg—14 to 26 inches; 60 percent greenish gray (5GY 6/1) and 40 percent yellowish brown (10YR 5/6) silt loam; strong coarse prismatic structure parting to moderate medium subangular blocky; firm; moderately sticky; nonplastic; many fine roots between peds; common fine tubular pores and common fine vesicular pores; common very coarse grayish brown (10YR 5/2) iron depletions on prism faces; 10 percent gravel; neutral; clear irregular boundary.

BCg—26 to 41 inches; 55 percent greenish gray (5GY 6/1) and 45 percent yellowish brown (10YR 5/6) channery silt loam; weak coarse subangular blocky structure parting to weak fine platy; friable; moderately sticky; nonplastic; common fine roots between peds; many fine vesicular pores; 15 percent subangular channers; neutral; clear wavy boundary.

Cg—41 to 51 inches; 60 percent light olive gray (5Y 6/2) and 30 percent strong brown (7.5YR 4/6) channery silt loam; massive parting to weak fine platy structure; friable; nonsticky; nonplastic; common fine vesicular pores; few prominent continuous dark reddish brown (5YR 3/2) organic coatings on faces of peds; 15 percent subangular channers; neutral; abrupt smooth boundary.

2Cg—51 to 60 inches; 55 percent grayish brown (10YR 5/2) and 45 percent yellowish brown (10YR 5/8) gravelly sandy clay loam; massive; friable; nonsticky; nonplastic; many fine vesicular pores; very few distinct patchy black (N 2/0, moist) organic coatings on faces of peds and very few faint discontinuous white (N 8/0) organic coatings on faces of peds; 5 percent subangular quartzite gravel; neutral.

The thickness of the solum ranges from 30 to 45 inches. Depth to bedrock is more than 60 inches. Reaction ranges from strongly acid to neutral. Depth to redoximorphic features ranges from 0 to 56 inches.

The A horizon has hue of 10YR to 2.5Y, value of 2 to 5, and chroma of 1 to 4. Texture ranges from loam to silt loam.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2. Mottles are in shades of red, yellow, and brown. In some pedons hue is commonly greener or bluer than 5Y. Texture is silt loam, silty clay loam, clay loam, or loam.

The C horizon has hue of 7.5YR to 5Y, value of 3 to 6, and chroma of 2 to 6. In some pedons hue is commonly greener or bluer than 5Y. Texture is silt loam, silty clay loam, clay loam, loam, or sandy clay loam.

BcB—Baile-Glenville silt loams, 0 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Baile and similar soils

Composition of map unit: 55 percent
Landform: Depressions, swales, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Loamy colluvium derived from phyllite or schist
Flooding: None
Available water capacity: Average of 11.1 inches

Glenville and similar soils

Composition of map unit: 30 percent
Landform: Concave footslopes, toeslopes, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 15 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy colluvium derived from phyllite or schist
Flooding: None
Available water capacity: Average of 6.9 inches

Additional Components

Glenelg and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Benevola Series

The Benevola series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum from marble. They are on uplands within the valley landscape. They are nearly level to strongly sloping. Slopes range from 0 to 15 percent.

Benevola soils are similar to Hagerstown soils and are commonly adjacent to Conestoga, Funkstown, Hyattstown, Linganore, Letort, and Wiltshire soils. Hagerstown soils formed in residuum weathered from limestone. Conestoga, Hyattstown, Letort, and Linganore soils formed in residuum weathered from micaceous phyllite and schist and average less than 35 percent clay in the particle-size control section. Funkstown and Wiltshire soils are moderately well drained.

Typical pedon of Benevola silty clay loam, 0 to 8 percent slopes; approximately 1,400 feet north of the intersection of Route 144 and Route 75, about 1,300 feet east of Route 75, in a crop field northeast of the Woodspring Meadows subdivision; lat. 39 degrees 23 minutes 28 seconds N. and long. 77 degrees 15 minutes 08 seconds W.

Ap—0 to 8 inches; dark brown (7.5YR 3/3) silty clay loam; weak coarse subangular blocky structure parting to moderate fine granular; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 17 inches; brown (7.5YR 4/4) silty clay loam; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; friable; many fine and common medium roots; many fine vesicular and many medium tubular pores; few prominent reddish black (2.5YR 2/1) manganese or iron and manganese stains on faces of peds and in pores; few faint brown (7.5YR 4/3) organic coatings on faces of peds and in pores; 5 percent mixed igneous and metamorphic gravel; neutral; clear irregular boundary.

Bt2—17 to 33 inches; dark reddish brown (2.5YR 3/4) silty clay; weak coarse prismatic structure parting to moderate medium subangular blocky, parting to strong fine angular blocky; friable; common medium roots; many fine and common medium vesicular pores and common medium tubular pores; few distinct dark reddish brown (5YR 3/4) clay films on faces of peds and few prominent black (N 2/0) manganese or iron and manganese stains on faces of peds and in pores; 5 percent mixed igneous and metamorphic gravel; neutral; abrupt wavy boundary.

Bt3—33 to 41 inches; dark reddish brown (2.5YR 3/4) clay; moderate medium subangular blocky structure parting to strong fine angular blocky; friable; common fine roots; many fine tubular and common fine vesicular pores; common fine and medium black (N 2/0) hard iron and manganese nodules; 10 percent mixed igneous and metamorphic gravel; neutral; clear wavy boundary.

Bt4—41 to 57 inches; yellowish red (5YR 4/6) clay; weak thick platy structure parting to moderate medium angular blocky, parting to weak fine angular blocky; friable; common fine roots; many fine vesicular and tubular pores; few faint dark

reddish brown (5YR 3/4) clay films on faces of peds; 1 percent mixed igneous and metamorphic gravel; slightly acid; clear irregular boundary.
C1—57 to 91 inches; reddish black (2.5YR 2/1) silt loam; weak thin platy structure; very friable; few prominent yellowish red (5YR 4/6) clay films on faces of peds; slightly acid; clear wavy boundary.
C2—91 to 94 inches; black (N 2/0) silt loam; massive; very friable; very strongly acid; gradual wavy boundary.
C3—94 to 115 inches; black (5YR 2/1) silty clay loam; massive; very friable; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 5 feet. The content of rock fragments of marble ranges from 0 to 25 percent throughout the profile. Reaction ranges from strongly acid to neutral.

The Ap horizon has hue of 5YR to 10YR, value of 2 or 3 (dry color of less than 5), and chroma of 2 to 4. Texture is silt loam, loam, clay loam, or silty clay loam in the fine-earth fraction.

The BE horizon, if it occurs, has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam, loam, or silty clay loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6. Texture is clay, silty clay, clay loam, or silty clay loam in the fine-earth fraction.

The C horizon is neutral in hue or has hue of 2.5YR to 10YR, has value of 2 to 6, and has chroma of 0 to 6. Texture is loam, silt loam, clay loam, silty clay loam, or clay in the fine-earth fraction.

BdB—Benevola silty clay loam, 0 to 8 percent slopes

Setting

Landscape: Valleys
Note: There is a potential for sinkhole development.

Component Description

Benevola and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silty clay loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from marble
Flooding: None
Available water capacity: Average of 7.3 inches

Additional Components

Conestoga and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Letort and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BdC—Benevola silty clay loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: There is a potential for sinkhole development. In some areas slopes are steeper than 15 percent.

Component Description

Benevola and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silty clay loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from marble
Flooding: None
Available water capacity: Average of 7.3 inches

Additional Components

Conestoga and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Bermudian Series

The Bermudian series consists of very deep, well drained soils. Permeability is moderate. These soils formed in deposits of recent alluvium weathered from red and brown shale, sandstone, and conglomerate. They are on nearly level flood plains. Slopes range from 0 to 3 percent.

Bermudian soils are similar to Rowland soils and are commonly adjacent to Abbottstown, Birdsboro, Bowmansville, Croton, Klinesville, Penn, Readington, and Reaville soils. Rowland soils are moderately well drained. Bowmansville soils are poorly drained. Abbottstown, Croton, and Readington soils have a fragipan. Birdsboro, Penn, and Reaville soils have argillic horizons. Klinesville soils have bedrock within a depth of 20 inches.

Typical pedon of Bermudian silt loam, 0 to 3 percent slopes; York County, Pennsylvania; East Manchester Township, 1½ miles southwest of the village of York Haven, along Conewago Creek, 75 feet south of the creek, on a northeast-facing slope in a cultivated field (the site is on Legislative Route 66002, about 0.2 mile east of Township Route 940 and 0.2 mile west of Township Route 952):

Ap—0 to 8 inches; dark reddish brown (5YR 3/3) silt loam, pinkish gray (5YR 6/2) dry; weak fine granular structure; very friable; nonsticky; slightly plastic; moderately acid; abrupt smooth boundary.

Bw1—8 to 30 inches; dark reddish brown (5YR 3/3) silt loam, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; friable; slightly sticky; slightly plastic; strongly acid; gradual wavy boundary.

Bw2—30 to 50 inches; reddish brown (2.5YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; very strongly acid; clear wavy boundary.

C—50 to 65 inches; reddish brown (2.5YR 4/4) stratified sand and gravel; single grain; loose; nonsticky; nonplastic; very strongly acid.

The thickness of the solum ranges from 34 to 52 inches. Depth to sand or stratified sand and gravel is more than 40 inches. Depth to bedrock is more than 6 feet. The content of rock fragments of sandstone gravel or shale ranges from 0 to 10 percent in the A and Bw horizons, from 0 to 30 percent in C horizons above a depth of 40 inches, and from 5 to 80 percent in C horizons below a depth of 40 inches. Reaction ranges from very strongly acid to slightly acid.

The A or Ap horizon has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 2 to 4. Texture is sandy loam, loam, or silt loam.

The Bw horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 3 or 4. Texture is loam, silt loam, silty clay loam, clay loam, or sandy clay loam.

The C horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 3 or 4. Texture is sand, sandy loam, loam, silt loam, silty clay loam, clay loam, or sandy clay loam. Sand and sandy loam textures are common below a depth of 40 inches.

BfA—Bermudian silt loam, 0 to 3 percent slopes

Setting

Landscape: River valleys
Note: In some areas the soil has a surface layer of fine sandy loam.

Component Description

Bermudian and similar soils

Composition of map unit: 85 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: 3.0 to 6.0 feet
Parent material: Loamy alluvium derived from sandstone or from shale and siltstone
Flooding: Occasional
Available water capacity: Average of 5.8 inches

Additional Components

Bowmansville and similar soils

Composition of map unit: 10 percent
Landform: Flood plains

Rowland and similar soils

Composition of map unit: 5 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Birdsboro Series

The Birdsboro series consists of very deep, well drained soils. Permeability is moderate. These soils formed from old alluvial deposits derived from red sandstone, siltstone, and shale. They are on nearly level to strongly sloping terraces. Slopes range from 0 to 8 percent.

Birdsboro soils are similar to Bermudian soils and are commonly adjacent to Bowmansville, Rowland, Croton, Abbottstown, Readington, Reaville, Penn, and Klinesville soils. Bermudian soils are on flood plains and are somewhat poorly drained. Rowland, Croton, Abbottstown, and Reaville soils are more poorly drained than the Birdsboro soils. Readington soils have a fragipan. Penn soils are moderately deep to bedrock, and Klinesville soils are shallow to bedrock.

Typical pedon of Birdsboro silt loam, 3 to 8 percent slopes; about 3,300 feet east of the town of Detour, about 500 feet due south on the Frederick County side of Little Pipe Creek; lat. 39 degrees 36 minutes 10 seconds N. and long. 77 degrees 15 minutes 23 seconds W.

Ap—0 to 11 inches; brown (7.5YR 4/4) silt loam; moderate fine granular structure; friable; 10 percent gravel; slightly acid; abrupt smooth boundary.

Bt1—11 to 21 inches; yellowish red (5YR 5/6) silt loam; moderate fine subangular blocky structure; firm; 10 percent gravel; extremely acid; clear wavy boundary.

Bt2—21 to 36 inches; red (2.5YR 4/6) silty clay loam; moderate fine and medium subangular blocky structure; firm; 10 percent gravel; extremely acid; clear wavy boundary.

2BC—36 to 42 inches; red (2.5YR 4/6) gravelly loam; moderate medium subangular blocky structure; firm; 16 percent sandstone gravel; very strongly acid; clear wavy boundary.

2C—42 to 70 inches; red (2.5YR 4/6) extremely gravelly loam; massive; very friable; 70 percent sandstone gravel; very strongly acid.

The thickness of the solum ranges from 30 to 50 inches. Depth to gravelly layers is more than 40 inches. The gravel content ranges from 0 to 16 percent in the solum and from 0 to 70 percent in the C horizon.

The Ap horizon has hue of 2.5YR to 10YR and value and chroma of 2 to 4. Texture is silt loam or loam.

The Bt and BC horizons have hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 3 to 6. Texture is loam, silt loam, sandy clay loam, clay loam, or silty clay loam.

The C horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. Texture is sand, loamy sand, sandy loam, loam, silt loam, or clay loam in the fine-earth fraction.

BgA—Birdsboro silt loam, 0 to 3 percent slopes

Setting

Landscape: River valleys

Component Description

Birdsboro and similar soils

Composition of map unit: 85 percent
Landform: Stream terraces
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy alluvium derived from sandstone and shale
Flooding: None
Available water capacity: Average of 7.6 inches

Additional Components

Bermudian and similar soils

Composition of map unit: 10 percent
Landform: Flood plains

Bowmansville and similar soils

Composition of map unit: 5 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BgB—Birdsboro silt loam, 3 to 8 percent slopes

Setting

Landscape: River valleys
Note: In some areas the soil has a gravelly surface layer.

Component Description

Birdsboro and similar soils

Composition of map unit: 85 percent
Landform: Stream terraces
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy alluvium derived from sandstone and shale
Flooding: None
Available water capacity: Average of 7.6 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Blocktown Series

The Blocktown series consists of shallow, well drained soils. Permeability is moderate. These soils formed in material weathered from phyllite and schist. They are on uplands on the Piedmont Plateau. Slopes range from 3 to 45 percent.

Blocktown soils are similar to Brinklow soils and are commonly adjacent to Glenelg, Baile, and Mt. Airy soils. Brinklow soils have bedrock at a depth of 20 to 40 inches and average less than 35 percent rock fragments throughout. Glenville and Baile soils are in concave upland flats and depressions. Glenville soils are moderately well drained, and Baile soils are poorly drained. Mt. Airy soils have bedrock at a depth of 20 to 40 inches and do not have an argillic horizon. Glenelg soils have bedrock at a depth of more than 60 inches and average less than 35 percent rock fragments throughout.

Typical pedon of Blocktown channery silt loam, 3 to 8 percent slopes; Montgomery County, Maryland: about 1 mile south of Woodfield, 1,510 feet north on Log House Road from its intersection with Watkins Road, 2,265 feet east:

Ap—0 to 6 inches; yellowish red (5YR 4/6) channery silt loam; moderate medium granular structure; friable; many fine roots; 30 percent channers; slightly acid; abrupt smooth boundary.
Bt—6 to 17 inches; red (2.5YR 4/6) extremely channery silt loam; weak medium granular structure; friable; few fine roots; many prominent clay films on faces of peds; 60 percent channers; slightly acid; abrupt wavy boundary.
Cr—17 to 21 inches; variegated red (2.5YR 4/6) and yellowish red (5YR 5/6) moderately cemented bedrock that crushes to extremely channery silt loam; inherited rock structure; firm; about 90 percent channers; strongly acid; clear wavy boundary.
R—21 inches; strongly cemented phyllite.

Depth to the Cr horizon ranges from 10 to 20 inches. The depth to hard bedrock ranges from 20 to 40 inches. The content of rock fragments ranges from 15 to 50 percent in the A horizon and from 35 to 90 percent in the B and C horizons. The fine-earth fraction of the textural control section is more than 50 percent silt and very fine sand. In unlimed areas reaction is moderately acid or slightly acid.

The A horizon has hue of 7.5YR to 2.5YR, value of 3 to 5, and chroma of 4 to 6. Texture is silt loam or loam in the fine-earth fraction.

The B horizon has hue of 7.5YR to 10R, value of 3 to 5, and chroma of 3 to 8. Texture is silt loam, loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5YR, value of 3 to 5, and chroma of 4 to 8. Texture is silt loam or loam in the fine-earth fraction.

BhE—Blocktown gravelly loam, 25 to 45 percent slopes

Setting

Landscape: Uplands

Component Description

Blocktown and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from phyllite or schist
Flooding: None
Available water capacity: Average of 1.4 inches

Additional Components

Mt. Airy and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Rock outcrop

Composition of map unit: 5 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Bowmansville Series

The Bowmansville series consists of very deep, somewhat poorly drained soils. Permeability is moderately slow above the stratified sand and gravel. These soils formed in recent alluvial deposits derived from upland soil materials weathered from Triassic red and brown shales and sandstones. They are on flood plains. Slopes range from 0 to 3 percent.

Bowmansville soils are similar to Rowland soils and are commonly adjacent to Bermudian, Birdsboro, Readington, Reaville, Abbottstown, Croton, Penn, and Klinesville soils. Rowland soils are moderately well drained and are on flood plains. Bermudian soils are on flood plains and are well drained. Birdsboro soils are on old terraces, are better drained than the Bowmansville soils, and have an argillic horizon. Reaville and Penn soils also have argillic horizons. Abbottstown and Croton soils are in upland depressions and are poorly drained. Klinesville soils are in upland positions and are shallow to bedrock. Readington soils are in upland positions, are moderately well drained, and have bedrock at a depth of 40 to 60 inches.

Typical pedon of Bowmansville silt loam in an area of Bowmansville-Rowland silt loams, 0 to 3 percent slopes; 200 feet north of Opossumtown Pike and 200 feet west of Bloomfield Road, near their intersection; lat. 39 degrees 29 minutes 05 seconds N. and long. 77 degrees 25 minutes 05 seconds W.

Ap—0 to 8 inches; dark reddish brown (5YR 3/3) silt loam; moderate fine granular structure; few distinct black (N 2/0) manganese or iron and manganese stains; common fine strong brown (7.5YR 4/6) iron masses between peds; strongly acid; clear smooth boundary.

Bw—8 to 25 inches; reddish brown (5YR 4/3) silt loam; weak medium subangular blocky structure; few distinct black (N 2/0) iron and manganese stains on faces of peds and in pores; common fine irregular reddish brown (5YR 5/3) iron masses between peds and common fine irregular reddish brown (5YR 4/3) iron depletions between peds; strongly acid; clear smooth boundary.

Bg1—25 to 32 inches; reddish gray (5YR 5/2) silt loam; weak medium subangular blocky structure; few distinct black (N 2/0) iron and manganese stains on nodules; common fine black (N 2/0) iron and manganese masses throughout; common fine reddish gray (5YR 5/2) iron concretions throughout; common fine black (N 2/0) iron and manganese concretions throughout; strongly acid; clear wavy boundary.

Bg2—32 to 45 inches; dark gray (5YR 4/1) silt loam; weak medium subangular blocky structure; common fine dark gray (5YR 4/1) iron masses between peds; common fine black (N 2/0) iron and manganese accumulations between peds; strongly acid; clear wavy boundary.

Bg3—45 to 54 inches; dark gray (5YR 4/1) silty clay loam; common coarse white (10YR 8/1) lithochromic mottles; weak medium subangular blocky structure; strongly acid; clear wavy boundary.

2Cg—54 to 60 inches; gray (5YR 5/1) very gravelly sandy loam; weak fine granular structure; 45 percent gravel; strongly acid.

The thickness of the solum ranges from 22 to 49 inches. Depth to lithologic discontinuity ranges from 26 to 54 inches. Depth to bedrock is more than 6 feet. The content of rock fragments of waterworn gravel ranges

from 0 to 14 percent in the solum and from 0 to 90 percent in the C horizon.

The Ap horizon has hue of 7.5YR to 5YR, value of 4, and chroma of 2 to 4. Texture is silt loam.

The Bw horizon has hue of 7.5YR to 5YR, value of 4 or 5, and chroma of 3. Texture is fine sandy loam, sandy loam, loam, or silt loam.

The Bg horizon has hue of 5YR or 7.5YR, value of 3 to 6, and chroma of 0 to 2. Texture is sandy clay loam, silt loam, or silty clay loam.

The Cg horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 0 to 2. Texture is loamy sand, sandy loam, sandy clay loam, loam, silt loam, or silty clay loam.

BmA—Bowmansville-Rowland silt loams, 0 to 3 percent slopes

Setting

Landscape: River valleys
Note: In some areas the soils have a cobbly surface layer.

Component Description

Bowmansville and similar soils

Composition of map unit: 50 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 0.0 to 1.5 feet
Parent material: Loamy alluvium derived from sandstone and shale or from shale and siltstone
Flooding: Occasional
Available water capacity: Average of 10.4 inches

Rowland and similar soils

Composition of map unit: 35 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium derived from sandstone and shale
Flooding: Occasional
Available water capacity: Average of 8.6 inches

Additional Components

Bermudian and similar soils

Composition of map unit: 15 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BmB—Bowmansville-Rowland silt loams, 3 to 8 percent slopes

Setting

Landscape: River valleys
Note: In some areas the soils have a cobbly surface layer.

Component Description

Bowmansville and similar soils

Composition of map unit: 50 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 0.0 to 1.5 feet
Parent material: Loamy alluvium derived from sandstone and shale or from shale and siltstone
Flooding: Occasional
Available water capacity: Average of 10.4 inches

Rowland and similar soils

Composition of map unit: 35 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium derived from sandstone and shale
Flooding: Occasional
Available water capacity: Average of 8.6 inches

Additional Components

Bermudian and similar soils

Composition of map unit: 15 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon

depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Braddock Series

The Braddock series consists of very deep, well drained soils. Permeability is moderate. These soils formed in colluvium derived from a mixture of crystalline rock including quartzite, phyllite, and schist. They are on gently sloping to moderately steep footslopes of ridges and colluvial fans. Slopes range from 3 to 25 percent.

Braddock soils are similar to Murrill soils and are commonly adjacent to Bagtown, Dryrun, Duffield, Hagerstown, Ryder, Thurmont, Trego, and Weverton soils. Murrill soils have shallower colluvial deposits over limestone residuum than the Braddock soils and contain less clay throughout. Bagtown and Thurmont soils are in the higher landform positions, contain less clay than the Braddock soils, and have deeper colluvial deposits. Duffield, Hagerstown, and Ryder soils formed from limestone residuum with no colluvial influences. Dryrun soils are on nearly level alluvial fans, are moderately well drained, and have more than 35 percent rock fragments in the solum. Trego soils are on the lower concave footslopes and in old alluvial fans, have a fragipan, and are moderately well drained. Weverton soils have more than 35 percent rock fragments in the solum.

Typical pedon of Braddock gravelly loam, 3 to 8 percent slopes; Washington County, Maryland; approximately 1,400 feet west of Crystal Falls Road, 3,400 feet south of Mt. Aetna Road, near the hamlet of Mount Aetna, in a forested area; lat. 39 degrees 35 minutes 24 seconds N. and long. 77 degrees 35 minutes 40 seconds W.

Oi—0 to 2 inches; partially decomposed leaf and twig matter.

Ap—2 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; 25 percent gravel and 5 percent cobbles; strongly acid; clear wavy boundary.

BE—7 to 13 inches; brown (7.5YR 5/4) gravelly loam; weak fine subangular blocky structure; friable; many fine, common medium, and few coarse roots; common fine and medium tubular and vesicular pores; 25 percent gravel; strongly acid; clear wavy boundary.

Bt1—13 to 22 inches; light red (2.5YR 6/6) gravelly clay loam; many coarse distinct red (2.5YR 4/6) mottles; weak medium subangular blocky structure parting to moderate fine subangular blocky; friable; many fine and common medium roots; many fine and few medium tubular and vesicular pores; many fine discontinuous clay films on faces of peds; 20 percent gravel; strongly acid; gradual wavy boundary.

Bt2—22 to 38 inches; red (2.5YR 4/6) gravelly clay; many fine prominent reddish yellow (7.5YR 7/6) mottles; moderate medium subangular blocky structure parting to strong fine subangular blocky; friable; few fine and medium roots; common fine tubular and vesicular pores; common distinct dark reddish brown (5YR 3/4) clay films on faces of peds and in pores; 15 percent gravel; strongly acid; clear wavy boundary.

Bt3—38 to 54 inches; dark red (2.5YR 3/6) clay; many medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine roots; many fine tubular and vesicular pores; many faint dark reddish brown (2.5YR 3/4) clay films in pores and on faces of peds; 10 percent gravel; extremely acid; clear irregular boundary.

BC—54 to 68 inches; red (2.5YR 4/6) clay loam; many medium faint light red (2.5YR 6/6) and common medium prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; firm in place, friable not in place; few fine roots; common fine vesicular and few fine tubular pores; common fine prominent very pale brown (10YR 8/2) iron depletions; few medium faint dusky red (2.5YR 3/2) manganese stains; few faint (2.5YR 3/4) clay films on faces of peds; 5 percent gravel; strongly acid; clear wavy boundary.

C—68 to 72 inches; red (2.5YR 4/6) clay loam; massive; friable; few fine roots; few fine vesicular pores; common medium prominent light gray (10YR 7/2) iron depletions and reddish yellow (7.5YR 6/8) iron accumulations and many medium yellowish brown (10YR 5/8) iron accumulations; 5 percent coarse fragments; extremely acid.

The thickness of the solum ranges from 40 to 70 inches. Depth to bedrock is more than 60 inches. The thickness of the colluvium ranges from 3 to more than 10 feet. The content of rock fragments ranges from 5 to 35 percent in the Ap horizon, BE horizon, and the upper part of the Bt horizon and from 0 to 25 percent in the lower part of the Bt horizon and in the C horizon.

Rock fragments consist mostly of gravel, cobbles, and stones. Reaction ranges from extremely acid to strongly acid except in limed areas.

The Ap horizon has hue of 7.5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is loam in the fine-earth fraction.

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

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

The BC and C horizons have hue of 2.5YR to 7.5YR and value and chroma of 3 to 8. Texture is clay loam, silty clay loam, or clay in the fine-earth fraction.

BnB—Braddock gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Braddock and similar soils

Composition of map unit: 85 percent
Landform: Convex footslopes and toeslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 4 feet
Parent material: Gravelly colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 9.7 inches

Additional Components

Murrill and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Thurmont and similar soils

Composition of map unit: 10 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BnC—Braddock gravelly loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil has a cobbly surface layer. In some areas slopes are steeper than 15 percent.

Component Description

Braddock and similar soils

Composition of map unit: 85 percent
Landform: Convex footslopes and toeslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 4 feet
Parent material: Gravelly colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 9.7 inches

Additional Components

Thurmont and similar soils

Composition of map unit: 10 percent
Landform: Undulating old colluvial fans

Murrill and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BoB—Braddock cobbly loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Braddock and similar soils

Composition of map unit: 85 percent
Landform: Convex footslopes and toeslopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 4 feet
Parent material: Gravelly colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 8.7 inches

Additional Components

Murrill and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

Thurmont and similar soils

Composition of map unit: 10 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Brecknock Series

The Brecknock series consists of deep, well drained soils. Permeability is moderate. These soils formed in residuum weathered from metamorphosed red shale and sandstone (porcelanite). They are on nearly level to steep, convex slopes of upland hills and low ridges. Slopes range from 3 to 8 percent.

Brecknock soils are similar to Penn soils and are commonly adjacent to Abbottstown, Croton, Lehigh, Legore, Montalto, and Watchung soils. Penn soils have bedrock between depths of 20 and 40 inches. Abbottstown, Croton, and Watchung soils are in the lower landform positions and upland drainage swales. Abbottstown soils are somewhat poorly drained, and Croton and Watchung soils are poorly drained. Lehigh soils are moderately well drained and are in the slightly lower landform positions. Legore and Montalto soils have bedrock weathered from diabase, diorite, and related rocks at a depth of more than 5 feet.

Typical pedon of Brecknock channery silt loam, 3 to 8 percent slopes; Lebanon County, Pennsylvania; South Londonderry Township, 1 1/2 miles northeast of Upper Lawn on Pennsylvania Highway 117 to its intersection with T331, about 600 feet east of the intersection, on an east-facing slope in a cultivated field:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) channery silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; slightly sticky; slightly plastic; 15 percent rock fragments; neutral; abrupt smooth boundary.

Bt1—8 to 20 inches; dark grayish brown (2.5Y 4/2) silt loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few faint clay films on faces of peds; 10 percent rock fragments; slightly acid; clear smooth boundary.

Bt2—20 to 28 inches; dark grayish brown (2.5Y 4/2) silt loam; moderate medium subangular blocky structure; firm; slightly sticky; slightly plastic; few faint clay films and few distinct black coatings on faces of peds; moderately acid; clear smooth boundary.

BC—28 to 36 inches; dark grayish brown (10YR 4/2) channery silt loam; weak medium subangular blocky structure; firm; slightly sticky; slightly plastic; common distinct black coatings on faces of peds; 15 percent rock fragments; moderately acid; clear smooth boundary.

C—36 to 46 inches; very dark gray (10YR 3/1) very channery silt loam; weak medium subangular blocky structure; firm; slightly sticky; slightly plastic; 40 percent rock fragments; strongly acid; clear wavy boundary.

R—46 inches; very dark gray to dark bluish gray indurated, slightly fractured porcelanite.

The thickness of the solum ranges from 24 to 40 inches. Depth to bedrock ranges from 42 to 60 inches. The content of rock fragments of porcelanite and hornfels channers ranges from 5 to 35 percent in the solum and from 15 to 70 percent in the C horizon. Reaction ranges from very strongly acid to slightly acid throughout the profile, except in limed areas.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. Value of 2 and chroma of 1 can occur in undisturbed pedons. Texture is loam or silt loam in the fine-earth fraction.

The B and BC horizons have hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. Texture is loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 10YR to 5B, value of 3 to

5, and chroma of 1 to 4. Texture is loam, silt loam, or clay loam in the fine-earth fraction.

BpB—Brecknock channery loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: In some areas slopes are steeper than 8 percent.

Component Description

Brecknock and similar soils

Composition of map unit: 85 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Channery loam
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 4.3 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Lehigh and similar soils

Composition of map unit: 5 percent
Landform: Ridges

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Brentsville Series

The Brentsville series consists of moderately deep, well drained soils. Permeability is moderate. These soils formed in material weathered from Triassic sandstone. They are on uplands. Slopes range from 3 to 15 percent.

Brentsville soils are similar to Penn soils and commonly adjacent to Klinesville, Reaville, Readington, Abbottstown, and Croton soils. Penn soils average more than 18 percent clay throughout. Klinesville soils have bedrock at a depth of less than 20 inches and average more than 35 percent rock fragments. Readington, Reaville, and Abbottstown soils are moderately well drained or somewhat poorly drained. Croton soils are poorly drained.

Typical pedon of Brentsville sandy loam, 3 to 8 percent slopes; Montgomery County, Maryland; about 2 miles southeast of Dickerson, about 300 feet northwest of the intersection of Martinsburg Road and Wasche Road; lat. 39 degrees 11 minutes 44 seconds N. and long. 77 degrees 27 minutes 04 seconds W.

Ap—0 to 10 inches; reddish brown (5YR 4/4) sandy loam; weak fine subangular blocky structure parting to weak fine granular; friable; many fine roots; about 5 percent channers; strongly acid; abrupt smooth boundary.
Bt1—10 to 21 inches; yellowish red (5YR 4/6) sandy loam; weak medium subangular blocky structure; friable; few fine roots; many fine interstitial pores; common prominent clay films on faces of peds and lining pores; about 10 percent channers; strongly acid; clear wavy boundary.
Bt2—21 to 33 inches; reddish brown (2.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few fine roots; many fine interstitial pores; common prominent clay films on faces of peds and lining pores; about 10 percent channers; strongly acid; abrupt wavy boundary.
R—33 inches; very strongly cemented, fractured Triassic sandstone.

Depth to bedrock ranges from 20 to 40 inches. The content of rock fragments ranges from 2 to 35 percent in the B horizon and from 25 to 35 percent in the C horizon. Reaction ranges from extremely acid to strongly acid in unlimed areas.

The A horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6.

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

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

BrB—Brentsville channery loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Brentsville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from sandstone and shale
Flooding: None
Available water capacity: Average of 4.0 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Klinesville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BrC—Brentsville channery loam, 8 to 15 percent slopes

Setting

Landscape: Valleys

Component Description

Brentsville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from sandstone and shale
Flooding: None
Available water capacity: Average of 4.0 inches

Additional Components

Klinesville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Penn and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Brinklow Series

The Brinklow series consists of moderately deep, well drained soils. Permeability is moderately slow. These soils formed in material weathered from acid crystalline rocks. They are on broad ridgetops and side slopes in the uplands on the Piedmont Plateau. Slopes range from 15 to 25 percent.

Brinklow soils are similar to Blocktown soils and are commonly adjacent to Glenelg, Glenville, Baile, and Mt. Airy soils. Blocktown soils have bedrock at a depth of less than 20 inches and average more than 35 percent rock fragments throughout. Glenville and Baile soils are in concave upland flats and depressions. Glenville soils are moderately well drained, and Baile soils are poorly drained. Mt. Airy soils have bedrock at a depth of 20 to 40 inches and do not have an argillic horizon. Glenelg soils have bedrock at a depth of more than 60 inches and average less than 35 percent rock fragments throughout.

Typical pedon of Brinklow channery silt loam in an area of Brinklow-Blocktown channery silt loams, 3 to 8 percent slopes; Montgomery County, Maryland; 2 miles northwest of Laytonsville, about 1.5 miles west on Rocky Road from its intersection with State Route 108, about 600 feet north:

Ap—0 to 10 inches; brown (7.5YR 5/4) channery silt loam; weak fine granular structure; friable; common fine roots; about 15 percent channers; slightly acid; abrupt smooth boundary.

Bt—10 to 19 inches; strong brown (7.5YR 5/8) channery silt loam; moderate medium subangular blocky structure; friable; few fine roots; common fine tubular pores; many prominent clay films on faces of peds and lining pores; 20 percent channers; moderately acid; clear wavy boundary.
BC—19 to 25 inches; variegated strong brown (7.5YR 5/8), reddish yellow (7.5YR 7/6), and yellowish red (5YR 5/6) channery loam; moderate medium and fine subangular blocky structure; friable; common fine tubular pores; 30 percent channers; moderately acid; abrupt wavy boundary.
Cr—25 to 35 inches; reddish yellow (5YR 7/6) moderately cemented bedrock that crushes to very channery loam; platy rock structure; firm; about 40 percent channers; moderately acid; abrupt wavy boundary.
R—35 inches; strongly cemented phyllite.

The thickness of the solum and the depth to paralithic contact range from 20 to 40 inches. Depth to hard bedrock ranges from 30 to 60 inches. The content of veined quartz and phyllite fragments ranges from 5 to 35 percent in the A and B horizons and from 35 to 50 percent in the C horizon. Reaction ranges from very strongly acid to moderately acid in unlimed areas.

The A horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 6.

The B and BC horizons have hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 4 to 8. Texture is loam, silt loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 10R, value of 4 to 7, and chroma of 4 to 8. Texture is loam or silt loam in the fine-earth fraction. The Cr horizon is extremely firm in place, but it consists of well weathered phyllite that can be penetrated by hand tools.

BkD—Brinklow-Blocktown channery loams, 15 to 25 percent slopes

Setting

Landscape: Uplands

Component Description

Brinklow and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from phyllite or schist
Flooding: None
Available water capacity: Average of 4.1 inches

Blocktown and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from phyllite or schist
Flooding: None
Available water capacity: Average of 1.4 inches

Additional Components

Mt. Airy and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Rock outcrop

Composition of map unit: 5 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Buckeystown Series

The Buckeystown series consists of very deep, well drained soils. Permeability is moderate. These soils formed from sandy limestone residuum. They occur on convex upland ridges within the Piedmont province. Slopes range from 0 to 25 percent.

Buckeystown soils are similar to Duffield and Hagerstown soils and are commonly adjacent to Adamstown, Funkstown, Ryder, and Walkersville soils. Duffield and Hagerstown soils have less sand in the solum than the Buckeystown soils. Adamstown and Funkstown soils developed from alluvial and colluvial

sediments. Ryder soils have bedrock at a depth of less than 40 inches. Walkersville soils are on stream terraces and formed in old alluvium over limestone residuum.

Typical pedon of Buckeystown sandy loam, 3 to 8 percent slopes; approximately 1 mile west of Buckeystown, 300 feet north of Keller Lime Plant Road, in a cultivated field; lat. 30 degrees 19 minutes 59 seconds N. and long. 77 degrees 26 minutes 59 seconds W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam; weak medium subangular blocky structure parting to moderate fine granular; friable; many fine roots; many fine and medium and common coarse tubular pores and many medium vesicular pores; 2 percent gravel; slightly acid; abrupt smooth boundary.

EB—10 to 24 inches; yellowish red (7.5YR 5/8) sandy loam; moderate fine and medium subangular blocky structure; friable; common fine roots throughout; common fine and medium vesicular and tubular pores and common coarse tubular pores; 5 percent gravel; slightly acid; gradual wavy boundary.

BE—24 to 32 inches; yellowish red (5YR 5/8) sandy loam; moderate medium subangular blocky structure; friable; common fine roots; many fine vesicular pores and many fine and medium tubular pores; few fine and medium prominent black (N 2/0) iron and manganese stains on faces of peds; 5 percent gravel; slightly acid; clear wavy boundary.

Bt1—32 to 44 inches; yellowish red (5YR 5/6) sandy loam; weak coarse platy structure parting to weak medium subangular blocky; friable; common fine roots; common fine and medium tubular and vesicular pores and many medium vesicular pores; common fine and medium prominent black (N 2/0) iron and manganese stains on faces of peds; 5 percent gravel; slightly acid; clear wavy boundary.

Bt2—44 to 51 inches; yellowish red (5YR 4/6) sandy loam; weak coarse platy structure parting to weak medium subangular blocky; friable; common fine roots; common fine and medium tubular and vesicular pores; distinct continuous clay films on faces of peds and in pores; common fine and medium prominent black (N 2/0) iron and manganese stains on faces of peds; 5 percent gravel; neutral; clear wavy boundary.

Bt3—51 to 60 inches; yellowish red (5YR 4/6) sandy loam; weak coarse platy structure parting to moderate medium subangular blocky; firm; many fine and medium tubular pores and common medium vesicular pores; common medium distinct continuous clay films on faces of peds and in pores; many fine and medium prominent black (N 2/0) iron and manganese stains on faces of peds; 5 percent gravel; neutral; clear wavy boundary.

Bt4—60 to 84 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium and coarse platy structure; friable; common medium tubular and vesicular pores and common fine tubular pores; many medium distinct continuous clay films on faces of peds; common prominent black (N 2/0) iron and manganese stains on faces of peds; neutral.

The thickness of the solum ranges from 60 to 90 inches. Depth to bedrock is more than 60 inches. The content of rock fragments, comprised mostly of limestone and sandstone gravel, ranges from 0 to 15 percent throughout the profile. Reaction ranges from moderately acid to neutral.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. Texture is loam, sandy loam, or sandy clay loam.

The BE and EB horizons have hue of 10YR or 5YR, value of 3 to 5, and chroma of 4 to 8. Texture is loam, sandy loam, or sandy clay loam.

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

The BC and C horizons, if they occur, have hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, sandy loam, or sandy clay loam.

BsB—Buckeystown sandy loam, 3 to 8 percent slopes

Setting

Landscape: Karst land
Note: In some areas slopes are steeper than 8 percent. There is a potential for sinkhole development.

Component Description

Buckeystown and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet

Parent material: Loamy residuum from sandy limestone
Flooding: None
Available water capacity: Average of 9.0 inches

Additional Components

Hagerstown and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BtB—Buckeystown loam, 3 to 8 percent slopes

Setting

Landscape: Karst land
Note: There is a potential for sinkhole development.

Component Description

Buckeystown and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from sandy limestone
Flooding: None
Available water capacity: Average of 9.0 inches

Additional Components

Hagerstown and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

BtC—Buckeystown loam, 8 to 15 percent slopes

Setting

Landscape: Karst land
Note: There is a potential for sinkhole development.

Component Description

Buckeystown and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from sandy limestone
Flooding: None
Available water capacity: Average of 9.0 inches

Additional Components

Hagerstown and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about

managing this map unit, see the section "Use and Management of the Soils."

BuB—Buckeystown sandy loam, 3 to 8 percent slopes, rocky

Setting

Landscape: Karst land
Note: In some areas slopes are steeper than 8 percent.

Component Description

Buckeystown and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from sandy limestone
Flooding: None
Available water capacity: Average of 9.0 inches

Additional Components

Ryder and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Burkittsville Series

The Burkittsville series consists of very deep, well drained soils. Permeability is moderate in the upper part of the subsoil and slow in the substratum. These soils formed in residuum weathered from granitic gneiss. They are on nearly level to strongly sloping summits and the upper backslopes within intermountain valleys of the Blue Ridge. Slopes range from 0 to 15 percent.

Burkittsville soils are similar to Myersville soils and are commonly adjacent to Catoctin, Lantz, Mt. Zion, Rohrersville, and Spoolsville soils. Myersville soils formed from greenstone. Catoctin soils contain more than 35 percent rock fragments in the particle-size control section. Spoolsville soils contain less than 18 percent clay in the particle-size control section. Lantz soils are very poorly drained, Rohrersville soils are somewhat poorly drained, and Mt. Zion soils are moderately well drained.

Typical pedon of Burkittsville loam in an area of Myersville-Burkittsville complex, 3 to 8 percent slopes; about 200 feet south of Brentland Road, about 0.5 mile west of Petersville, in a cultivated field; lat. 39 degrees 21 minutes 02 seconds N. and long. 77 degrees 37 minutes 48 seconds W.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) loam; moderate medium granular structure in upper part and weak medium platy structure in lower part; friable; many fine roots; 5 percent quartzite and granitic gneiss pebbles; slightly acid; abrupt smooth boundary.

Bt1—10 to 18 inches; strong brown (7.5YR 4/6) clay loam; moderate medium and fine subangular blocky structure; firm; common fine roots; common fine tubular pores; many distinct clay films on faces of peds and lining pores; neutral; clear smooth boundary.

Bt2—18 to 35 inches; strong brown (7.5YR 5/8) loam; common fine and medium distinct brownish yellow (10YR 6/6) and yellow (10YR 7/6) lithochromic mottles; weak and moderate coarse subangular blocky structure; firm; common fine roots; common fine tubular pores; many distinct yellowish red (5YR 4/6) clay films on faces of peds and lining pores; strongly acid; clear wavy boundary.

BC—35 to 59 inches; yellow (10YR 7/6), brown (7.5YR 4/3), and strong brown (7.5YR 5/8) coarse sandy loam; weak medium and thick platy structure; friable; few fine roots; common medium tubular pores; many prominent yellowish red (5YR 4/6) clay films lining pores and few on faces of peds; very strongly acid; gradual smooth boundary.

CB—59 to 82 inches; light yellowish brown (10YR 6/4), dark brown (7.5YR 3/3), and strong brown (7.5YR 5/8) coarse sandy loam; weak medium platy structure (inherited); friable; few prominent yellowish red (5YR 4/6) clay films on faces of peds; very strongly acid; clear smooth boundary.

C—82 to 130 inches; variegated light gray (5Y 7/1), yellowish red (5YR 5/8), strong brown (7.5YR 5/8), and reddish yellow (7.5YR 6/8) coarse sandy loam; moderate thick platy structure (inherited); friable; common distinct black (N 2.5/0) manganese stains; very strongly acid.

The thickness of the solum ranges from 40 to 80 inches. Depth to bedrock is more than 60 inches. The content of rock fragments, consisting of mostly granitic gneiss and quartzite, ranges from 0 to 25 percent in the A horizon and the upper part of the B horizon, from 0 to 40 percent in the lower part of the B horizon, and from 0 to 75 percent in the C horizon. Reaction ranges from very strongly acid to moderately acid throughout the profile, except in limed areas.

The A or Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 3 or 4. It is loam or silt loam in the fine-earth fraction.

The BE or EB horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. Texture is dominantly loam but ranges from sandy loam to silt loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is clay loam, loam, or sandy clay loam in the fine-earth fraction. Silt content is typically less than 35 percent.

The BC, CB, and C horizons are commonly multicolored with hue of 5YR to 5Y, value of 3 to 7, and chroma of 1 to 8. Subhorizons having hue of 5YR occur in some pedons. The horizons are commonly coarse sandy loam but range from loam to loamy sand in the fine-earth fraction.

Cardiff Series

The Cardiff series consists of deep, well drained soils. Permeability is moderate. These soils formed in residuum from material weathered from hard quartzitic slate, phyllite, or other fine-grained rock. They are on summits and side slopes. Slopes range from 3 to 65 percent.

Cardiff soils are similar to Mt. Airy soils and are commonly adjacent to Whiteford, Buckeystown, Hagerstown, Duffield, Ryder, Adamstown, Funkstown, Glenelg, Glenville, Myersville, Penn, Reaville, Legore, and Montalto soils. Mt. Airy soils formed from hard mica schist. Whiteford, Buckeystown, Hagerstown, Duffield, Ryder, Glenelg, Myersville, Penn, Funkstown, and Adamstown soils have an argillic horizon. Glenville and Reaville soils are somewhat poorly drained. Legore and Montalto soils formed from diabase.

Typical pedon of Cardiff channery loam in an area of Whiteford-Cardiff channery loams, 3 to 8 percent slopes; 0.5 mile east of the intersection of Greenfield Road and Route 85, about 950 feet north on Greenfield Road, in a field; lat. 39 degrees 15 minutes 42 seconds N. and long. 77 degrees 26 minutes 55 seconds W.

Oi—0 to 1 inch; highly decomposed plant material.

A—1 to 2 inches; very dark gray (10YR 3/1) channery loam; strong fine granular structure; very friable; many fine and common medium roots throughout; 16 percent channers; extremely acid; clear wavy boundary.

Ap—2 to 4 inches; dark grayish brown (10YR 4/2) channery loam; moderate fine and medium subangular blocky structure; very friable; many fine and common medium roots throughout; many fine vesicular pores; 18 percent channers; extremely acid; clear wavy boundary.

Bw1—4 to 8 inches; light yellowish brown (2.5Y 6/3) channery loam; weak fine subangular blocky structure; friable; many fine, common medium, and common coarse roots throughout; many fine vesicular pores; many coarse prominent dark grayish brown (10YR 4/2) organic stains on faces of peds and lining pores; 30 percent channers; very strongly acid; clear wavy boundary.

Bw2—8 to 16 inches; light yellowish brown (2.5Y 6/3) very channery silt loam; weak fine and medium subangular blocky structure; friable; many fine and medium and common coarse roots throughout; many fine tubular and common fine vesicular pores; common medium prominent dark yellowish brown (10YR 4/4) organic stains throughout; 40 percent channers; very strongly acid; clear wavy boundary.

C1—16 to 20 inches; light yellowish brown (2.5Y 6/4) extremely channery silt loam; common medium distinct yellowish brown (10YR 5/4) lithochromic mottles throughout; massive; firm; common medium roots throughout; common fine tubular pores; 60 percent channers; very strongly acid; gradual wavy boundary.

C2—20 to 27 inches; light yellowish brown (2.5Y 6/4) extremely channery silt loam; many coarse prominent yellowish brown (10YR 5/4) lithochromic mottles throughout; massive; firm; common fine and medium roots between rock fragments; common medium vesicular pores; 75 percent channers; very strongly acid; gradual wavy boundary.

Cr—27 to 42 inches; yellowish brown (10YR 5/4), greenish gray (5GY 6/1), and strong brown (7.5YR 5/8) moderately cemented bedrock that has extremely channery silt loam filling in fractures; firm; common fine and medium roots between rock fragments; common fine vesicular pores; 85 percent channers; clear wavy boundary.

R—42 inches; yellowish brown (10YR 5/4) to greenish gray (5GY 6/1) strongly cemented quartzite slate and phyllite.

The thickness of the solum ranges from 15 to 35 inches. Depth to paralithic contact ranges from 20 to 40 inches. The content of rock fragments ranges from 15 to 60 percent in the solum and averages more than 60 percent in the C horizon. The rock fragments consist of gray to greenish gray slate or other fine-grained rock. Reaction is strongly acid or very strongly acid in unlimed areas.

The A and Ap horizons have hue of 10YR to 5Y, value of 2 to 6, and chroma of 1 to 4. The lowest value is confined to the thin A horizon, and the highest value is confined to the E horizon in undisturbed pedons. Texture is channery silt loam or channery loam.

The Bw horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 3 to 8. Texture is loam or silt loam in the fine-earth fraction. The clay content ranges from 12 to 25 percent.

The C horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 3 to 8. The fine-earth fraction is mainly rock fragments coated with loam or silt loam. The 5GY 6/1 and 7.5YR 5/8 colors in the Cr horizon are inherited from the bedrock and are not indications of wetness. In some pedons there is chroma of 1 or 2, which is inherited from the parent material and not due to wetness.

CaC—Cardiff channery loam, 8 to 15 percent slopes

Setting

Landscape: Uplands

Component Description

Cardiff and similar soils

Composition of map unit: 85 percent
Landform: Ridges
Surface layer texture: Channery loam
Depth to restrictive feature: 30 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from slate
Flooding: None
Available water capacity: Average of 7.2 inches

Additional Components

Whiteford and similar soils

Composition of map unit: 15 percent
Landform: Ridges, summits, and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CaD—Cardiff channery loam, 15 to 25 percent slopes

Setting

Landscape: Uplands
Note: In some areas the soil has flaggy surface layers.

Component Description

Cardiff and similar soils

Composition of map unit: 85 percent
Landform: Ridges
Surface layer texture: Channery loam
Depth to restrictive feature: 30 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from slate
Flooding: None
Available water capacity: Average of 7.2 inches

Additional Components

Whiteford and similar soils

Composition of map unit: 15 percent
Landform: Ridges, summits, and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CaE—Cardiff channery loam, 25 to 45 percent slopes

Setting

Landscape: Uplands

Component Description

Cardiff and similar soils

Composition of map unit: 85 percent
Landform: Ridges
Surface layer texture: Channery loam
Depth to restrictive feature: 30 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from slate
Flooding: None
Available water capacity: Average of 7.2 inches

Additional Components

Whiteford and similar soils

Composition of map unit: 10 percent
Landform: Ridges, summits, and backslopes

Rock outcrop

Composition of map unit: 5 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CbF—Cardiff flaggy loam, 25 to 65 percent slopes, rocky

Setting

Landscape: Uplands

Component Description

Cardiff and similar soils

Composition of map unit: 85 percent
Landform: Ridges
Surface layer texture: Channery loam
Depth to restrictive feature: 30 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from slate
Flooding: None
Available water capacity: Average of 6.1 inches

Additional Components

Rock outcrop

Composition of map unit: 10 percent
Landform: None assigned

Whiteford and similar soils

Composition of map unit: 5 percent
Landform: Ridges, summits, and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Catoctin Series

The Catoctin series consists of moderately deep, well drained soils. Permeability is moderately rapid. These soils formed in material weathered primarily from greenstone schist or metabasalt. They are on nearly level to very steep ridges and side slopes. Slopes range from 0 to 80 percent.

Catoctin soils are similar to Hazel soils and are commonly adjacent to Lantz, Mt. Zion, Myersville, Rohrersville, and Spoolsville soils. Hazel soils are weathered from acid phyllite and schist material. Lantz, Mt. Zion, and Rohrersville soils have bedrock at a depth of more than 40 inches. Lantz soils are poorly drained, Mt. Zion soils are moderately well drained, and Rohrersville soils are somewhat poorly drained. Myersville and Spoolsville soils are very deep, well drained, residual soils that developed from greenstone schist.

Typical pedon of Catoctin channery loam, 15 to 25 percent slopes; approximately 1,500 feet west of Holter Road and 1,300 feet south of the intersection of Bussard and Holter Roads, on a south-facing aspect in a cultivated field; lat. 39 degrees 24 minutes 36

seconds N. and long. 77 degrees 31 minutes 45 seconds W.

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) channery loam; weak medium platy structure parting to weak fine granular; friable; common fine and few medium roots; few fine tubular pores and common fine vesicular pores; 7 percent quartz gravel and 5 percent greenstone schist channers; neutral; abrupt smooth boundary.

Bt—6 to 11 inches; strong brown (7.5YR 4/6) channery loam; weak medium subangular blocky structure; friable; few fine roots; common fine vesicular pores and few fine tubular pores; few faint patchy clay films surrounding rock fragments; 30 percent channers of which 15 percent are easily crushable by hand; slightly acid; clear wavy boundary.

BC—11 to 22 inches; strong brown (7.5YR 4/6) very channery loam; weak coarse subangular blocky structure; friable; few fine roots; few fine tubular pores and common fine vesicular pores; few fine clay bridges between rock fragments; 40 percent channers of which 20 percent are easily crushable by hand; moderately acid; clear wavy boundary.

C—22 to 38 inches; yellowish red (5YR 4/6) very channery loam; massive parting to weak medium platy structure; friable; common fine tubular and vesicular pores and common medium tubular pores; 45 percent channers of which 20 percent are easily crushable by hand; moderately acid; clear irregular boundary.

R—38 inches; very strongly cemented, highly fractured greenstone.

The thickness of the solum ranges from 15 to 30 inches. Depth to bedrock ranges from 20 to 40 inches. The content of rock fragments ranges from 5 to 55 percent in the solum and from 35 to 80 percent in the C horizon. The content of para rock fragments ranges from 5 to 35 percent throughout the profile. These rock fragments primarily consist of greenstone schist. Reaction ranges from strongly acid to slightly acid except in limed areas.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam or loam in the fine-earth fraction.

The B and BC horizons have hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam, loam, or fine sandy loam in the fine-earth fraction.

The C horizon has variegated hues of 5YR to 2.5Y and value and chroma of 4 to 8. Texture is loam, fine sandy loam, or silt loam in the fine-earth fraction. The content of para rock fragments ranges to 40 percent.

CcC—Catoctin channery loam, 8 to 15 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 3.4 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Myersville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CcD—Catoctin channery loam, 15 to 25 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam

Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Channery residuum weathered from greenstone schist
Flooding: None
Available water capacity: Average of 3.4 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Myersville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CcE—Catoctin channery loam, 25 to 45 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 90 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone schist
Flooding: None
Available water capacity: Average of 2.9 inches

Additional Components

Burkittsville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Spoolsville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CdB—Catoctin-Highfield complex, 3 to 8 percent slopes, very rocky

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum weathered from greenstone schist
Flooding: None
Available water capacity: Average of 3.4 inches

Highfield and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone

Flooding: None
Available water capacity: Average of 6.9 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Spoolsville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CdC—Catoctin-Highfield complex, 8 to 15 percent slopes, very rocky

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 3.3 inches

Highfield and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.9 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Myersville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CdD—Catoctin-Highfield complex, 15 to 25 percent slopes, very rocky

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 3.3 inches

Highfield and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock

Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.9 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CdE—Catoctin-Highfield complex, 15 to 45 percent slopes, very rocky

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 60 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum weathered from greenstone schist
Flooding: None
Available water capacity: Average of 3.3 inches

Highfield and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.9 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CeB—Catoctin-Spoolsville complex, 3 to 8 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 2.9 inches

Spoolsville and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum derived from greenstone schist

Flooding: None
Available water capacity: Average of 12.7 inches

Additional Components

Myersville and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CeC—Catoctin-Spoolsville complex, 8 to 15 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 2.9 inches

Spoolsville and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum derived from greenstone schist
Flooding: None
Available water capacity: Average of 12.7 inches

Additional Components

Myersville and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CeD—Catoctin-Spoolsville complex, 15 to 25 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 55 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone schist
Flooding: None
Available water capacity: Average of 2.9 inches

Spoolsville and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum derived from greenstone
Flooding: None
Available water capacity: Average of 12.7 inches

Additional Components

Myersville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CeE—Catoctin-Spoolsville complex, 25 to 45 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Catoctin and similar soils

Composition of map unit: 60 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 2.9 inches

Spoolsville and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum derived from greenstone
Flooding: None
Available water capacity: Average of 12.7 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Codorus Series

The Codorus series consists of very deep, moderately well drained soils. Permeability is moderate. These soils formed in recently deposited alluvial materials derived from metamorphic and crystalline rocks. They are on nearly level, active flood plains. Slopes range from 0 to 3 percent.

Codorus soils are similar to Hatboro soils and are commonly adjacent to Catoctin, Lantz, Myersville, Mt. Zion, and Rohrersville soils. Hatboro soils are poorly drained and typically occur in backwater areas on flood plains. Catoctin, Myersville, and Mt. Zion soils are on adjacent uplands. Lantz and Rohrersville soils are in concave upland draws which do not flood and have a water table within a depth of 20 inches.

Typical pedon of Codorus silt loam in an area of Codorus and Hatboro silt loams, 0 to 3 percent slopes; Washington County, Maryland; approximately 1,000 feet north of Frog Eye Road, about 75 feet west of Israel Creek, south of Brownsville; lat. 39 degrees 21 minutes 48 seconds N. and long. 77 degrees 49 minutes 47 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to weak fine granular; friable; many fine and few medium roots; neutral; abrupt smooth boundary.

Bw1—7 to 16 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine and common medium tubular pores and few medium vesicular pores; neutral; clear smooth boundary.

Bw2—16 to 22 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; common fine roots; many fine tubular and vesicular pores and few medium tubular pores; 5 percent gravel; slightly acid; clear smooth boundary.

Bg—22 to 29 inches; grayish brown (10YR 5/2) loam; weak coarse subangular blocky structure; friable; common fine and few coarse roots; many fine and common medium tubular and vesicular pores; common medium prominent reddish brown (5YR 5/4) iron accumulations; few fine and medium

distinct dark gray (10YR 4/1) organic coatings in pores and on faces of peds; 5 percent gravel; slightly acid; clear smooth boundary.
C1—29 to 34 inches; brown (10YR 4/3) loam; common fine distinct yellowish brown (10YR 5/4) mottles; massive; friable; few fine roots; common medium and many fine tubular and vesicular pores; 5 percent gravel; slightly acid; clear smooth boundary.
C2—34 to 40 inches; brown (10YR 4/3) very gravelly loamy sand; massive; single grain; very friable; many medium black (N 2/0) iron and manganese concretions; 40 percent gravel; slightly acid; clear smooth boundary.
C3—40 to 72 inches; yellowish brown (10YR 5/4) very gravelly loamy coarse sand; massive; single grain; very friable; 50 percent gravel; slightly acid.

The thickness of the solum ranges from 20 to 30 inches. Depth to bedrock is more than 72 inches. Depth to sand and stratified material is 30 inches or more. The content of coarse fragments ranges from 0 to 15 percent in the solum, from 0 to 25 percent in the substratum above a depth of 30 inches, and from 15 to 70 percent below a depth of 30 inches. Reaction ranges from neutral to moderately acid in limed areas.

The Ap horizon has hue of 10YR, value of 3 to 6, and chroma of 2 or 3. Texture is silt loam or loam in the fine-earth fraction.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. Texture is silt loam, clay loam, loam, or silty clay loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 1 to 4. Texture is silt loam, clay loam, loam, or silty clay loam. In some pedons the horizon contains stratified sand and gravel below a depth of 40 inches.

CgA—Codorus and Hatboro silt loams, 0 to 3 percent slopes

Setting

Landscape: River valleys
Note: In some areas the soils have gravel layers above a depth of 40 inches. Ponding may occur for periods of long duration.

Component Description

Codorus and similar soils

Composition of map unit: 60 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.6 to 2.5 feet
Parent material: Loamy alluvium derived from greenstone, phyllite, schist, quartzite, or diabase
Flooding: Occasional
Available water capacity: Average of 7.1 inches

Hatboro and similar soils

Composition of map unit: 40 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Loamy alluvium derived from greenstone, quartzite, schist, or phyllite
Flooding: Occasional
Available water capacity: Average of 9.0 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Combs Series

The Combs series consists of deep, well drained soils. Permeability is moderate or moderately rapid. These soils formed in recent alluvium derived from sandstone, shale, siltstone, and limestone. They are on nearly level active flood plains along the Potomac River and smaller tributaries. Slopes range from 0 to 3 percent.

Combs soils are similar to Lindside soils and are commonly adjacent to Funkstown and Melvin soils. Lindside soils are moderately well drained and do not have a thick, dark brown surface layer. Melvin soils are poorly drained and formed in silty alluvium. Funkstown soils are moderately well drained and are not associated with perennial streams.

Typical pedon of Combs silt loam, 0 to 3 percent slopes; in the Leitersburg area, 250 feet southwest of Battletown Road, 100 feet northwest of Antietam Creek, in a nearly level crop field adjacent to Antietam Creek; lat. 39 degrees 42 minutes 21 seconds N. and long. 77 degrees 37 minutes 20 seconds W.

Ap1—0 to 9 inches; dark brown (10YR 3/3) silt loam; strong fine granular structure; very friable; many fine and medium roots; common fine and medium tubular pores; neutral; clear wavy boundary.
Ap2—9 to 13 inches; dark brown (10YR 3/3) silt loam; strong medium granular structure; friable; many fine and medium roots; common fine and medium tubular pores; neutral; clear wavy boundary.
Bw1—13 to 23 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few medium and coarse tubular pores; neutral; clear wavy boundary.
Bw2—23 to 41 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few medium and coarse tubular pores; 5 percent quartzite gravel; slightly acid; clear wavy boundary.
Ab—41 to 46 inches; very dark grayish brown (10YR 3/2) very fine sandy loam; weak medium subangular blocky structure parting to moderate fine granular; few fine roots; common fine and medium and few coarse tubular pores; neutral; clear wavy boundary.
C1—46 to 51 inches; dark yellowish brown (10YR 4/4) loam; massive; very friable; few fine roots; 5 percent quartzite gravel; moderately acid; clear wavy boundary.
C2—51 to 60 inches; yellowish brown (10YR 5/6) gravelly coarse sandy loam; massive; single grain; loose; few coarse prominent yellowish red (5YR 4/6) iron accumulations; 15 percent gravel; moderately acid.

The thickness of the solum ranges from 40 to 50 inches. The thickness of the mollic epipedon ranges from 10 to 15 inches. The content of coarse fragments ranges from 0 to 5 percent in the surface layer, from 0 to 10 percent in the solum, and from 5 to 15 percent in the substratum. The coarse fragments may be stratified. Reaction ranges from moderately acid to neutral.

The Ap and Ab horizons have hue of 10YR, value of 3, and chroma of 2 or 3. Texture is silt loam, loam, fine sandy loam, or sandy loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Texture is silt loam, loam, fine sandy loam, or sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Texture is loam, sandy loam, or fine sandy loam. In some pedons the horizon has stratified sand and gravel.

CmA—Combs fine sandy loam, 0 to 3 percent slopes

Setting

Landscape: River valleys
Note: In some areas the soil has firm or brittle characteristics. In some areas the soil does not have a thick, dark surface layer.

Component Description

Combs and similar soils

Composition of map unit: 85 percent
Landform: Flood plains
Surface layer texture: Fine sandy loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy alluvium derived from limestone, sandstone, and shale
Flooding: Rare
Available water capacity: Average of 9.6 inches

Additional Components

Lindside and similar soils

Composition of map unit: 10 percent
Landform: Flood plains

Melvin and similar soils

Composition of map unit: 5 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CnA—Combs silt loam, 0 to 3 percent slopes

Setting

Landscape: River valleys
Note: In some areas the soil has firm or brittle characteristics.

Component Description

Combs and similar soils

Composition of map unit: 85 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy alluvium derived from limestone, sandstone, and shale
Flooding: Rare
Available water capacity: Average of 9.8 inches

Additional Components

Lindside and similar soils

Composition of map unit: 10 percent
Landform: Flood plains

Melvin and similar soils

Composition of map unit: 5 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Conestoga Series

The Conestoga series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum from calcareous schist. They are on nearly level to moderately steep uplands. Slopes range from 0 to 15 percent.

Conestoga soils are similar to Letort soils and are commonly adjacent to Benevola, Funkstown, Hyattstown, Linganore, and Wiltshire soils. Letort soils contain a dark black solum enriched with manganese. Benevola and Wiltshire soils formed from marble. Linganore and Hyattstown soils formed from phyllite. Funkstown soils are moderately well drained.

Typical pedon of Conestoga silt loam in an area of Conestoga and Letort silt loams, 3 to 8 percent slopes; approximately 1/2 mile east of the intersection of Clemsonville Road and Pearre Road, in a cropped field; lat. 39 degrees 31 minutes 33 seconds N. and long. 77 degrees 10 minutes 06 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; many fine to coarse roots; many very fine to coarse vesicular and tubular pores; 14 percent schist channers; strongly acid; abrupt smooth boundary.

Bt1—8 to 17 inches; brown (7.5YR 4/4) channery silt loam; moderate medium subangular blocky structure; friable; many fine and medium roots; many fine and medium vesicular and tubular pores; 26 percent schist channers; strongly acid; clear smooth boundary.

Bt2—17 to 32 inches; brown (7.5YR 4/4) channery silty clay loam; common fine and medium prominent weak red (2.5YR 5/2) lithochromic mottles; moderate medium subangular blocky structure; friable; many fine and medium roots; many fine and medium vesicular and tubular pores; 25 percent schist channers; moderately acid; gradual wavy boundary.

Bt3—32 to 66 inches; light olive brown (2.5Y 5/4) channery silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine and medium vesicular and tubular pores; 25 percent schist channers; moderately acid; gradual wavy boundary.

BC—66 to 70 inches; light olive brown (2.5Y 5/4) very channery silt loam; common fine and medium prominent yellowish brown (10YR 5/6) lithochromic mottles; moderate medium subangular blocky structure; friable; 35 percent schist channers; neutral.

The thickness of the solum ranges from 30 to 60 inches. Depth to bedrock is more than 60 inches. The content of rock fragments of quartz and schist ranges from 15 to 30 percent in the solum and from 5 to 35 percent in the substratum. Reaction ranges from very strongly acid to slightly alkaline.

The A horizon has hue of 10YR, value of 4, and chroma of 2 or 3. Texture is silt loam or loam in the fine-earth fraction.

The B horizon has hue of 10YR to 7.5YR and value and chroma of 4 to 6. In some pedons it has hue of 2.5Y, value of 5 or 6, and chroma of 4 to 8. Texture is silt loam, loam, or clay loam in the fine-earth fraction.

The BC horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 4 to 6. Texture is silt loam, loam, or sandy loam in the fine-earth fraction.

CoB—Conestoga and Letort silt loams, 3 to 8 percent slopes

Setting

Landscape: Uplands
Note: There is a potential for sinkhole development.

Component Description

Conestoga and similar soils

Composition of map unit: 60 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from marble and calcareous schist
Flooding: None
Available water capacity: Average of 7.4 inches

Letort and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: More than 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from marble and calcareous schist
Flooding: None
Available water capacity: Average of 7.6 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CoC—Conestoga and Letort silt loams, 8 to 15 percent slopes

Setting

Landscape: Uplands
Note: There is a low or moderate potential for sinkhole development.

Component Description

Conestoga and similar soils

Composition of map unit: 70 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from marble and calcareous schist
Flooding: None
Available water capacity: Average of 7.4 inches

Letort and similar soils

Composition of map unit: 20 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: More than 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from marble and calcareous schist
Flooding: None
Available water capacity: Average of 7.6 inches

Additional Components

Linganore and similar soils

Composition of map unit: 10 percent
Landform: Summits, backslopes, and ridges

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Croton Series

The Croton series consists of deep, poorly drained soils. Permeability is slow. These soils formed in silty colluvium and residuum underlain mainly by sandstone. They are in colluvial depressions on uplands. Slopes range from 0 to 3 percent.

Croton soils are similar to Abbottstown soils and are commonly adjacent to Penn, Reaville, Readington, and Klinesville soils. Abbottstown soils contain more

silt in the particle-size control section than the Croton soils. Penn, Reaville, and Klinesville soils have bedrock within a depth of 40 inches. Readington soils are moderately well drained.

Typical pedon of Croton silt loam, 0 to 3 percent slopes; Montgomery County, Maryland; about 1 mile northeast of Poolesville, about 1,000 feet north of Dry Seneca Creek on Cattail Road, 100 feet northwest in a pasture; lat. 39 degrees 09 minutes 02 seconds N. and long. 77 degrees 24 minutes 02 seconds W.

A1—0 to 5 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; slightly sticky; slightly plastic; many very fine and fine roots; common medium faint grayish brown (10YR 5/2) iron depletions; strongly acid; clear wavy boundary.

A2—5 to 12 inches; brown (10YR 4/3) silt loam; moderate fine and medium subangular blocky structure; friable; slightly sticky; slightly plastic; common very fine and fine roots; many medium faint pale brown (10YR 6/3) iron depletions; strongly acid; clear wavy boundary.

Btg—12 to 17 inches; pinkish gray (5YR 6/2) silty clay loam; moderate medium prismatic structure parting to weak medium platy; firm and brittle; slightly sticky; plastic; few fine roots; many prominent clay films on faces of peds; 5 percent channers; common medium prominent strong brown (7.5YR 5/8) iron accumulations; strongly acid; clear wavy boundary.

Btxg—17 to 32 inches; pinkish gray (5YR 6/2) silty clay loam; moderate coarse prismatic structure parting to moderate medium platy; firm and brittle; sticky; plastic; few fine roots along faces of peds; many prominent clay films on faces of peds; many medium prominent strong brown (7.5YR 5/8) iron accumulations; very strongly acid; abrupt wavy boundary.

Cg1—32 to 48 inches; reddish brown (5YR 4/3) silt loam; massive; firm in place; slightly sticky; slightly plastic; about 10 percent channers; common medium distinct yellowish red (5YR 5/8) iron accumulations; very strongly acid; abrupt wavy boundary.

Cg2—48 to 56 inches; dark reddish gray (5YR 4/2) silty clay loam; massive; friable; sticky; plastic; about 10 percent channers; common medium distinct strong brown (7.5YR 5/6) iron accumulations; very strongly acid; abrupt wavy boundary.

R—56 inches; indurated fine-grained Triassic sandstone.

Depth to the fragipan ranges from 15 to 25 inches. Depth to bedrock ranges from 42 to 60 inches. The C horizon has 10 to 35 percent pebbles. In unlimed areas reaction is strongly acid or very strongly acid in the A horizon and ranges from moderately acid to very strongly acid in the B and C horizons.

The A horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam or silty clay loam.

The B horizon has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 1 to 6. The faces of peds have dominant chroma of 2 or less. This horizon is silt loam or silty clay loam in the fine-earth fraction. The Bx horizon is firm or very firm and brittle. It has medium or coarse prismatic structure.

The C horizon has hue of 10R to 5YR, value of 3 or 4, and chroma of 2 or 3. Mottles have value of 5 or 6 and chroma of 2 to 8. The horizon is silt loam, silty clay loam, or the channery analogs of these textures.

CrA—Croton-Abbottstown silt loams, 0 to 3 percent slopes

Setting

Landscape: Valleys

Note: In some areas the soils do not have fragic characteristics and have thick mantles of recent material.

Component Description

Croton and similar soils

Composition of map unit: 50 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 15 to 25 inches to a fragipan; 42 to 60 inches to lithic bedrock
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Loamy residuum weathered from shale or siltstone
Flooding: None
Available water capacity: Average of 2.7 inches

Abbottstown and similar soils

Composition of map unit: 35 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 15 to 30 inches to a fragipan; 40 to 60 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet

Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 6.0 inches

Additional Components

Reaville and similar soils

Composition of map unit: 15 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

CrB—Croton-Abbottstown silt loams, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soils do not have fragic characteristics.

Component Description

Croton and similar soils

Composition of map unit: 50 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 42 to 60 inches to lithic bedrock; 15 to 25 inches to a fragipan
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Loamy residuum weathered from shale or siltstone
Flooding: None
Available water capacity: Average of 5.4 inches

Abbottstown and similar soils

Composition of map unit: 35 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to lithic bedrock; 15 to 30 inches to a fragipan
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy residuum weathered from shale or siltstone
Flooding: None
Available water capacity: Average of 6.0 inches

Additional Components

Reaville and similar soils

Composition of map unit: 15 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils. Permeability is rapid. These soils formed in residuum weathered from acid brown and gray sandstone and quartzite. They are on nearly level to very steep summits and backslopes. Slopes range from 0 to 65 percent.

Dekalb soils are similar to Stumptown soils and are commonly adjacent to Bagtown, Airmont, and Edgemont soils. Stumptown soils formed from quartzite. Bagtown and Edgemont soils are very deep. Airmont soils are moderately well drained.

Typical pedon of Dekalb channery loam, 15 to 25 percent slopes, very stony; Washington County, Maryland; 300 feet south of Maryland Route 40, on an east-facing slope, on the summit of Sideling Hill near Hancock; lat. 39 degrees 41 minutes 13 seconds N. and long. 78 degrees 18 minutes 17 seconds W.

Oi—0 to 1 inch; leaves, twigs, and partially decomposed organic matter; 2 percent stones on and in the surface layer.
A—1 to 3 inches; very dark brown (10YR 2/2) channery loam; weak fine granular structure; very friable; many fine and common medium roots; 15 percent fine channers and 2 percent stones; very strongly acid; abrupt smooth boundary.
BA—3 to 7 inches; brown (10YR 4/3) very channery sandy loam; weak fine and medium subangular blocky structure; very friable; many fine and

medium and few coarse roots; few coarse tubular pores filled with very dark brown (10YR 2/2) organic material; 35 percent channers; very strongly acid; clear wavy boundary.
Bw1—7 to 14 inches; light yellowish brown (10YR 6/4) very channery sandy loam; weak fine and medium subangular blocky structure; very friable; common fine and medium and few coarse roots; common fine and few medium vesicular and tubular pores and few coarse tubular pores filled with very dark brown (10YR 2/2) organic material; 40 percent channers; very strongly acid; clear wavy boundary.
Bw2—14 to 23 inches; light yellowish brown (10YR 6/4) very channery loam; weak fine subangular blocky structure; very friable; common fine and few medium roots; common fine and medium vesicular pores and few fine tubular pores; 45 percent channers and 5 percent flagstones; very strongly acid; abrupt wavy boundary.
C—23 to 34 inches; yellowish brown (10YR 5/6) extremely channery loamy sand; weak fine subangular blocky structure; few fine roots; common medium and few coarse voids; 70 percent channers; very strongly acid; abrupt irregular boundary.
R—34 inches; indurated, highly fractured sandstone.

The thickness of the solum ranges from 20 to 35 inches. Depth to bedrock ranges from 20 to 40 inches. The content of rock fragments ranges from 5 to 35 percent in the surface layer, from 15 to 55 percent in the B horizon, and from 50 to 75 percent in the C horizon. The coverage of surface stones and boulders ranges from 1 to 25 percent. Reaction ranges from extremely acid to strongly acid in unlimed areas.

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

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

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

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

DbF—Dekalb-Bagtown-Rock outcrop complex, 25 to 65 percent slopes

Setting

Landscape: Mountains

Component Description

Dekalb and similar soils

Composition of map unit: 45 percent
Landform: Summits and shoulders
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from sandstone and shale, shale, sandstone, or quartzite
Flooding: None
Available water capacity: Average of 2.7 inches

Bagtown and similar soils

Composition of map unit: 40 percent
Landform: Backslopes and footslopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 10.2 inches

Rock outcrop

Composition of map unit: 15 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DeC—Dekalb-Rock outcrop complex, 8 to 15 percent slopes

Setting

Landscape: Mountains
Note: In some areas slopes are less than 8 percent. In some areas the Dekalb soil has weak spodic characteristics.

Component Description

Dekalb and similar soils

Composition of map unit: 55 percent
Landform: Summits and shoulders
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from sandstone and shale, shale, sandstone, or quartzite
Flooding: None
Available water capacity: Average of 2.7 inches

Rock outcrop

Composition of map unit: 35 percent
Landform: None assigned

Additional Components

Airmont and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

Leetonia and similar soils

Composition of map unit: 5 percent
Landform: Summits

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

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

Setting

Landscape: Mountains
Note: In some areas the Dekalb soil has weak spodic characteristics.

Component Description

Dekalb and similar soils

Composition of map unit: 45 percent
Landform: Summits and shoulders
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from sandstone and shale, shale, sandstone, or quartzite
Flooding: None
Available water capacity: Average of 2.7 inches

Rock outcrop

Composition of map unit: 35 percent
Landform: None assigned

Additional Components

Bagtown and similar soils

Composition of map unit: 20 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Downsville Series

The Downsville series consists of very deep, well drained soils. Permeability is moderate. These soils formed in old alluvium composed of sandstone, shale, limestone, and, to a lesser extent, chert. They are on nearly level to steep, old stream terraces along major water courses. Slopes range from 0 to 45 percent.

Downsville soils are similar to Walkersville soils and are commonly adjacent to Combs, Duffield, Hagerstown, Lindside, Melvin, Opequon, and Ryder soils. Walkersville soils have fewer rock fragments in the solum than the Downsville soils and are on the lower terraces. Combs, Lindside, and Melvin soils are on the lower active flood plains. Duffield and Hagerstown soils formed in residuum weathered from limestone. Ryder and Opequon soils are shallower to limestone bedrock than the Downsville soils.

Typical pedon of Downsville gravelly loam, 3 to 8 percent slopes; Washington County, Maryland; about 50 feet north of Falling Water Road, 2,800 feet south,

5,300 feet east of the Potomac River, in a cultivated field; lat. 39 degrees 33 minutes 21 seconds N. and long. 77 degrees 52 minutes 03 seconds W.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) gravelly loam; moderate fine and medium subangular blocky structure parting to moderate medium granular; friable; common fine roots; 25 percent gravel and 5 percent cobbles; neutral; abrupt smooth boundary.

BE—10 to 18 inches; dark yellowish brown (10YR 4/4) very gravelly loam; moderate fine subangular blocky structure; friable; few very fine roots; many fine and common medium tubular and vesicular pores; 35 percent gravel and 5 percent cobbles; neutral; clear wavy boundary.

Bt1—18 to 30 inches; strong brown (7.5YR 5/6) very gravelly loam; moderate medium subangular blocky structure; friable; few very fine roots; few fine tubular and vesicular pores; many prominent red (2.5YR 4/6) clay films on faces of peds and around rock fragments; 40 percent gravel and 5 percent cobbles; strongly acid; clear wavy boundary.

Bt2—30 to 41 inches; yellowish red (5YR 5/6) very gravelly clay loam; moderate fine blocky structure; friable; few fine and very fine roots; common fine and few medium tubular and vesicular pores; many fine prominent red (2.5YR 4/6) continuous clay films on faces of peds and around rock fragments; 40 percent gravel and 10 percent cobbles; very strongly acid; clear wavy boundary.

Bt3—41 to 87 inches; red (2.5YR 4/6) very gravelly sandy clay loam; moderate fine subangular blocky structure; friable; few fine roots; few medium vesicular pores and few fine tubular pores; many fine faint dark red (2.5YR 3/6) continuous clay films on faces of peds and around rock fragments; 40 percent gravel and 10 percent cobbles; very strongly acid; gradual smooth boundary.

Bt4—87 to 106 inches; red (2.5YR 4/6) very gravelly sandy clay loam; moderate fine subangular blocky structure; very friable; few medium vesicular pores and few fine tubular pores; common fine faint dark red (2.5YR 3/6) continuous clay films on faces of peds and around rock fragments; 35 percent gravel and 5 percent cobbles; very strongly acid; gradual smooth boundary.

BC—106 to 118 inches; yellowish red (5YR 5/8) very gravelly sandy loam; moderate medium subangular blocky structure; very friable; common fine prominent red (2.5YR 4/6) discontinuous clay films on faces of peds and around rock fragments; 40 percent gravel and 10 percent cobbles; very strongly acid; clear smooth boundary.

2C—118 to 134 inches; brownish yellow (10YR 6/8) to yellow (10YR 8/6) loam; moderate medium platy structure inherited from the bedrock; friable; common fine prominent red (2.5YR 4/6) discontinuous clay films lining fractures between rock fragments; 5 percent channers; very strongly acid.

The thickness of the solum ranges from 60 to 120 inches. Depth to bedrock is more than 6 feet. The content of rock fragments of sandstone, limestone, shale, and, to a lesser extent, chert ranges from 15 to 40 percent in the Ap and BE horizons, from 35 to 70 percent in the Bt, BC, and C horizons, and from 3 to 25 percent in the 2C horizon. The rock fragments consist of gravel and cobbles. Reaction ranges from neutral to slightly acid in limed areas.

The Ap horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 4 to 6. Texture is loam, sandy loam, or silt loam. The content of gravel ranges from 15 to 35 percent, and the content of cobbles ranges from 0 to 20 percent. Reaction ranges from moderately acid to neutral in limed areas.

The BE horizon has hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 4 to 7. Texture is loam, sandy loam, or silt loam. The content of gravel ranges from 15 to 30 percent, and the content of cobbles ranges from 5 to 15 percent. Reaction ranges from moderately acid to neutral.

The Bt horizon has hue of 7.5YR or 2.5YR, value of 4 or 5, and chroma of 4 to 8. Texture is clay loam, sandy clay loam, or loam. The content of gravel ranges from 35 to 60 percent, and the content of cobbles ranges from 5 to 15 percent. Reaction is very strongly acid or strongly acid.

The BC horizon has hue of 7.5YR to 2.5YR, value of 4 or 5, and chroma of 4 to 8. Texture is clay loam, sandy clay loam, or clay. The content of gravel ranges from 35 to 60 percent, and the content of cobbles ranges from 5 to 15 percent. Reaction is very strongly acid or strongly acid.

The 2C horizon has hue of 10YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, silt loam, or clay loam. The content of gravel and channers ranges from 3 to 25 percent. Reaction is very strongly acid or strongly acid.

DoB—Downsville gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: There is a moderate potential for sinkhole

development. In some areas the soil has gravelly surface layers. In some areas there are depressions in which ponding can occur.

Component Description

Downsville and similar soils

Composition of map unit: 85 percent
Landform: Stream terraces
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly old alluvium derived from limestone, sandstone, and shale
Flooding: None
Available water capacity: Average of 6.7 inches

Additional Components

Funkstown and similar soils

Composition of map unit: 10 percent
Landform: Swales, depressions, and drainageways

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Swales and saddles

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DoC—Downsville gravelly loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: There is a potential for sinkhole development. In some areas the soil has gravelly surface layers. Some areas have depressions in which ponding can occur.

Component Description

Downsville and similar soils

Composition of map unit: 85 percent
Landform: Stream terraces
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly old alluvium derived from limestone, sandstone, and shale
Flooding: None
Available water capacity: Average of 6.7 inches

Additional Components

Ryder and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Murrill and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Dryrun Series

The Dryrun series consists of very deep, moderately well drained soils. Permeability is moderately slow in the subsoil and moderately rapid or rapid in the substratum. These soils formed in old alluvium from the surrounding mountains over limestone residuum. They are on alluvial fans, on fan terraces, and along drainageways. Slopes range from 0 to 8 percent.

Dryrun soils are similar to Murrill soils and are commonly adjacent to Braddock, Duffield, Funkstown, Hagerstown, Opequon, and Ryder soils. Murrill soils are well drained and have fewer rock fragments in the solum than the Dryrun soils. Braddock soils are redder than the Dryrun soils, have fewer rock fragments throughout, and average more than 35 percent clay throughout. Duffield, Hagerstown, Opequon, and Ryder soils are on convex uplands and formed in residuum weathered from limestone. Funkstown soils occur in concave upland drainageways that flood.

Typical pedon of Dryrun gravelly loam, 0 to 3 percent slopes; 0.5 mile east of the intersection of Fairview Road and St. Paul Church Road, 200 feet north of Fairview Road near the community of Dry Run, in a crop field; lat. 39 degrees 42 minutes 47

seconds N. and long. 77 degrees 52 minutes 28 seconds W.

Ap1—0 to 6 inches; brown (10YR 4/3) gravelly loam; weak medium platy structure parting to weak fine granular; friable; many fine roots; common medium vesicular pores and few medium tubular pores; 10 percent gravel, 5 percent cobbles, and 5 percent channers; neutral; clear smooth boundary.

Ap2—6 to 12 inches; brown (10YR 4/3) gravelly loam; weak medium platy structure parting to weak fine subangular blocky; friable; many fine roots; many fine tubular and vesicular pores, few medium vesicular pores, and common medium tubular pores; 10 percent gravel, 5 percent cobbles, and 5 percent channers; neutral; abrupt smooth boundary.

BE—12 to 21 inches; yellowish brown (10YR 5/6) gravelly silt loam; common medium distinct brown or dark brown (10YR 4/3) surface material in pores; moderate medium subangular blocky structure; friable; many fine roots; many fine tubular and vesicular pores, common medium tubular pores, and few medium vesicular pores; 10 percent gravel, 5 percent channers, and 5 percent cobbles; neutral; clear smooth boundary.

Bt1—21 to 27 inches; yellowish brown (10YR 5/6) very gravelly loam; moderate medium subangular blocky structure parting to moderate medium platy; friable; common fine roots; many fine and common medium tubular and vesicular pores and few coarse vesicular pores; common medium prominent yellowish red (5YR 4/6) iron accumulations; common faint discontinuous clay films on faces of peds; 20 percent gravel, 10 percent channers, 3 percent cobbles, and 5 percent flagstones; slightly acid; gradual irregular boundary.

Bt2—27 to 43 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam; many coarse prominent pale brown (10YR 6/3) mottles; moderate medium platy structure parting to weak medium platy; firm; few fine roots; common fine and few medium tubular pores and many fine and common coarse vesicular pores; many prominent discontinuous clay films on faces of peds and in pores; 55 percent gravel, 5 percent flagstones, and 5 percent cobbles; many medium distinct light gray (7.5YR 7/1) iron depletions, many medium faint strong brown (7.5YR 5/8) iron accumulations and prominent reddish brown (5YR 4/4) iron concentrations, many medium iron and manganese stains on faces of peds, surrounding rock fragments, and lining pores; moderately acid; clear wavy boundary.

BC—43 to 61 inches; strong brown (7.5YR 5/6) extremely gravelly sandy clay loam; weak fine subangular blocky structure; friable; many fine vesicular pores; many medium iron and manganese stains; many faint patchy clay films on faces of peds and around rock fragments; 50 percent gravel, 15 percent channers, 3 percent flagstones, and 5 percent cobbles; strongly acid; clear wavy boundary.

C—61 to 74 inches; brown (7.5YR 4/4) extremely gravelly sandy clay loam; few medium light brown (7.5YR 6/4) mottles; massive; friable; many fine and few medium vesicular pores; few distinct discontinuous clay films surrounding rock fragments and in pores; 50 percent gravel, 15 percent channers, 5 percent flagstones, and 5 percent cobbles; common medium distinct strong brown (7.5YR 5/8) iron accumulations; moderately acid.

The thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 80 inches. Depth to the underlying limestone is more than 70 inches. Depth to redoximorphic features is more than 24 inches. The content of rock fragments, consisting of sandstone, shale, and limestone, ranges from 10 to 25 percent in the Ap and BE horizons and from 35 to 75 percent in the subsoil and substratum. Reaction ranges from neutral to very strongly acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. Texture is silt loam or loam or their gravelly or cobbly analogs. The content of cobbles ranges to 15 percent.

The BE horizon has hue of 7.5YR or 10YR and value and chroma of 3 to 6. Texture is silt loam, loam, clay loam, or their gravelly or cobbly analogs. The content of cobbles ranges to 10 percent.

The Bt and BC horizons have hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is clay loam, sandy clay loam, loam, loamy sand, or silt loam. In some pedons the horizons have brittle characteristics.

The C horizon has hue of 7.5YR to 2.5Y and value and chroma of 4 to 8. Texture is loam, silt loam, sandy loam, sandy clay loam, or clay loam or their gravelly or cobbly analogs.

DqA—Dryrun gravelly loam, 0 to 3 percent slopes

Setting

Landscape: Valleys

Note: There is a potential for sinkhole development. In

some areas the soil has a cobbly surface layer. In some areas slopes are steeper than 3 percent. Pesticide leaching and groundwater contamination are highly probable.

Component Description

Dryrun and similar soils

Composition of map unit: 85 percent
Landform: Undulating old alluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.0 feet
Parent material: Gravelly old alluvium derived from limestone, sandstone, and shale
Flooding: None
Available water capacity: Average of 8.0 inches

Additional Components

Duffield and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

Murrill and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Duffield Series

The Duffield series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum weathered from impure limestone. They are on nearly level to steep uplands. Slopes range from 0 to 25 percent.

Duffield soils are similar to Hagerstown soils and are commonly adjacent to Dryrun, Funkstown, Murrill, Opequon, and Ryder soils. Hagerstown soils are redder and more alkaline than the Duffield soils and average more than 35 percent clay throughout. Dryrun soils formed from old alluvial and colluvial materials on broad alluvial flats and are moderately well drained. Funkstown soils are in upland drainageways which flood, formed in local alluvial material over limestone residuum, and are moderately well drained. Murrill soils formed in acid colluvium over limestone residuum and have more rock fragments in the solum than the Duffield soils. Opequon and Ryder soils have bedrock within a depth of 40 inches. Rock outcrops of limestone are common within delineations of the Duffield soils.

Typical pedon of Duffield silt loam, 0 to 3 percent slopes; Washington County, Maryland; 1,850 feet east of the intersection of Maryland Route 11 and Long Meadow Road, 200 feet north.of Long Meadow Road, in the Paramount area, on a southeast-facing, convex slope in a crop field; lat. 39 degrees 41 minutes 04 seconds N. and long. 77 degrees 42 minutes 54 seconds W.

Ap—0 to 12 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; very friable; many fine and very fine roots; 5 percent limestone channers; neutral; clear smooth boundary.

Bt1—12 to 22 inches; brownish yellow (10YR 6/6) silt loam; weak medium subangular blocky structure; friable; common fine roots; many fine and common medium tubular pores; few distinct discontinuous clay films on faces of peds and in pores; slightly acid; clear wavy boundary.

Bt2—22 to 30 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct brownish yellow (10YR 6/8) and common fine distinct yellowish red (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; many fine tubular and vesicular pores and common medium tubular pores; common prominent clay films on faces of peds and in pores; 5 percent limestone channers; many fine and medium distinct black (N 2.5/0) iron and manganese stains on faces of peds and lining pores; moderately acid; clear wavy boundary.

Bt3—30 to 60 inches; strong brown (7.5YR 5/8) silty clay loam; weak coarse prismatic structure parting to strong medium subangular blocky; firm; common fine roots; common fine and few medium tubular and vesicular pores; many distinct discontinuous clay films on faces of peds and in pores; common fine and medium distinct black (N 2.5/0) iron and manganese stains on faces of peds and lining pores; moderately acid.

The thickness of the solum ranges from 40 to 70 inches. Depth to bedrock is more than 6 feet. The content of rock fragments, consisting of weathered limestone, quartz, chert, and shale, ranges from 0 to 20 percent in the upper part of the solum and from 0 to 40 percent in the lower part of the solum and in the substratum. Reaction ranges from strongly acid to neutral throughout the solum.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam, loam, or silty clay loam.

The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 8. Texture is loam, silt loam, silty clay loam, or clay.

The C horizon, if it occurs, has hue of 2.5YR to 7.5YR and value and chroma of 4 to 8. Texture is silt loam, silty clay loam, or clay.

DtA—Duffield-Ryder silt loams, 0 to 3 percent slopes

Setting

Landscape: Karst land
Note: There is a potential for sinkhole development.

Component Description

Duffield and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 10.4 inches

Ryder and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 24 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 5.3 inches

Additional Components

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Swales and saddles

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

Hagerstown and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DtB—Duffield-Ryder silt loams, 3 to 8 percent slopes

Setting

Landscape: Karst land
Note: There is a potential for sinkhole development.

Component Description

Duffield and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 10.4 inches

Ryder and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 24 to 40 inches to paralithic bedrock

Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 5.3 inches

Additional Components

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Swales and saddles

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

Hagerstown and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DtC—Duffield-Ryder silt loams, 8 to 15 percent slopes

Setting

Landscape: Karst land
Note: In some areas slopes are steeper than 15 percent. There is a potential for sinkhole development.

Component Description

Duffield and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 10.3 inches

Ryder and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 24 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 5.3 inches

Additional Components

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

Hagerstown and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DuB—Duffield and Ryder channery silt loams, 3 to 8 percent slopes

Setting

Landscape: Karst land
Note: In some areas slopes are steeper than 8 percent. There is a potential for sinkhole development.

Component Description

Duffield and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Channery silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained

Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 10.4 inches

Ryder and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Channery silt loam
Depth to restrictive feature: 24 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 5.0 inches

Additional Components

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Swales and saddles

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

Hagerstown and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DvB—Duffield and Ryder channery silt loams, 3 to 8 percent slopes, rocky

Setting

Landscape: Karst land
Note: There is a potential for sinkhole development.

Component Description

Duffield and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Channery silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 6.6 inches

Ryder and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Channery silt loam
Depth to restrictive feature: 24 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 5.3 inches

Additional Components

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Swales and saddles

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

DwB—Duffield-Hagerstown-Urban land complex, 3 to 8 percent slopes

Setting

Landscape: Karst land
Note: This map unit is highly variable and can have

both cut and fill material to a depth of 8 feet or more. There is a potential for sinkhole development. Ponding can occur for periods of short duration due to inadequate drainage.

Component Description

Duffield and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Channery silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shaly limestone
Flooding: None
Available water capacity: Average of 10.4 inches

Hagerstown and similar soils

Composition of map unit: 30 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from limestone
Flooding: None
Available water capacity: Average of 10.5 inches

Urban land

Composition of map unit: 15 percent
Landform: None assigned

Urban land consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Additional Components

Adamstown and similar soils

Composition of map unit: 10 percent
Landform: Swales and saddles

Udorthents

Composition of map unit: 10 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Edgemont Series

The Edgemont series consists of very deep, well drained soils. Permeability is moderate. These soils formed from quartzite residuum. They are on nearly level to steep ridges and upper backslopes in the Piedmont and Blue Ridge provinces. Slopes range from 0 to 65 percent.

Edgemont soils are similar to Thurmont soils and are commonly adjacent to Blocktown, Brinklow, Dekalb, Glenelg, Highfield, Mt. Airy, and Stumptown soils. Thurmont soils formed in colluvial materials weathered from quartzite and phyllite. Dekalb and Mt. Airy soils do not have an argillic horizon. Blocktown, Brinklow, and Glenelg soils formed in materials weathered from phyllite and schist. Highfield soils formed from materials weathered from metabasalt, metarhyolite, and meta-andesite. Stumptown soils are moderately deep and formed from materials weathered from interbedded quartzite, quartz muscovite schist, and phyllite.

Typical pedon of Edgemont gravelly loam, 3 to 8 percent slopes; northwest of Libertytown on Route 550, about 700 feet south of Pine Tree Road, 250 feet east of Route 550, in a wooded area; lat. 39 degrees 30 minutes 16 seconds N. and long. 77 degrees 16 minutes 15 seconds W.

A—0 to 2 inches; brown (10YR 4/3) gravelly loam; moderate medium granular structure; friable; many fine and common coarse roots; 18 percent quartzite gravel; very strongly acid; clear smooth boundary.

E—2 to 7 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium subangular blocky structure; friable; many fine and common medium and coarse roots; 18 percent quartzite gravel; very strongly acid; clear smooth boundary.

BE—7 to 13 inches; light yellowish brown (10YR 6/4) gravelly loam; weak and moderate medium subangular blocky structure; friable; many fine roots; many fine tubular pores; 18 percent quartzite gravel; very strongly acid; clear smooth boundary.

Bt1—13 to 24 inches; light yellowish brown (10YR 6/4) gravelly loam; moderate medium subangular blocky structure; friable; many fine roots; many fine and common medium tubular pores and many fine vesicular pores; few fine distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; 25 percent quartzite gravel; very strongly acid; clear smooth boundary.

Bt2—24 to 30 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine roots; many fine and common medium tubular pores and many fine vesicular pores; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; 10 percent quartzite gravel; very strongly acid; clear smooth boundary.

BC—30 to 38 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine roots; many fine tubular and vesicular pores; 10 percent quartzite gravel; very strongly acid; clear smooth boundary.

C1—38 to 44 inches; light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6) loam; weak thin platy structure; friable; many fine and medium vesicular pores and common fine tubular pores; 5 percent quartzite gravel; very strongly acid; clear smooth boundary.

C2—44 to 63 inches; yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/6) loam; moderate thin platy structure; friable; few distinct dark grayish brown (2.5Y 4/2) skeletans on horizontal faces of peds; very strongly acid; clear smooth boundary.

C3—63 to 72 inches; yellowish brown (10YR 5/6) loam; common medium distinct strong brown (7.5YR 5/6) and common fine prominent light brownish gray (2.5Y 6/2) lithochromic mottles; weak thin platy structure; friable; few fine prominent dark grayish brown (2.5Y 4/2) skeletans on horizontal faces of peds; strongly acid.

The thickness of the solum ranges from 25 to 40 inches. Depth to bedrock is more than 60 inches. The content of rock fragments of quartzite, quartz, and some phyllite ranges from 5 to 30 percent in the solum and from 10 to 90 percent in the substratum. Reaction ranges from extremely acid to strongly acid throughout the profile.

The A horizon has hue of 7.5YR to 10YR, value of 2 or 4, and chroma of 0 to 3. Texture is loam, silt loam, or sandy loam. In wooded areas the surfaces are commonly stony or very stony.

The E horizon has hue of 7.5YR, 10R, or 2.5Y or is neutral in hue, has value of 4 or 5, and has chroma of 0 to 4. Texture is loam, sandy loam, or silt loam.

The B and BE horizons have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. Texture is silt loam, loam, or sandy loam.

The Bt and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, clay loam, or sandy clay loam.

The C horizon has hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. Texture is loam, sandy loam, or sandy clay loam.

EdB—Edgemont gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Mountains and uplands
Note: In some areas slopes are steeper than 8 percent. In some areas east of Frederick, the soil has sandier textures than those described.

Component Description

Edgemont and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from quartzite
Flooding: None
Available water capacity: Average of 5.7 inches

Additional Components

Hazel and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenville and similar soils

Composition of map unit: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

EgB—Edgemont gravelly loam, 3 to 8 percent slopes, very stony

Setting

Landscape: Mountains and uplands
Note: In some areas east of Frederick, the soil has sandier textures than those described.

Component Description

Edgemont and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from quartzite
Flooding: None
Available water capacity: Average of 5.9 inches

Additional Components

Hazel and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

EgC—Edgemont gravelly loam, 8 to 15 percent slopes, very stony

Setting

Landscape: Mountains and uplands
Note: In some areas east of Frederick, the soil has sandier textures than those described.

Component Description

Edgemont and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from quartzite
Flooding: None
Available water capacity: Average of 5.9 inches

Additional Components

Hazel and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

EgD—Edgemont gravelly loam, 15 to 25 percent slopes, very stony

Setting

Landscape: Mountains and uplands

Component Description

Edgemont and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from quartzite
Flooding: None
Available water capacity: Average of 5.9 inches

Additional Components

Hazel and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in

alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ErB—Edgemont-Rock outcrop complex, 3 to 8 percent slopes

Setting

Landscape: Mountains
Note: In some areas east of Frederick, the soil has sandier textures than those described.

Component Description

Edgemont and similar soils

Composition of map unit: 75 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from quartzite
Flooding: None
Available water capacity: Average of 5.7 inches

Rock outcrop

Composition of map unit: 20 percent
Landform: None assigned

Additional Components

Hazel and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ErC—Edgemont-Rock outcrop complex, 8 to 15 percent slopes

Setting

Landscape: Mountains
Note: In some areas east of Frederick, the soil has sandier textures than those described.

Component Description

Edgemont and similar soils

Composition of map unit: 75 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from quartzite
Flooding: None
Available water capacity: Average of 5.7 inches

Rock outcrop

Composition of map unit: 20 percent
Landform: None assigned

Additional Components

Hazel and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ErD—Edgemont-Rock outcrop complex, 15 to 25 percent slopes

Setting

Landscape: Mountains and uplands

Component Description

Edgemont and similar soils

Composition of map unit: 75 percent
Landform: Summits and backslopes

Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from quartzite
Flooding: None
Available water capacity: Average of 5.7 inches

Rock outcrop

Composition of map unit: 20 percent
Landform: None assigned

Additional Components

Hazel and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ErE—Edgemont-Rock outcrop complex, 25 to 45 percent slopes

Setting

Landscape: Mountains and uplands

Component Description

Edgemont and similar soils

Composition of map unit: 75 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from quartzite
Flooding: None
Available water capacity: Average of 5.7 inches

Rock outcrop

Composition of map unit: 20 percent
Landform: None assigned

Additional Components

Hazel and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Foxville Series

The Foxville series consists of very deep, somewhat poorly drained soils. Permeability is moderately slow. These soils formed in alluvium and colluvium derived from mixed greenstone, greenstone schist, quartzite, and phyllite. They are on nearly level and gently sloping, high-gradient flood plains. Slopes range from 0 to 8 percent.

Foxville soils are similar to Codorus and Hatboro soils and are commonly adjacent to Catoctin, Lantz, Highfield, Mt. Zion, Myersville, Ravenrock, Rohrersville, Thurmont, and Trego soils. Codorus soils are moderately well drained and have fewer rock fragments in the upper part than the Foxville soils. Hatboro soils are poorly drained and also have fewer rock fragments in the upper part. Catoctin, Highfield, Lantz, Mt. Zion, Myersville, Ravenrock, Rohrersville, Thurmont, and Trego soils are in the surrounding uplands and are not subject to flooding.

Typical pedon of Foxville cobbly silt loam in an area of Foxville and Hatboro soils, 0 to 3 percent slopes; approximately 0.9 mile east of Foxville on Maryland Route 77, about 200 feet north of Maryland Route 77 in Catoctin Mountain National Park, on a forested flood plain; lat. 39 degrees 33 minutes 10 seconds N. and long. 77 degrees 28 minutes 44 seconds W.

Oi—0 to 3 inches; partially decomposed leaf and twig matter; 55 percent stone cover.
A—3 to 4 inches; very dark gray (10YR 3/1) cobbly silt loam; weak fine granular structure; friable; many coarse roots throughout; 20 percent cobbles and 10 percent stones; extremely acid; abrupt wavy boundary.

Bw—4 to 22 inches; light yellowish brown (2.5Y 6/4) cobbly silt loam; moderate medium subangular blocky structure; friable; many fine medium and coarse roots; 25 percent cobbles, 15 percent stones, and 10 percent gravel; common fine distinct light olive gray (5Y 6/2) iron depletions and few fine prominent dark brown (7.5YR 3/3) iron and manganese stains on faces of peds; extremely acid; clear wavy boundary.

Bg1—22 to 29 inches; greenish gray (5GY 7/1) very cobbly silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common fine tubular pores; 45 percent cobbles and 10 percent gravel; many fine prominent dark brown (7.5YR 3/3) iron and manganese stains on faces of peds; many fine prominent yellowish brown (10YR 5/6) iron accumulations between peds; common fine faint greenish gray (5GY 6/1) iron depletions in pores and along roots; moderately acid; clear wavy boundary.

Bg2—29 to 43 inches; light greenish gray (5GY 7/1) very cobbly silt loam; weak coarse subangular blocky structure; firm; common fine and few medium roots; 45 percent cobbles and 10 percent gravel; many medium prominent strong brown (7.5YR 5/8) iron accumulations; moderately acid; abrupt smooth boundary.

2BC—43 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; weak very coarse prismatic structure parting to moderate medium platy; firm; common fine roots in cracks; few medium and coarse vesicular pores and common fine and medium tubular pores; 5 percent gravel; common coarse prominent light greenish gray (5GY 7/1) iron depletions in pores; common medium distinct yellowish brown (10YR 5/6) iron accumulations; common medium prominent dark brown (7.5YR 3/3) iron and manganese stains on faces of peds; moderately acid.

The thickness of the solum ranges from 25 to 60 inches. Depth to bedrock is more than 6 feet. The content of rock fragments ranges from 20 to 70 percent on the surface, 15 to 35 percent in the topsoil, 20 to 50 percent in the solum, and 5 to 20 percent in the substratum. Rock fragments cover 20 to 70 percent of the surface. Reaction ranges from moderately acid to extremely acid throughout the profile.

The A horizon has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 to 4. Texture is silt loam or loam or their cobbly or stony analogs.

The Bg and Bw horizons have hue of 10YR to 5GY, value of 4 to 7, and chroma of 1 to 6. Texture is silt loam, loam, clay loam, or silty clay loam or their cobbly analogs.

The 2BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. Texture is loam, clay loam, or silt loam.

FoB—Foxville cobbly silt loam, 0 to 8 percent slopes, rubbly

Setting

Landscape: Mountains

Component Description

Foxville and similar soils

Composition of map unit: 90 percent
Landform: Narrow, high-gradient flood plains
Surface layer texture: Cobbly silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy alluvium derived from diabase or schist or gravelly alluvium derived from quartzite, phyllite, or greenstone
Flooding: Occasional
Available water capacity: Average of 9.7 inches

Additional Components

Hatboro and similar soils

Composition of map unit: 5 percent
Landform: Flood plains

Trego and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

FxA—Foxville and Hatboro soils, 0 to 3 percent slopes

Setting

Landscape: Mountains

Component Description

Foxville and similar soils

Composition of map unit: 50 percent
Landform: Narrow, high-gradient flood plains
Surface layer texture: Cobbly silt loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Gravelly alluvium derived from quartzite, phyllite, or greenstone or loamy alluvium derived from schist
Flooding: Occasional
Available water capacity: Average of 9.7 inches

Hatboro and similar soils

Composition of map unit: 45 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Gravelly alluvium derived from greenstone, phyllite, or quartzite or loamy alluvium derived from diabase or schist
Flooding: Occasional
Available water capacity: Average of 8.2 inches

Additional Components

Trego and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Funkstown Series

The Funkstown series consists of very deep, moderately well drained soils. Permeability is moderate. These soils formed from local alluvial material eroded from surrounding uplands over limestone residuum. They are in nearly level, concave upland drainageways. Slopes range from 0 to 3 percent.

Funkstown soils are similar to Lindside soils and are commonly adjacent to Adamstown, Braddock, Downsville, Dryrun, Duffield, Hagerstown, Murrill, Melvin, Ryder, and Walkersville soils. Lindside soils formed in recent alluvium and are on active flood plains associated with perennial streams. Braddock and Murrill soils formed from colluvial deposits over limestone, are well drained, and are not subject to flooding. Adamstown soils formed in colluvium over limestone and are on upland flats and in swales. Duffield, Hagerstown, and Ryder soils are on adjacent limestone uplands and are well drained. Dryrun soils formed in old alluvial fan deposits on broad alluvial fans. Downsville and Walkersville soils are on old stream terraces and are well drained.

Typical pedon of Funkstown silt loam, 0 to 3 percent slopes; Washington County, Maryland; approximately 350 feet north of Londontown Drive and 0.5 mile east of Fairview Meadows Boulevard, east of the Funkstown area, in an idle field; lat. 39 degrees 36 minutes 39 seconds N. and long. 77 degrees 40 minutes 19 seconds W.

Ap1—0 to 4 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium granular structure parting to moderate medium subangular blocky; friable; many fine and medium roots; few fine tubular pores; 5 percent gravel; neutral; clear wavy boundary.

Ap2—4 to 12 inches; brown (7.5YR 4/4) silt loam; weak medium platy structure parting to moderate medium subangular blocky; friable; many fine and few medium roots; common fine and medium tubular pores; 8 percent gravel; neutral; abrupt smooth boundary.

BE—12 to 22 inches; strong brown (7.5YR 5/6) gravelly silt loam; moderate medium subangular blocky structure; friable; common fine roots; common fine and medium and few coarse tubular pores and few medium vesicular pores; 20 percent gravel; neutral; clear wavy boundary.

Bt1—22 to 29 inches; strong brown (7.5YR 5/6) very gravelly loam; few medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; common fine roots; common fine and few medium tubular pores and common fine vesicular pores; common distinct clay films and clay bridging in pores and between rock fragments; 50 percent gravel; few medium faint strong brown (7.5YR 5/8) iron accumulations; slightly acid; clear wavy boundary.

2Bt2—29 to 45 inches; strong brown (7.5YR 5/6) silty clay loam; few medium distinct brownish yellow (10YR 6/6) mottles inherited from the bedrock;

moderate medium subangular blocky structure parting to weak fine platy; friable; few fine roots; common fine and medium tubular and vesicular pores; many distinct clay films on faces of peds and in pores; few coarse krotovina; 10 percent channers; many coarse prominent very dark gray (5YR 3/1) iron and manganese stains and concretions on faces of peds and ped interiors; slightly acid; clear wavy boundary.

2BC—45 to 63 inches; yellowish brown (10YR 5/8) channery silt loam; moderate medium platy structure inherited from the bedrock; friable; few fine roots; many distinct discontinuous strong brown (7.5YR 5/6) clay films on faces of peds and around rock fragments; many coarse prominent very dark gray (5YR 3/1) iron and manganese stains; 16 percent channers; slightly acid; clear wavy boundary.

2C—63 to 80 inches; variegated brownish yellow (10YR 6/8), yellowish red (5YR 5/8), and yellowish brown (10YR 5/8) channery silt loam; moderate medium platy structure inherited from the bedrock; friable; common fine tubular pores; many coarse prominent very dark gray (5YR 3/1) iron and manganese stains; common coarse prominent reddish yellow (5YR 6/6) iron accumulations; 30 percent channers of which 20 percent are crushable; slightly acid.

The thickness of the solum ranges from 40 to 60 inches. The A horizon commonly ranges from 8 to 15 inches in thickness but can be as much as 22 inches thick in some places. Lithic contact is at a depth of more than 72 inches. Depth to underlaying residuum ranges from 25 to 60 inches. The content of rock fragments, consisting of chert, sandstone, and limestone gravel, ranges from 0 to 25 percent in the Ap horizon and from 10 to 60 percent in individual subhorizons of the Bt horizon but averages less than 35 percent. In the 2Bt and 2C horizons, the content of rock fragments, which are dominantly limestone, ranges from 5 to 25 percent. Reaction ranges from moderately acid to slightly alkaline throughout the profile.

The Ap horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. Texture is silt loam, loam, or silty clay loam. Reaction ranges from slightly acid to slightly alkaline.

The BE horizon has hue of 7.5YR to 10YR and value and chroma of 4 to 6. Texture is silt loam or loam. Reaction ranges from slightly acid to neutral.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is clay loam, loam, or silt loam. Reaction ranges from slightly acid to neutral.

The 2Bt horizon has hue of 5YR to 7.5YR and value and chroma of 4 to 8. Texture is silt loam, loam, clay loam, or silty clay loam. Reaction ranges from moderately acid to neutral.

The 2BC horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam, loam, clay loam, or silty clay loam but includes clay in some pedons.

The 2C horizon has hue of 5YR to 2.5Y and value and chroma of 4 to 8. Texture is silt loam, loam, clay loam, or silty clay loam but includes clay in some pedons. Reaction ranges from moderately acid to neutral.

Gaila Series

The Gaila series consists of very deep, well drained soils. Permeability is moderately rapid. These soils formed in material weathered from quartz muscovite schist. They are on nearly level to strongly sloping uplands. Slopes range from 0 to 15 percent.

Gaila soils are similar to Glenelg soils and are commonly adjacent to Mt. Airy, Brinklow, and Blocktown soils. Glenelg soils have a thicker solum than the Gaila soils. Mt. Airy, Brinklow, and Blocktown soils have bedrock at a depth of less than 40 inches.

Typical pedon of Gaila silt loam, 3 to 8 percent slopes; Montgomery County, Maryland; about 1 mile south of Sandy Spring, about 4,000 feet south from Olney-Sandy Spring Road on Meeting House Road, 1,000 feet east:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; common fine roots; common very fine interstitial pores; about 5 percent gravel; neutral; abrupt smooth boundary.

Bt—8 to 17 inches; strong brown (7.5YR 5/8) loam; strong medium subangular blocky structure; friable; few fine roots; common very fine tubular pores; many prominent clay films on faces of peds and lining pores; strongly acid; clear wavy boundary.

BC—17 to 20 inches; yellowish brown (10YR 5/8) loam; weak medium subangular blocky structure; friable; few fine roots; common very fine interstitial pores; few faint clay films lining pores; strongly acid; clear wavy boundary.

C—20 to 76 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; friable; very strongly acid.

Depth to bedrock is more than 5 feet. The content of rock fragments ranges from 0 to 15 percent throughout the profile. Reaction ranges from extremely acid to strongly acid in unlimed areas.

The A horizon has hue of 5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. Texture is loam, silt loam, or sandy loam.

The B and BC horizons have hue of 10YR to 5YR, value of 4 or 6, and chroma of 3 to 8. Texture is sandy loam, loam, or sandy clay loam in the fine-earth fraction.

The C horizon commonly is multicolored in shades of red, yellow, brown, or white. Texture is sandy loam, loamy sand, or loam in the fine-earth fraction. This horizon has a high content of mica.

GaB—Gaila silt loam, 3 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Gaila and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum weathered from quartz muscovite schist
Flooding: None
Available water capacity: Average of 7.4 inches

Additional Components

Glenelg and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Mt. Airy and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GaC—Gaila silt loam, 8 to 15 percent slopes

Setting

Landscape: Uplands

Component Description

Gaila and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum weathered from quartz muscovite schist
Flooding: None
Available water capacity: Average of 7.4 inches

Additional Components

Glenelg and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Mt. Airy and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Glenelg Series

The Glenelg series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum from phyllite and micaceous schist. They are on nearly level to strongly sloping uplands of the northern Piedmont Plateau. Slopes range from 0 to 15 percent.

Glenelg soils are similar to Gaila soils and are commonly adjacent to Glenville, Baile, Brinklow, Blocktown, and Mt. Airy soils. Gaila soils have a thinner solum than the Glenelg soils. Glenville and Baile soils are on concave upland flats and in depressions. Glenville soils are moderately well

drained, and Baile soils are poorly drained. Brinklow, Blocktown, and Mt. Airy soils have bedrock at a depth of less than 40 inches.

Typical pedon of Glenelg loam, 3 to 8 percent slopes; Howard County, Maryland; about 0.5 mile south of Route 144 on St. Michael's Road, 0.25 mile southeast of the intersection of St. Michael's Road and Hardy Road, in a crop field; lat. 39 degrees 20 minutes 09 seconds N. and long. 77 degrees 06 minutes 12 seconds W.

Ap1—0 to 6 inches; brown (10YR 4/3) loam; moderate medium subangular blocky structure parting to strong fine granular; friable; common fine, many fine, and few medium roots; 5 percent schist channers; slightly acid; clear smooth boundary.

Ap2—6 to 10 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure parting to strong coarse granular; friable; many fine and few medium roots; common fine and coarse tubular pores; 8 percent schist channers; slightly acid; abrupt smooth boundary.

Bt1—10 to 18 inches; strong brown (7.5YR 5/8) clay loam; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; friable; many fine and few medium roots; many fine and common coarse tubular pores and common medium vesicular pores; common distinct brown (7.5YR 5/4) organic coatings; 3 percent schist channers; moderately acid; clear wavy boundary.

Bt2—18 to 25 inches; strong brown (7.5YR 5/6) clay loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; common fine roots; many fine tubular and common fine vesicular pores; common distinct brown (7.5YR 5/4) organic coatings on faces of peds and in pore linings; 8 percent channers; moderately acid; clear smooth boundary.

BCt1—25 to 30 inches; yellowish brown (10YR 5/6) clay loam; common prominent yellowish red (5YR 5/8) lithochromic mottles; moderate very thick platy structure parting to moderate medium subangular blocky; friable; common fine roots; few fine tubular pores; 5 percent channers; moderately acid; clear smooth boundary.

BCt2—30 to 42 inches; yellowish red (5YR 5/6) and yellowish brown (10YR 5/6) loam; moderate very thick platy structure parting to moderate medium subangular blocky; friable; few fine roots; common fine tubular pores; 5 percent schist channers; strongly acid; clear wavy boundary.

CBt—42 to 54 inches; yellowish red (5YR 5/6) and yellowish brown (10YR 5/6) loam; moderate thick platy structure; friable; few fine roots; many fine and few medium and coarse tubular pores and common fine vesicular pores; 5 percent schist channers and 2 percent quartz gravel; strongly acid; clear wavy boundary.

C—54 to 76 inches; strong brown (7.5YR 5/8), brownish yellow (10YR 6/8), and yellow (10YR 7/6) extremely channery sandy loam; weak thick platy structure inherited from the bedrock; friable; few fine roots; 50 percent schist channers; very strongly acid.

The thickness of the solum ranges from 24 to 40 inches. Depth to hard bedrock is more than 6 feet. The content of rock fragments ranges from 0 to 35 percent in the solum and from 20 to 35 percent in the substratum.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. Texture is loam or silt loam in the fine-earth fraction.

The E and BE horizons, if they occur, have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. Texture is loam or silt loam in the fine-earth fraction.

The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 8. Texture is loam, silt loam, silty clay loam, or clay loam in the fine-earth fraction.

The BC and CB horizons have hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 3 to 8. Texture ranges from loam to very fine sandy loam in the fine-earth fraction.

The C horizon has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 3 to 8. Texture is loam or sandy loam in the fine-earth fraction and silt loam in association with veins of quartz.

GeB—Glenelg loam, 3 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Glenelg and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from schist
Flooding: None
Available water capacity: Average of 9.6 inches

Additional Components

Glenville and similar soils

Composition of map unit: 10 percent
Landform: Concave footslopes, toeslopes, and drainageways

Brinklow and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GfB—Glenelg silt loam, 3 to 8 percent slopes

Setting

Landscape: Uplands
Note: In some areas slopes are steeper than 8 percent.

Component Description

Glenelg and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from schist
Flooding: None
Available water capacity: Average of 9.7 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenville and similar soils

Composition of map unit: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GgB—Glenelg gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Glenelg and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from schist
Flooding: None
Available water capacity: Average of 9.5 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenville and similar soils

Composition of map unit: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GgC—Glenelg gravelly loam, 8 to 15 percent slopes

Setting

Landscape: Uplands

Component Description

Glenelg and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from schist
Flooding: None
Available water capacity: Average of 9.5 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenville and similar soils

Composition of map unit: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GhB—Glenelg-Blocktown gravelly loams, 3 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Glenelg and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from schist
Flooding: None
Available water capacity: Average of 9.5 inches

Blocktown and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from phyllite or schist
Flooding: None
Available water capacity: Average of 1.4 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenville and similar soils

Composition of map unit: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GhC—Glenelg-Blocktown gravelly loams, 8 to 15 percent slopes

Setting

Landscape: Uplands

Component Description

Glenelg and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes

Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from schist
Flooding: None
Available water capacity: Average of 9.5 inches

Blocktown and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from phyllite or schist
Flooding: None
Available water capacity: Average of 1.4 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Mt. Airy and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GmB—Glenelg-Mt. Airy channery loams, 3 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Glenelg and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from phyllite and schist
Flooding: None
Available water capacity: Average of 9.5 inches

Mt. Airy and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from low-base phyllite or low-base schist
Flooding: None
Available water capacity: Average of 2.3 inches

Additional Components

Glenville and similar soils

Composition of map unit: 10 percent
Landform: Concave footslopes, toeslopes, and drainageways

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GnB—Glenelg-Mt. Airy-Urban land complex, 0 to 8 percent slopes

Setting

Landscape: Uplands
Note: This map unit is highly variable and can have both cut and fill material to a depth of 8 feet or more. Bedrock can occur at a depth of less than

20 inches. Ponding can occur for periods of short duration due to inadequate drainage.

Component Description

Glenelg and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from phyllite and schist
Flooding: None
Available water capacity: Average of 9.5 inches

Mt. Airy and similar soils

Composition of map unit: 30 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from low-base phyllite or low-base schist
Flooding: None
Available water capacity: Average of 2.3 inches

Urban land

Composition of map unit: 20 percent
Landform: None assigned

Urban land consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Additional Components

Udorthents

Composition of map unit: 10 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Glenville Series

The Glenville series consists of very deep, moderately well drained soils. Permeability is slow. These soils formed in residuum and colluvium derived from schist, gneiss, and other crystalline rocks. They are on nearly level to strongly sloping drainageways and in low areas on uplands. Slopes range from 0 to 15 percent.

Glenville soils are similar to Baile soils and are commonly adjacent to Glenelg, Mt. Airy, Brinklow, Blocktown, Hatboro, and Codorus soils. Baile soils are poorly drained. Glenelg soils are very deep and are on convex uplands. Mt. Airy, Brinklow, and Blocktown soils have bedrock at a depth of less than 40 inches. Codorus and Hatboro soils are on active flood plains.

Typical pedon of Glenville silt loam, 0 to 3 percent slopes; Montgomery County, Maryland; about 2 miles northwest of Brookeville, about 2,040 feet east and 300 feet south of the intersection of Zion Road and Riggs Road; lat. 39 degrees 12 minutes 01 second N. and long. 77 degrees 05 minutes 33 seconds W.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam; moderate fine and medium subangular blocky structure; friable; many fine and medium roots; 10 percent gravel; neutral; abrupt smooth boundary.

Bt1—8 to 20 inches; yellowish brown (10YR 5/6) gravelly silt loam; moderate medium subangular blocky structure; friable; many medium roots; 25 percent gravel; common medium distinct grayish brown (10YR 5/2) iron depletions; neutral; clear wavy boundary.

Bt2—20 to 30 inches; yellowish brown (10YR 5/8) silt loam; weak medium angular blocky structure; friable; few fine roots; few faint clay films on faces of peds; 5 percent gravel; common medium faint strong brown (7.5YR 5/8) iron accumulations and common medium distinct grayish brown (2.5YR 5/2) iron depletions; strongly acid; clear wavy boundary.

Btx—30 to 40 inches; yellowish brown (10YR 5/4) loam; moderate coarse prismatic structure parting to moderate thick platy; firm and brittle; few medium roots on exterior faces of peds; many prominent clay films on faces of peds; many medium distinct yellowish red (5YR 5/6) iron

accumulations and few medium distinct pale brown (10YR 6/3) iron depletions; common coarse grayish brown (10YR 5/2) iron depletions on faces of peds; very strongly acid; gradual irregular boundary.

C1—40 to 59 inches; variegated strong brown (7.5YR 5/8), light gray (10YR 7/1), and light yellowish brown (2.5YR 6/4) fine sandy loam; massive; friable; 5 percent gravel; very strongly acid; gradual irregular boundary.

C2—59 to 70 inches; variegated brownish yellow (10YR 6/6), very pale brown (10YR 7/3), and reddish yellow (7.5YR 6/8) sandy loam; massive; very friable; 10 percent pebbles and cobbles; very strongly acid.

Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 15 to 30 inches. The content of rock fragments ranges from 0 to 30 percent in the A and B horizons and from 5 to 50 percent in the C horizon. In unlimed areas reaction ranges from neutral to very strongly acid in the A horizon, ranges from moderately acid to very strongly acid in the B horizon, and is strongly acid or very strongly acid in the C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 6. Texture is loam, silt loam, or sandy loam in the fine-earth fraction.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. Iron depletions are in the upper 10 inches of the argillic horizon. The Bt horizon is silt loam, clay loam, or silty clay loam in the fine-earth fraction.

The Btx horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Texture is loam or silt loam in the fine-earth fraction. This horizon has moderate medium, thick platy, or moderate coarse prismatic structure. It is firm or very firm and brittle.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 1 to 8. Texture is loam, sandy loam, or fine sandy loam in the fine-earth fraction.

GoB—Glenville silt loam, 3 to 8 percent slopes

Setting

Landscape: Uplands
Note: In some areas the soil does not have fragic properties. In some areas recent deposition is as much as 25 inches thick. In some areas the soil is more olive in color than is described.

Component Description

Glenville and similar soils

Composition of map unit: 85 percent
Landform: Concave footslopes, toeslopes, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 15 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 0.5 foot to 3.0 feet
Parent material: Loamy colluvium derived from phyllite or schist
Flooding: None
Available water capacity: Average of 7.3 inches

Additional Components

Glenelg and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GoC—Glenville silt loam, 8 to 15 percent slopes

Setting

Landscape: Uplands
Note: In some areas the soil does not have fragic properties. In some areas the soil is more olive in color than is described. In some areas recent deposition is as much as 25 inches thick.

Component Description

Glenville and similar soils

Composition of map unit: 85 percent
Landform: Concave footslopes, toeslopes, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 15 to 30 inches to a fragipan
Drainage class: Moderately well drained

Depth to seasonal high water table: 0.5 foot to 3.0 feet
Parent material: Loamy colluvium derived from phyllite or schist
Flooding: None
Available water capacity: Average of 7.3 inches

Additional Components

Glenelg and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GuB—Glenville-Baile silt loams, 3 to 8 percent slopes

Setting

Landscape: Uplands
Note: In some areas the soil does not have fragic properties.

Component Description

Glenville and similar soils

Composition of map unit: 60 percent
Landform: Concave footslopes, toeslopes, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 15 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 0.5 foot to 3.0 feet
Parent material: Loamy colluvium derived from phyllite or schist
Flooding: None
Available water capacity: Average of 7.3 inches

Baile and similar soils

Composition of map unit: 40 percent
Landform: Swales, drainageways, and depressions
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Loamy colluvium derived from phyllite or schist
Flooding: None
Available water capacity: Average of 10.7 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GvA—Glenville-Codorus complex, 0 to 3 percent slopes

Setting

Landscape: Uplands
Note: This map unit can be highly variable. In some areas the soils do not have fragic properties.

Component Description

Glenville and similar soils

Composition of map unit: 65 percent
Landform: Concave footslopes, toeslopes, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 15 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy colluvium derived from phyllite or schist
Flooding: None
Available water capacity: Average of 7.3 inches

Codorus and similar soils

Composition of map unit: 35 percent
Landform: Flood plains
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium from phyllite, schist, quartzite, or diabase

Flooding: Occasional
Available water capacity: Average of 7.7 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

GvB—Glenville-Codorus complex, 3 to 8 percent slopes

Setting

Landscape: Uplands
Note: This map unit can be highly variable and is generally mapped on the higher gradient streams. In some areas the soils do not have fragic properties.

Component Description

Glenville and similar soils

Composition of map unit: 65 percent
Landform: Concave footslopes, toeslopes, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 15 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy colluvium derived from phyllite or schist
Flooding: None
Available water capacity: Average of 7.3 inches

Codorus and similar soils

Composition of map unit: 35 percent
Landform: Flood plains
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium from phyllite, schist, quartzite, or diabase
Flooding: Occasional
Available water capacity: Average of 7.7 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hagerstown Series

The Hagerstown series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum weathered from limestone. They are on nearly level to moderately steep uplands. Slopes range from 0 to 25 percent.

Hagerstown soils are similar to Duffield soils and are commonly adjacent to Dryrun, Funkstown, Murrill, Opequon, and Ryder soils. Dryrun and Funkstown soils formed in local alluvium and colluvium and are moderately well drained. Duffield soils formed in residuum weathered from limestone which contains shale fragments and average less than 35 percent clay throughout. Opequon and Ryder soils are shallower to bedrock than the Hagerstown soils. Murrill soils formed in colluvium over limestone and have more rock fragments in the solum than the Hagerstown soils.

Typical pedon of Hagerstown silt loam, 3 to 8 percent slopes; approximately 2,300 feet north of the intersection of Wheeler Road and Maryland Route 34, about 1,200 feet east of Wheeler Road, in the Keedysville area, on a west-facing, convex slope of 4 percent in a cultivated field; lat. 39 degrees 30 minutes 03 seconds N. and long. 77 degrees 41 minutes 13 seconds W.

Ap1—0 to 7 inches; brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; many fine and common medium roots; many fine and common medium tubular pores; neutral; abrupt smooth boundary.
Ap2—7 to 10 inches; brown (7.5YR 4/4) silt loam; weak coarse platy structure; firm; many fine and few medium roots; common fine and medium tubular pores; 1 percent limestone channers; neutral; abrupt smooth boundary.
BE—10 to 17 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; many fine and medium tubular and vesicular pores; common medium distinct brown (7.5YR 4/2) organic films in pores; few distinct

discontinuous clay skins in pores; neutral; clear wavy boundary.

Bt1—17 to 26 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many fine and medium vesicular and tubular pores; many medium brown (7.5YR 4/3) organic films in pores; many distinct continuous clay films on faces of peds and in pores; 5 percent limestone channers; common medium distinct very dark gray (5YR 3/1) manganese stains on faces of peds and interiors of peds; common fine distinct very dark gray (5YR 3/1) manganese concretions; slightly acid; clear wavy boundary.

Bt2—26 to 45 inches; reddish brown (2.5YR 4/4) silty clay; strong fine subangular blocky structure; friable; common fine roots; many fine and medium tubular and vesicular pores; common medium distinct brown (7.5YR 4/3) organic films in pores; many prominent continuous clay films on faces of peds and in pores; 5 percent limestone channers; common fine distinct very dark gray (5YR 3/1) manganese concretions; many fine and medium distinct very dark gray (5YR 3/1) iron and manganese stains; slightly acid; gradual wavy boundary.

Bt3—45 to 61 inches; red (2.5YR 4/6) clay; common medium distinct brownish yellow (10YR 6/8) lithochromic mottles; strong fine platy structure; friable; common fine and few medium roots; many fine and medium tubular and vesicular pores; common prominent continuous clay films on faces of peds and in pores; 5 percent limestone channers; neutral; gradual wavy boundary.

BC—61 to 71 inches; variegated yellowish brown (10YR 5/8), yellowish red (5YR 4/6), and brown (7.5YR 4/3) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; common fine and few medium tubular and vesicular pores; common distinct discontinuous clay skins on faces of peds; 10 percent limestone channers; slightly acid.

The thickness of the solum ranges from 40 to 72 inches. Depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 20 percent throughout the profile. Reaction ranges from slightly acid to neutral in the solum and from moderately acid to neutral in the substratum.

The Ap horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam, silty clay loam, clay loam, or loam.

The BE horizon has hue of 5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. Texture is silt loam, loam, silty clay loam, clay loam, clay, or silty clay.

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

The BC horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. Texture is silt loam, silty clay loam, silty clay, clay, or loam.

HaA—Hagerstown loam, 0 to 3 percent slopes

Setting

Landscape: Karst land
Note: There is a potential for sinkhole development.

Component Description

Hagerstown and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from limestone
Flooding: None
Available water capacity: Average of 10.5 inches

Additional Components

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Swales and saddles

Duffield and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HaB—Hagerstown loam, 3 to 8 percent slopes

Setting

Landscape: Karst land
Note: There is a potential for sinkhole development.

Component Description

Hagerstown and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from limestone
Flooding: None
Available water capacity: Average of 10.5 inches

Additional Components

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Swales and saddles

Duffield and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HaC—Hagerstown loam, 8 to 15 percent slopes

Setting

Landscape: Karst land
Note: In eroded areas the soil has a surface layer of clay loam. There is a potential for sinkhole development.

Component Description

Hagerstown and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from limestone
Flooding: None
Available water capacity: Average of 10.4 inches

Additional Components

Duffield and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Walkersville and similar soils

Composition of map unit: 5 percent
Landform: Stream terraces

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HbB—Hagerstown silt loam, 3 to 8 percent slopes

Setting

Landscape: Karst land
Note: In eroded areas the soil has a surface layer of clay loam. In some areas slopes are steeper than 8 percent. There is a potential for sinkhole development. Active and inactive sinkholes can make up as much as 10 percent of the unit.

Component Description

Hagerstown and similar soils

Composition of map unit: 85 percent

Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from limestone
Flooding: None
Available water capacity: Average of 10.5 inches

Additional Components

Adamstown and similar soils

Composition of map unit: 10 percent
Landform: Swales and saddles

Funkstown and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HcB—Hagerstown-Opequon silty clay loams, 3 to 8 percent slopes, rocky

Setting

Landscape: Karst land
Note: In some areas slopes are steeper than 8 percent. There is a high potential for sinkhole development. Active and inactive sinkholes can make up as much as 10 percent of the unit.

Component Description

Hagerstown and similar soils

Composition of map unit: 55 percent
Landform: Summits and backslopes
Surface layer texture: Silty clay loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from limestone
Flooding: None
Available water capacity: Average of 10.4 inches

Opequon and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Silty clay loam
Depth to restrictive feature: 12 to 20 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from limestone
Flooding: None
Available water capacity: Average of 2.0 inches

Additional Components

Duffield and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hatboro Series

The Hatboro series consists of very deep, poorly drained soils. Permeability is moderate. These soils formed in recent alluvial material eroded from micaceous and phyllitic uplands. They occur on nearly level flood plains. Slopes range from 0 to 3 percent.

Hatboro soils are similar to Codorus soils and are commonly adjacent to Catoctin, Highfield, Lantz, Mt. Zion, Myersville, and Rohrersville soils. Codorus soils are moderately well drained and typically occur on convex portions of the flood plains. Catoctin, Highfield, Lantz, Mt. Zion, Myersville, and Rohrersville soils are on the surrounding uplands, which do not flood.

Typical pedon of Hatboro silt loam, 0 to 3 percent slopes; Washington County, Maryland; approximately 1,000 feet west of State Route 67 and 0.5 mile south of the hamlet of Brownsville; lat. 39 degrees 22 minutes 27 seconds N. and long. 77 degrees 40 minutes 17 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; strong fine granular structure; friable; many fine roots; many fine distinct grayish brown (2.5Y 5/2) iron

depletions, many fine prominent yellowish red (5YR 4/6) iron concentrations, and many fine prominent yellowish red (5YR 5/8) oxidized rhizospheres; 4 percent gravel; slightly acid; clear smooth boundary.

Bg1—8 to 17 inches; grayish brown (2.5Y 5/2) silt loam; moderate medium subangular blocky structure; friable; many fine roots; common fine and few medium vesicular pores and many fine and few medium tubular pores; many medium prominent strong brown (7.5YR 5/8) oxidized rhizospheres; many medium prominent yellowish red (5YR 4/6) iron concentrations; 2 percent gravel; neutral; clear smooth boundary.

Bg2—17 to 30 inches; light gray (2.5Y 7/2) silt loam; common coarse prominent reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine and few medium tubular pores and common fine and few medium vesicular pores; common fine prominent dark grayish brown (10YR 4/2) organic material in pores; many medium prominent strong brown (7.5YR 5/6) iron concentrations; black (N 2.5/0) iron and manganese stains on faces of peds; 10 percent gravel comprised of quartzite, greenstone, and quartz; neutral; clear smooth boundary.

Bg3—30 to 39 inches; gray (2.5Y 6/1) gravelly clay loam; common fine faint light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; firm; few fine roots; common fine tubular pores; many medium prominent yellowish red (5YR 4/6) iron and manganese concretions; many medium prominent black (N 2.5/0) iron and manganese stains on faces of peds; common coarse prominent brownish yellow (10YR 6/8) iron accumulations; 20 percent gravel comprised of quartzite, greenstone, and quartz; neutral; clear wavy boundary.

C1—39 to 42 inches; yellowish brown (10YR 5/6) gravelly sandy clay loam; massive; friable; few fine roots; many fine tubular pores and common medium vesicular pores; many medium prominent gray (2.5Y 6/2) iron depletions; common medium iron and manganese stains; 30 percent mixed gravel; neutral; clear wavy boundary.

C2—42 to 50 inches; yellowish brown (10YR 5/6) gravelly sandy clay loam; massive; friable; 30 percent gravel comprised of quartzite, greenstone, phyllites, and quartz; neutral; abrupt wavy boundary.

C3—50 to 72 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; single grain; very friable; 40 percent gravel comprised of quartzite, greenstone, phyllites, and quartz; slightly acid.

The thickness of the solum ranges from 30 to 40 inches. Depth to bedrock is more than 5 feet. The content of gravel and cobbles ranges from 0 to 10 percent in the solum and from 0 to 60 percent in the C horizon. In some pedons individual horizons above a depth of 40 inches average more than 30 percent rock fragments. Mica flakes occur in the lower portion of some pedons. Reaction ranges from moderately acid to neutral.

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

The Bg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. Texture is silt loam, clay loam, silty clay loam, sandy clay loam, or loam or their gravelly analogs.

The C horizon has variegated hues of 10YR to 5Y or is neutral in hue, has value of 4 to 7, and has chroma of 0 to 6. Texture is gravelly or very gravelly sandy clay loam, sandy loam, clay loam, silty clay loam, or silt loam.

HdA—Hatboro-Codorus silt loams, 0 to 3 percent slopes

Setting

Landscape: River valleys

Note: In some areas the soils have gravel layers above a depth of 40 inches. Inclusions of somewhat poorly drained soils are common. Ponding may occur for periods of long duration.

Component Description

Hatboro and similar soils

Composition of map unit: 60 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Gravelly alluvium derived from greenstone, phyllite, or quartzite or loamy alluvium derived from diabase or schist
Flooding: Occasional
Available water capacity: Average of 8.2 inches

Codorus and similar soils

Composition of map unit: 40 percent
Landform: Flood plains

Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 2.5 feet
Parent material: Loamy colluvium derived from greenstone, phyllite, schist, quartzite, or diabase
Flooding: Occasional
Available water capacity: Average of 7.1 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hazel Series

The Hazel series consists of moderately deep, well drained soils. Permeability is moderately rapid. These soils formed in residuum weathered from a mixture of phyllite and quartzite. They are on gently sloping to steep upland ridges of low relief. Slopes range from 3 to 45 percent.

Hazel soils are similar to Catoctin soils and are commonly adjacent to Bagtown, Braddock, Thurmont, Trego, and Weverton soils. Catoctin soils formed from hard metabasalt greenstone or greenstone schist. Bagtown, Braddock, Thurmont, Trego, and Weverton soils formed from quartzite colluvial materials over phyllite or limestone and have bedrock at a depth of more than 40 inches.

Typical pedon of Hazel channery silt loam, 3 to 8 percent slopes; Washington County, Maryland; in the Dargan area, approximately 900 feet west of Hoffmaster Road and 1,200 feet east of the intersection of Harpers Ferry Road and Hoffmaster Road; lat. 39 degrees 22 minutes 06 seconds N. and long. 77 degrees 43 minutes 06 seconds W.

Ap—0 to 10 inches; brown (7.5YR 4/4) channery silt loam; moderate fine subangular blocky structure; friable; many fine roots; few fine tubular pores; 20 percent gravel; neutral; abrupt wavy boundary.
Bw—10 to 20 inches; strong brown (7.5YR 5/6) channery loam; moderate medium subangular blocky structure; friable; many fine roots; common fine tubular pores and few fine and few medium vesicular pores; common discontinuous clay films around rock fragments and in pores; 20 percent channers; moderately acid; clear wavy boundary.
C—20 to 27 inches; yellowish brown (10YR 5/6) channery loam; massive; friable; common fine roots; few fine tubular pores and common fine and few medium vesicular pores; 25 percent channers; strongly acid; abrupt wavy boundary.
R—27 inches; strongly cemented, highly fractured phyllite.

The thickness of the solum ranges from 14 to 28 inches. Depth to hard bedrock ranges from 20 to 40 inches and varies widely within short horizontal distances. The content of channers ranges from 0 to 30 percent in the A and Bw horizons and from 20 to 50 percent in the C horizon. Reaction is strongly acid or very strongly acid except in limed areas.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. Texture is loam or silt loam.

The Bw horizon has hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. Texture is loam, sandy loam, fine sandy loam, or silt loam.

The C horizon is variegated with hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 3 to 8. Texture is loam or silt loam.

Highfield Series

The Highfield series consists of very deep, well drained soils. Permeability is moderate. These soils formed in material weathered from metabasalt, metarhyolite, and meta-andesite. They are on mountain summits and backslopes. Slopes range from 3 to 65 percent.

Highfield soils are similar to Myersville soils and are commonly adjacent to Lantz, Mt. Zion, Ravenrock, Catoctin, and Rohrersville soils. Myersville soils contain more than 18 percent clay in the subsoil. Lantz and Rohrersville soils are in drainageways. Lantz soils are very poorly drained. Rohrersville soils are somewhat poorly drained. Mt. Zion soils are moderately well drained and commonly occur in the lower landform positions. Ravenrock soils have more than 35 percent rock fragments in the subsoil and are seasonally wet in the substratum. Catoctin soils have bedrock at a depth of less than 40 inches and have more than 35 percent rock fragments throughout.

Typical pedon of Highfield gravelly silt loam, 3 to 8 percent slopes, very stony; approximately 5,250 feet northeast of the intersection of Mt. Zion Church Road, Quirauk School Road, and Catoctin Trail, 50 feet east of Catoctin Trail, in a reforested area of white oak, northern red oak, and maple; lat. 39 degrees 40 minutes 48 seconds N. and long. 77 degrees 29 minutes 02 seconds W.

Oi—0 to 1 inch; partially decomposed leaves and twigs.
Ap—1 to 3 inches; dark grayish brown (2.5Y 4/2) gravelly silt loam; weak fine subangular blocky structure; friable; many fine and few medium roots; 25 percent gravel and 1 percent stones; extremely acid; abrupt smooth boundary.
BE—3 to 13 inches; light olive brown (2.5Y 5/6) gravelly loam; moderate fine and weak medium subangular blocky structure; friable; many fine, common medium, and few coarse roots; 20 percent gravel; very strongly acid; clear smooth boundary.
Bt1—13 to 21 inches; strong brown (7.5YR 5/6) gravelly loam; few medium distinct olive brown (2.5Y 4/6) mottles; moderate medium subangular blocky structure; friable; many fine and common medium roots; common fine tubular and vesicular pores; common faint discontinuous clay films on faces of peds; 15 percent gravel; very strongly acid; clear smooth boundary.
Bt2—21 to 39 inches; yellowish red (5YR 5/6) gravelly loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; many fine and common medium roots; many fine and few medium tubular pores and many fine vesicular pores; common distinct discontinuous strong brown (7.5YR 4/6) clay films on faces of peds; many medium black (N 2/0) iron and manganese stains; 15 percent gravel; strongly acid; clear wavy boundary.
CB—39 to 64 inches; variegated strong brown (7.5YR 5/6), yellowish red (5YR 5/6), dark yellowish brown (10YR 5/6), and red (2.5YR 5/6) loam; weak thick platy structure inherited from the bedrock; friable; common fine and few medium roots; many fine tubular and vesicular pores; few distinct discontinuous clay films on surface of rock fragments; 5 percent channers; strongly acid; abrupt smooth boundary.
R—64 inches; olive brown (2.5Y 5/4) indurated, highly fractured chloritic metarhyolite.

The thickness of the solum ranges from 20 to 40 inches. Depth to bedrock ranges from 60 to 80 inches. The content of rock fragments, consisting of chloritic metabasalt, metarhyolite, meta-andesite, and quartz, ranges from 5 to 25 percent, by volume, in the surface layer, from 15 to 40 percent in subhorizons of the B horizon, and from 20 to 80 percent in the C horizon. Reaction is very strongly acid or strongly acid in the surface layer and the upper part of the B horizon and ranges from strongly acid to moderately acid in the lower part of the B horizon and in the C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. Texture is silt loam or loam.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. Texture is silt loam or loam.

The B and BE horizons have hue of 7.5YR to 2.5Y, value or 5 or 6, and chroma of 4 to 6. Some pedons have hue ranging to 5YR in the lower subhorizons. Texture is silt loam or loam.

The C and CB horizons are commonly variegated and have hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 6. Texture is silt loam or loam.

HgB—Highfield gravelly silt loam, 3 to 8 percent slopes

Setting

Landscape: Mountains and valleys

Component Description

Highfield and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Catoctin and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HgC—Highfield gravelly silt loam, 8 to 15 percent slopes

Setting

Landscape: Mountains and valleys

Component Description

Highfield and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Catoctin and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HgD—Highfield gravelly silt loam, 15 to 25 percent slopes

Setting

Landscape: Mountains and valleys
Note: In some areas slopes are steeper than 25 percent.

Component Description

Highfield and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Additional Components

Catoctin and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Myersville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HhB—Highfield gravelly silt loam, 3 to 8 percent slopes, very stony

Setting

Landscape: Mountains and valleys
Note: In some areas slopes are steeper than 8 percent.

Component Description

Highfield and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Catoctin and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HhC—Highfield gravelly silt loam, 8 to 15 percent slopes, very stony

Setting

Landscape: Mountains and valleys

Component Description

Highfield and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Additional Components

Catoctin and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Myersville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HhD—Highfield gravelly silt loam, 15 to 25 percent slopes, very stony

Setting

Landscape: Mountains and valleys

Component Description

Highfield and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Catoctin and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Hyattstown Series

The Hyattstown series consists of shallow, well drained soils. Permeability is moderate. These soils

formed in residuum weathered from phyllite. They are on strongly sloping, narrow ridgetops and side slopes. Slopes range from 3 to 65 percent.

Hyattstown soils are similar to Linganore soils and are commonly adjacent to Conestoga, Benevola, Funkstown, Wiltshire, and Letort soils. Linganore soils have bedrock at a depth of 20 to 40 inches. Benevola soils are in valley positions and have more than 35 percent clay. Funkstown and Wiltshire soils are in concave positions associated with intermittent drainageways and are moderately well drained. Conestoga and Letort soils have bedrock at a depth of more than 60 inches.

Typical pedon of Hyattstown channery silt loam in an area of Linganore-Hyattstown channery silt loams, 3 to 8 percent slopes; Montgomery County, Maryland; about 2,500 feet north of the intersection of Old Hundred Road and Comus Road, 2,300 feet west on a farm road, 500 feet north:

Ap—0 to 5 inches; dark grayish brown (2.5Y 4/2) channery silt loam; weak coarse subangular blocky structure parting to weak fine granular; very friable; many fine roots; 30 percent channers; neutral; clear wavy boundary.

AB—5 to 10 inches; olive brown (2.5Y 4/3) very channery silt loam; moderate coarse subangular blocky structure; friable; many fine roots; common coarse vesicular pores and common medium and many fine tubular pores; few faint light olive brown (2.5Y 5/4) clay films on faces of peds; 45 percent channers; neutral; clear wavy boundary.

C—10 to 18 inches; brown (10YR 4/3) and strong brown (7.5YR 4/6) extremely channery silt loam; massive; friable; many very fine and fine roots in cracks; 70 percent channers of which 50 percent are parachanners; neutral; gradual wavy boundary.

Cr—18 to 72 inches; moderately cemented bedrock of greenish gray (5GY 5/1) and brown (10YR 4/3) extremely channery loam; weak fine platy structure; firm; 90 percent channers; neutral.

The thickness of the solum ranges from 10 to 20 inches. Depth to the Cr horizon ranges from 13 to 20 inches. The content of rock fragments ranges from 21 to 65 percent in the A horizon and from 20 to 75 percent in the B and C horizons.

The Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam or loam in the fine-earth fraction.

The AB horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 4 to 8. Texture is silt loam or loam in the fine-earth fraction.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. Texture is silt loam or clay loam in the fine-earth fraction.

The Cr horizon has hue of 5GY or 10YR, value of 4 or 5, and chroma of 1 to 3. It is dense but can be chipped with hand tools. Texture is loam in the fine-earth fraction.

HtF—Hyattstown very channery loam, 25 to 65 percent slopes, rocky

Setting

Landscape: Uplands

Component Description

Hyattstown and similar soils

Composition of map unit: 85 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Very channery loam
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from high-base phyllite and schist
Flooding: None
Available water capacity: Average of 2.3 inches

Additional Components

Linganore and similar soils

Composition of map unit: 15 percent
Landform: Summits, backslopes, and ridges

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

HyD—Hyattstown-Linganore channery silt loams, 15 to 25 percent slopes

Setting

Landscape: Uplands

Component Description

Hyattstown and similar soils

Composition of map unit: 60 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Channery silt loam
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from high-base phyllite and schist
Flooding: None
Available water capacity: Average of 2.3 inches

Linganore and similar soils

Composition of map unit: 40 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Channery silt loam
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from high-base phyllite and schist
Flooding: None
Available water capacity: Average of 2.6 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Klinesville Series

The Klinesville series consists of shallow, well drained soils. Permeability is moderately rapid. These soils formed in residuum from red shale, siltstone, slate, and fine-grained sandstone. They are on dissected uplands. Slopes range from 3 to 65 percent.

Klinesville soils are similar to Penn soils and are commonly adjacent to Croton, Readington, Reaville, Rowland, Bowmansville, Bermudian, and Birdsboro soils. Readington soils are moderately well drained, Reaville soils are somewhat poorly drained, and Croton soils are poorly drained. Rowland, Bowmansville, Bermudian, and Birdsboro soils are influenced by alluvial deposition. Penn soils have bedrock between depths of 20 and 40 inches.

Typical pedon of Klinesville channery silt loam, 3 to 8 percent slopes; approximately 0.25 mile west of Longs Mill Road, 500 feet south of the intersection of Longs Mill Road and Legore Bridge Road, in a crop field; lat. 77 degrees 19 minutes 32 seconds N. and long. 39 degrees 35 minutes 53 seconds W.

Ap—0 to 8 inches; reddish brown (5YR 4/4) channery silt loam; moderate fine granular structure; friable; common fine and medium roots throughout; common fine tubular pores; 20 percent channers; moderately acid; clear smooth boundary.
Bw—8 to 14 inches; yellowish red (5YR 5/6) very channery loam; moderate medium subangular blocky structure; friable; common fine roots throughout; few fine tubular pores; 50 percent channers; strongly acid; clear wavy boundary.
R—14 inches; weak red (10R 5/4) strongly cemented, highly fractured Triassic shale.

The thickness of the solum and depth to bedrock range from 10 to 20 inches. The content of rock fragments, which are dominantly red shale, ranges from 15 to 75 percent in the solum and from 40 to 90 percent in the C horizon and averages more than 50 percent in the textural control section. Reaction ranges from very strongly acid to moderately acid in unlimed areas.

The A horizon has hue of 5YR to 10R and value and chroma of 2 to 4. Texture is silt loam or loam in the fine-earth fraction.

The B horizon has hue of 5YR to 10R, value of 3 to 5, and chroma of 3 to 6. Texture is silt loam or loam.

The C horizon, if it occurs, has hue of 5YR to 10R, value of 3 or 4, and chroma of 3 to 6. Texture is silt loam or loam.

KeB—Klinesville very channery loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil is not as red as described and is gray.

Component Description

Klinesville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Very channery loam

Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 1.1 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

KeC—Klinesville very channery loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil is not as red as described and is gray.

Component Description

Klinesville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Very channery loam
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 1.1 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

KeD—Klinesville very channery loam, 15 to 25 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil is not as red as described and is gray.

Component Description

Klinesville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Very channery loam
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 1.1 inches

Additional Components

Penn and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

KnB—Klinesville channery silt loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Klinesville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery silt loam
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 1.1 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

KnC—Klinesville channery silt loam, 8 to 15 percent slopes

Setting

Landscape: Valleys

Component Description

Klinesville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery silt loam
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 1.1 inches

Additional Components

Penn and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

KrF—Klinesville-Rock outcrop complex, 25 to 65 percent slopes

Setting

Landscape: Valleys

Component Description

Klinesville and similar soils

Composition of map unit: 70 percent
Landform: Summits and backslopes
Surface layer texture: Very channery loam
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 1.1 inches

Rock outcrop

Composition of map unit: 25 percent
Landform: None assigned

Additional Components

Penn and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Lantz Series

The Lantz series consists of very deep, very poorly drained soils. Permeability is slow throughout the profile. These soils are in nearly level and gently sloping upland draws, swales, depressions, and drainageways. Slopes range from 0 to 8 percent.

Lantz soils are similar to Rohrersville soils and are commonly adjacent to Catoctin, Foxville, Highfield, Mt. Zion, Myersville, Ravenrock, Thurmont, and Weverton soils. Rohrersville soils are in landform positions similar to those of the Lantz soils but have a seasonal high water table between depths of 10 and 20 inches. Catoctin soils have bedrock within a depth of 40 inches. Highfield, Mt. Zion, Myersville, Ravenrock, Thurmont, and Weverton soils are in the higher landform positions and are better drained than the Lantz soils. Foxville soils have more rock fragments within the solum than the Lantz soils and are associated with perennial streams.

Typical pedon of Lantz silt loam, 0 to 3 percent slopes; Washington County, Maryland; in the Washington County Wetland Reserve Park near Rohrersville, 200 feet north of Mill Brook Road, ½ mile west of Rohrersville, in an abandoned crop field; lat. 39 degrees 26 minutes 18 seconds N. and long. 77 degrees 40 minutes 42 seconds W.

Ap—0 to 9 inches; very dark grayish brown (2.5Y 3/2) silt loam; strong fine and medium granular structure; very friable; many fine and medium roots; few medium tubular pores; common fine strong brown (7.5YR 5/6) oxidized rhizospheres and iron concretions; moderately acid; abrupt smooth boundary.

Eg—9 to 14 inches; light olive gray (5Y 6/2) silt loam; moderate medium angular blocky structure; friable; common fine and medium roots; common fine and medium tubular pores; many very dark grayish brown (2.5Y 3/2) organic films on faces of peds; common fine strong brown (7.5YR 5/6) iron concretions; moderately acid; clear wavy boundary.

Btg1—14 to 33 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak coarse prismatic structure parting to strong medium angular blocky; firm; common fine and medium roots; few medium and coarse pores; few medium yellowish red (5YR 5/6) iron masses; moderately acid; gradual wavy boundary.

Btg2—33 to 47 inches; grayish brown (2.5Y 5/2) clay loam; weak coarse prismatic structure parting to moderate medium angular blocky; firm; few fine roots; few fine tubular pores; few fine and medium yellowish red (5YR 5/6) iron masses; 5 percent quartz rock fragments; moderately acid; clear wavy boundary.

BC—47 to 72 inches; light gray (5Y 7/2) gravelly loam; weak medium subangular blocky structure; very friable; few fine strong brown (7.5YR 5/6) iron stains; 20 percent quartz rock fragments; slightly acid.

The thickness of the solum ranges from 30 to 80 inches. Depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 20 percent in the solum and from 10 to 30 percent in the substratum. The fragments are typically metabasalt, meta-andesite, sandstone, and quartz. The coverage of surface stones ranges from 0 to 20 percent in some pedons. Reaction ranges from neutral to moderately acid.

The A horizon has hue of 2.5Y or 5Y, value of 2 to 3, and chroma of 0 to 3. It has iron and manganese accumulations. Texture is silt loam or loam.

The E horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 0 to 2. It has iron and manganese accumulations. Texture is silt loam or loam.

The B and BC horizons have hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 0 to 2. They have iron and manganese accumulations. Texture is silt loam, loam, silty clay loam, clay loam, or silty clay.

The C horizon, if it occurs, is commonly variegated and has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 0 to 4. Texture is loam, silt loam, silty clay loam, or sandy loam.

LaB—Lantz-Rohrersville silt loams, 0 to 8 percent slopes, extremely stony

Setting

Landscape: Valleys and mountains
Note: In some areas the soils do not have fragic properties.

Component Description

Lantz and similar soils

Composition of map unit: 55 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Loamy alluvium derived from greenstone or loamy colluvium derived from greenstone
Flooding: Rare
Available water capacity: Average of 8.0 inches

Rohrersville and similar soils

Composition of map unit: 35 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 60 to 80 inches to bedrock; 24 to 36 inches to fragic properties
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy alluvium derived from greenstone or loamy colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 10.9 inches

Additional Components

Mt. Zion and similar soils

Composition of map unit: 10 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Leetonia Series

The Leetonia series consists of deep, well drained soils. Permeability is moderately rapid. These soils formed in residuum weathered from quartzite and metagraywacke. They are on nearly level to strongly sloping mountain summits. Slopes range from 0 to 15 percent.

Leetonia soils are similar to Edgemont soils and are commonly adjacent to Airmont, Bagtown, Highfield, Ravenrock, Stumptown, and Weverton soils. Airmont, Bagtown, and Ravenrock soils formed in colluvial materials and have bedrock at a depth of more than 60 inches. Edgemont and Highfield soils formed in residuum, have bedrock at a depth of more than 60 inches, and do not have spodic characteristics. Stumptown soils have bedrock at a depth of less than 40 inches and formed partly in slope creep and partly in residuum that weathered from interbedded quartzite and metagraywacke. Weverton soils have colluvium from quartzite over phyllite residuum and generally are in the lower landform positions.

Typical pedon of Leetonia very gravelly sandy loam, 0 to 8 percent slopes, very stony; approximately 1,400 feet north of the intersection of State Route 77 and Park Central Road, 900 feet east of Park Central Road near Wolf Rock; lat. 39 degrees 38 minutes 19 seconds N. and long. 77 degrees 26 minutes 25 seconds W.

Oi—0 to 1 inch; partially decomposed leaves and twigs.
Oe—1 to 2 inches; partially decomposed and decomposed leaves and twigs.
A—2 to 3 inches; black (5YR 2.5/1) very gravelly sandy loam; moderate fine granular structure; very friable; many fine and medium roots; 40 percent pebbles, 10 percent cobbles, and 2 percent stones; extremely acid; abrupt discontinuous boundary.
E—3 to 8 inches; brown (7.5YR 5/2) and light brownish gray (10YR 6/2) very gravelly sandy loam; moderate fine granular structure; very friable; many fine, common medium, and few coarse roots; 40 percent pebbles, 10 percent cobbles, and 2 percent stones; extremely acid; abrupt wavy boundary.
Bs—8 to 10 inches; strong brown (7.5YR 4/6) gravelly loam; weak fine subangular blocky structure; friable; slightly smeary; many fine and few medium roots; 25 percent pebbles; very strongly acid; abrupt irregular boundary.

Bt1—10 to 16 inches; light yellowish brown (2.5Y 6/4) and dark yellowish brown (10YR 4/4) gravelly loam; weak fine subangular blocky structure; friable; many fine, common medium, and few coarse roots; few faint clay films on surfaces of pebbles; 25 percent pebbles; very strongly acid; clear wavy boundary.

Bt2—16 to 24 inches; light yellowish brown (2.5Y 6/4) gravelly loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common very fine tubular pores; common faint clay films on surfaces of pebbles; 30 percent pebbles; very strongly acid; abrupt wavy boundary.

BC—24 to 40 inches; light yellowish brown (2.5Y 6/4) and pale yellow (2.5Y 7/3) extremely cobbly loam; common fine strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; firm in place; few fine and medium roots; few faint clay films on surfaces of rock fragments; 40 percent cobbles and 30 percent pebbles; very strongly acid; gradual wavy boundary.

C—40 to 56 inches; pale yellow (2.5Y 7/3) and light yellowish brown (2.5Y 6/4) extremely cobbly loam; common fine strong brown (7.5YR 5/8) mottles; massive; firm; few fine roots; 45 percent cobbles and 30 percent pebbles; very strongly acid; diffuse irregular boundary.

R—56 inches; indurated, slightly fractured quartzose graywacke.

The thickness of the solum ranges from 25 to 42 inches. Depth to bedrock is 40 inches or more. The thickness of spodic materials ranges from 1 to 5 inches. The content of quartzite rock fragments ranges from 15 to 60 percent, by volume, in the surface layer, from 35 to 70 percent in the solum, and from 35 to 90 percent in the substratum. Stones cover 1 to 3 percent of the surface. Reaction is extremely acid or very strongly acid in all horizons.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 0 to 2. Texture is dominantly very gravelly sandy loam but ranges from loam to loamy sand, including their gravelly analogs.

The E horizon has hue of 7.5YR to 10YR, value of 5 or 6, and chroma of 1 or 2. Texture is dominantly very gravelly sandy loam but ranges from loam to loamy sand, including their gravelly analogs.

The Bs horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 4 to 6. Texture is dominantly gravelly loam but ranges to loamy sand, including its gravelly analogs.

The Bt horizon has hue of 7.5YR to 2.5Y and value and chroma of 4 to 6. Texture is gravelly loam but ranges to sandy loam, including its very gravelly analogs.

The BC horizon, if it occurs, and the C horizon have hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 3 to 6. Texture is loam, sandy loam, or loamy sand or the gravelly cobbly analogs of these textures.

LeB—Leetonia very gravelly sandy loam, 0 to 8 percent slopes, very stony

Setting

Landscape: Mountains
Note: In some areas the soil does not have spodic characteristics. In some areas slopes are steeper than 8 percent.

Component Description

Leetonia and similar soils

Composition of map unit: 85 percent
Landform: Summits and shoulders
Surface layer texture: Very gravelly sandy loam
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from quartzite or from sandstone and shale
Flooding: None
Available water capacity: Average of 1.8 inches

Additional Components

Edgemont and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Dekalb and similar soils

Composition of map unit: 5 percent
Landform: Mountain summits and shoulders

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Legore Series

The Legore series consists of very deep, well drained soils. Permeability is moderate. These soils formed in material weathered from diabase, diorite, and other related basic rock. They are on gently sloping to steep uplands consisting of narrow dikes. Slopes range from 3 to 25 percent.

Legore soils are similar to Brecknock soils and are commonly adjacent to Croton, Klinesville, Lehigh, Montalto, Penn, Readington, Reaville, and Watchung soils. Brecknock soils have metamorphic bedrock at a depth of 42 to 60 inches and have hue of 2.5Y and 5Y in the B horizon. Croton, Klinesville, Penn, Readington, and Reaville soils formed from Triassic red rocks. Klinesville and Penn soils have more than 35 percent rock fragments in the control section. Klinesville soils have bedrock at a depth of less than 20 inches. Penn soils have bedrock at a depth of 20 to 40 inches. Croton soils are poorly drained, Reaville soils are somewhat poorly drained, and Readington soils are moderately well drained. Lehigh soils are moderately well drained and formed in residuum from metamorphosed sandstone and shale. Watchung soils are poorly drained and formed in material weathered from diabase and other dark basic rocks. Montalto soils have more than 35 percent clay in the control section.

Typical pedon of Legore gravelly silt loam, 3 to 8 percent slopes; approximately 200 feet southeast of Legore Bridge Road, 700 feet west of the intersection of Legore Bridge Road and Legore Road, in a woodlot; lat. 77 degrees 34 minutes 47 seconds N. and long. 39 degrees 31 minutes 17 seconds W.

Oi—0 to 1 inch; leaves and twigs.

A—1 to 2 inches; very dark grayish brown (10YR 3/2) gravelly silt loam; strong medium granular structure; friable; many fine and medium roots; 15 percent gravel; strongly acid; clear wavy boundary.

BE—2 to 11 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; firm; many fine and medium roots; 10 percent gravel; strongly acid; clear wavy boundary.

Bt—11 to 27 inches; strong brown (7.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; firm; many fine and medium roots; 5 percent gravel; moderately acid; few faint clay films on faces of peds; gradual wavy boundary.

BC—27 to 52 inches; dark yellowish brown (10YR 4/6) and brownish yellow (10YR 6/8) silt loam; moderate medium subangular blocky structure; firm; few fine roots; moderately acid; gradual wavy boundary.

C—52 to 72 inches; yellowish brown (10YR 5/8) and dark yellowish brown (10YR 4/6) sandy loam; massive; firm; moderately acid.

The thickness of the solum ranges from 20 to 34 inches. Depth to bedrock commonly ranges from 5 to 10 feet. Rock fragments are mainly gravel but can be as large as stones and boulders. They consist of diabase, diorite, or related basic rock. The content of rock fragments ranges from 0 to 35 percent throughout the profile. Reaction ranges from strongly acid to slightly acid, and acidity decreases as depth decreases.

The A horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam, loam, silty clay loam, or their gravelly analogs.

The Bt and BE horizons have hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 6. Texture is silty clay loam, clay loam, or their gravelly analogs.

The BC horizon, if it occurs, has colors similar to the Bt horizon. Texture is silt loam, sandy loam, or their gravelly analogs.

The C horizon is variegated but dominantly has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 4 to 8. Texture is sandy loam, loam, silt loam, silty clay loam, or the gravelly analogs of these textures. This horizon consists mostly of saprolite.

LgB—Legore gravelly silt loam, 3 to 8 percent slopes

Setting

Landscape: Uplands

Note: In some areas the soil averages more than 35 percent clay and does not have a gravelly surface layer. In some areas slopes are steeper than 8 percent.

Component Description

Legore and similar soils

Composition of map unit: 85 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from diabase
Flooding: None
Available water capacity: Average of 8.4 inches

Additional Components

Montalto and similar soils

Composition of map unit: 10 percent
Landform: Summits, backslopes, and ridges

Lehigh and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

LnB—Legore-Montalto gravelly silt loams, 3 to 8 percent slopes, bouldery

Setting

Landscape: Uplands
Note: In some areas the soils do not have a bouldery surface. In some areas slopes are less than 3 percent.

Component Description

Legore and similar soils

Composition of map unit: 55 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from diabase
Flooding: None
Available water capacity: Average of 8.4 inches

Montalto and similar soils

Composition of map unit: 45 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from diabase
Flooding: None
Available water capacity: Average of 9.4 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

LnD—Legore-Montalto gravelly silt loams, 15 to 25 percent slopes, bouldery

Setting

Landscape: Uplands

Component Description

Legore and similar soils

Composition of map unit: 55 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from diabase
Flooding: None
Available water capacity: Average of 8.3 inches

Montalto and similar soils

Composition of map unit: 45 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from diabase
Flooding: None
Available water capacity: Average of 9.4 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Lehigh Series

The Lehigh series consists of deep, somewhat poorly drained soils. Permeability is slow. These soils formed in residuum from porcelanite (metamorphosed shale and sandstone). They are on low-lying summits and side slopes. Slopes range from 3 to 8 percent.

Lehigh soils are similar to Reaville soils and are commonly adjacent to Legore, Montalto, Watchung, Penn, Readington, Brecknock, Croton, Abbottstown, and Klinesville soils. Legore, Montalto, and Watchung soils formed from basic rock. Reaville soils are moderately deep. Readington and Abbottstown soils have a fragipan. Klinesville soils have more than 35 percent rock fragments in the control section. Penn and Brecknock soils are well drained. Croton soils are poorly drained.

Typical pedon of Lehigh channery loam, 3 to 8 percent slopes; about 1/4 mile from the intersection of Harney Road and Bullfrog Road, about 850 feet north of Harney Road, in a field; lat. 39 degrees 43 minutes 55 seconds N. and long. 77 degrees 16 minutes 20 seconds W.

Ap—0 to 8 inches; dark grayish brown (2.5Y 4/2) channery loam; weak fine granular structure; friable; 15 percent channers; slightly acid; abrupt smooth boundary.

Bt—8 to 16 inches; light olive brown (2.5Y 5/4) silt loam; moderate fine subangular blocky structure; friable; common medium prominent yellowish brown (10YR 5/6) soft iron masses throughout and common fine gray (10YR 5/1) soft iron depletions throughout; 10 percent rock fragments; slightly acid; clear wavy boundary.

Btg—16 to 23 inches; gray (10YR 5/1) silty clay loam; moderate medium subangular blocky structure; friable; 10 percent rock fragments; common medium distinct yellowish brown (10YR 5/4) soft iron masses throughout; slightly acid; clear wavy boundary.

C_g—23 to 70 inches; gray (10YR 5/1) very channery silt loam; massive; firm; many fine and medium vesicular pores; common coarse distinct yellowish brown (10YR 5/8) soft iron and manganese accumulations; 40 percent channers; neutral.

The thickness of the solum ranges from 20 to 40 inches. Depth to bedrock ranges from 40 to 60 inches. The content of rock fragments of porcelanite ranges from 0 to 40 percent in the A horizon, from 5 to 60 percent in individual B horizons, and from 25 to 80 percent in the C horizon. Reaction ranges from very strongly acid to neutral in unlimed areas.

The Ap horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 to 3. Texture is silt loam in the fine-earth fraction.

The B horizon has hue of 7.5YR to 5Y, value of 3 to 6, and chroma of 0 to 4. Texture is silt loam or silty clay loam.

The C horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 0 to 3. Texture is silt loam or silty clay loam in the fine-earth fraction.

LqB—Lehigh channery loam, 3 to 8 percent slopes

Setting

Landscape: Uplands
Note: In some areas slopes are steeper than 8 percent.

Component Description

Lehigh and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 2.5 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 6.0 inches

Additional Components

Penn and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Letort Series

The Letort series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum from interbedded calciferous schist and graphite phyllite. They are on gently sloping and strongly sloping uplands. Slopes range from 3 to 15 percent.

Letort soils are similar to Conestoga soils and are commonly adjacent to Benevola, Funkstown, Hyattstown, Linganore, and Wiltshire soils. Conestoga soils do not have a dark solum enriched with manganese. Benevola soils have an average clay content that is more than 35 percent in the particle-size control section. Linganore and Hyattstown soils formed from phyllite. Linganore soils are moderately deep, and Hyattstown soils are shallow. Funkstown and Wiltshire soils are moderately well drained.

Typical pedon of Letort silt loam in an area of Conestoga and Letort silt loams, 3 to 8 percent slopes; 1,400 feet east of the intersection of Green Valley Road and Hardboard Road, 1,600 feet north of Molasses Road, in the Johnsville area; lat. 39 degrees 32 minutes 20 seconds N. and long. 77 degrees 13 minutes 47 seconds W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; weak coarse subangular blocky structure parting to moderate fine granular; friable; common fine roots; 14 percent quartz gravel; alkaline; abrupt smooth boundary.

Bt1—9 to 22 inches; very dark grayish brown (10YR 3/2) silt loam; common distinct yellowish brown (10YR 5/6) and yellowish red (5YR 5/8) lithochromic mottles; moderate medium subangular blocky structure; very friable; common fine and medium roots; common fine tubular vesicular pores; 12 percent quartz gravel; alkaline; gradual smooth boundary.

Bt2—22 to 33 inches; very dark grayish brown (10YR 3/2) and dark reddish brown (5YR 3/3) silt loam; moderate medium subangular blocky structure; very friable; common very fine roots; 18 percent quartz gravel; alkaline; gradual wavy boundary.

BC—33 to 42 inches; very dark grayish brown (10YR 3/2) silt loam; common distinct reddish yellow (7.5YR 6/8) and common distinct dark reddish brown (5YR 3/3) lithochromic mottles; weak coarse subangular blocky structure; friable; common fine roots; 10 percent quartz gravel and 5 percent greenstone schist channers; alkaline; gradual wavy boundary.

CB—42 to 67 inches; dark yellowish brown (10YR 3/4) and very dark gray (10YR 3/1) channery silt loam; common distinct red (2.5YR 4/6) lithochromic mottles; weak medium subangular blocky structure; friable; common fine roots; 20 percent greenstone schist channers; alkaline; abrupt irregular boundary.

Ct—67 to 74 inches; red (2.5YR 4/6) very gravelly silt loam; weak medium subangular blocky structure; friable; 37 percent schist and quartz gravel; alkaline; clear wavy boundary.

Cr—74 to 80 inches; moderately cemented bedrock; 92 percent parachanners of greenstone schist and manganese.

The thickness of the solum ranges from 35 to 45 inches. Depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 15 percent in the solum and from 0 to 40 percent in the C horizon. Reaction ranges from strongly acid to neutral in the solum and from moderately acid to slightly alkaline in the substratum.

The A horizon has hue of 10YR or 2.5YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam or loam in the fine-earth fraction.

The B and BC horizons have hue of 10YR or 5Y, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam, silty clay loam, or silty clay in the fine-earth fraction.

The C and CB horizons are neutral in hue or have hue of 10YR to 5Y, have value of 3 to 5, and have chroma of 2 to 4. Texture is silt loam, loam, or sandy loam in the fine-earth fraction.

Lindside Series

The Lindside series consists of very deep, moderately well drained soils. Permeability is moderate. These soils formed in alluvium eroded from limestone uplands. They are on nearly level, active flood plains. Slopes range from 0 to 3 percent.

Lindside soils are similar to Combs soils and are commonly adjacent to Funkstown and Melvin soils. Combs soils have a thick, dark brown surface layer and are well drained. Funkstown soils are in upland drainage swales and have alluvium over limestone residuum. Melvin soils formed in silty alluvium and are poorly drained.

Typical pedon of Lindside silt loam; Washington County, Maryland; 1,500 feet south of the intersection of Maryland Route 60 and Maryland Route 62, about 1,500 feet west of Maryland Route 62, in the Leitersburg area, in a nearly level crop field adjacent to Antietam Creek; lat. 39 degrees 41 minutes 10 seconds N. and long. 77 degrees 38 minutes 13 seconds W.

Ap1—0 to 8 inches; brown (10YR 4/3) silt loam; strong fine granular structure; very friable; many fine and common medium roots; common fine tubular pores and few medium tubular and vesicular pores; slightly alkaline; abrupt smooth boundary.

Ap2—8 to 13 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure parting to strong fine granular; very friable; many fine and few medium roots; common fine and medium and few coarse tubular pores; common coarse faint dark brown (10YR 3/3) organic films lining pores; slightly alkaline; abrupt smooth boundary.

Bw1—13 to 28 inches; dark yellowish brown (10YR 4/4) silt loam; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky; friable; many fine roots; many fine and common medium tubular and vesicular pores, few coarse tubular pores, and common coarse vesicular pores; common coarse faint dark brown (10YR 3/3) organic films lining pores; slightly alkaline; gradual wavy boundary.

Bw2—28 to 40 inches; brown (10YR 4/3) silt loam; moderate coarse prismatic structure parting to moderate fine subangular blocky; friable; common fine roots; many fine and common medium tubular and vesicular pores and few coarse tubular pores; many medium distinct very dark gray (10YR 3/1) organic films; slightly alkaline; clear wavy boundary.

Bg1—40 to 46 inches; dark gray (10YR 4/1) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine roots; common fine tubular and vesicular pores and few medium and few coarse tubular pores; many fine prominent strong brown (7.5YR 4/6) iron accumulations; slightly alkaline; gradual wavy boundary.

Bg2—46 to 66 inches; variegated dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) silt loam; moderate coarse prismatic structure parting to strong medium subangular blocky; friable; common fine roots; common fine tubular and vesicular pores and few medium and few coarse tubular pores; common fine distinct strong brown (7.5YR 5/6) iron accumulations; few medium distinct very pale brown (10YR 8/2) iron depletions; common fine distinct iron and manganese stains; slightly alkaline; gradual wavy boundary.

Bg3—66 to 73 inches; grayish brown (10YR 5/2) gravelly sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine tubular and vesicular pores; many medium distinct brown (7.5YR 4/4) iron accumulations; 17 percent gravel; slightly alkaline.

The thickness of the solum ranges from 40 to 80 inches. The content of rock fragments ranges from 0 to 5 percent within a depth of 40 inches and from 0 to 30 percent below a depth of 40 inches. Some pedons have a higher gravel content above a depth of 40 inches. Reaction ranges from moderately acid to slightly alkaline.

The Ap horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 2 or 3. Texture is silt loam, loam, or silty clay loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Texture is silty clay loam, silt loam, sandy clay loam, or loam.

The Bg horizon has hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 1 or 2. Texture is silty clay loam, silt loam, or loam.

The C horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4. Texture is silt loam, loam, fine sandy loam, or clay loam.

LsA—Lindside silt loam, 0 to 3 percent slopes

Setting

Landscape: River valleys
Note: Some surface textures are coarser than those described. In portions of some pedons, the content of rock fragments is as high as 20 percent.

Component Description

Lindside and similar soils

Composition of map unit: 85 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium derived from sandstone and shale or from limestone
Flooding: Frequent
Available water capacity: Average of 11.7 inches

Additional Components

Melvin and similar soils

Composition of map unit: 10 percent
Landform: Flood plains

Combs and similar soils

Composition of map unit: 5 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Linganore Series

The Linganore series consists of moderately deep, well drained soils. Permeability is moderate in the solum and moderate or moderately rapid in the C horizon. These soils formed in residuum weathered from very firm phyllite. They are on ridgetops, convex shoulders, and backslopes located primarily in the eastern part of Frederick County. Slopes range from 3 to 15 percent.

Linganore soils are similar to Hyattstown soils and are commonly adjacent to Conestoga, Benevola, Funkstown, Wiltshire, and Letort soils. Hyattstown soils have bedrock at a depth of less than 20 inches. Conestoga, Benevola, Funkstown, Letort, and Wiltshire soils have bedrock at a depth of more than 60 inches and average less than 35 percent rock fragments throughout. Funkstown and Wiltshire soils are moderately well drained.

Typical pedon of Linganore channery silt loam in an area of Linganore-Hyattstown channery silt loams, 3 to 8 percent slopes; 1.2 miles south of Clemsonville, 1,600 feet west of Clemsonville Road, in a cultivated field; lat. 39 degrees 30 minutes 20 seconds N. and long. 77 degrees 10 minutes 53 seconds W.

Ap1—0 to 6 inches; olive brown (2.5Y 4/3) channery silt loam; weak coarse subangular blocky structure parting to moderate fine granular; friable; many very fine and fine roots; 25 percent channers; neutral; abrupt smooth boundary.

Ap2—6 to 13 inches; olive brown (2.5Y 4/3) channery silt loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; firm; many very fine and fine roots; common medium and coarse tubular pores and many fine and medium vesicular pores; 25 percent channers; neutral; abrupt smooth boundary.

Bt—13 to 25 inches; light olive brown (2.5Y 5/4) very channery silt loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; many fine roots; common medium and many fine tubular pores and many very fine and fine vesicular pores; few fine prominent discontinuous red (2.5YR 4/6, moist) iron stains on faces of peds; few medium faint discontinuous olive brown (2.5Y 4/3) organic coatings on faces of peds; few fine faint discontinuous olive brown (2.5Y 4/4) clay films on faces of peds; 5 percent gravel; 38 percent channers of which 15 percent are parachanners; neutral; clear wavy boundary.

BC—25 to 31 inches; light olive brown (2.5Y 5/4) extremely channery silt loam; weak fine platy structure; friable; many fine and common medium roots; many fine vesicular and tubular pores; 70 percent channers of which 40 percent are parachanners; moderately acid; clear wavy boundary.

C—31 to 36 inches; dark yellowish brown (10YR 4/6) very channery silt loam; weak fine platy structure; friable; 60 percent channers of which 35 percent are parachanners; moderately acid; clear irregular boundary.

Cr—36 inches; weakly cemented bedrock of olive (5Y 5/3), strong brown (7.5YR 5/8), and dark brown (7.5YR 3/3) extremely channery silt loam; moderately acid.

The thickness of the solum ranges from 22 to 40 inches. Depth to very firm bedrock is more than 2 feet. The content of rock fragments increases as depth increases and ranges from 20 to 70 percent in the solum and from 35 to 70 percent in the C horizon. Reaction ranges from strongly acid to neutral.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 4. Texture is silt loam in the fine-earth fraction.

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

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

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

The Cr horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 3 to 8. Texture is silt loam in the fine-earth fraction. The parachanners are soft and crushable phyllite.

LyB—Linganore-Hyattstown channery silt loams, 3 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Linganore and similar soils

Composition of map unit: 50 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Channery silt loam
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from high-base phyllite or high-base schist
Flooding: None
Available water capacity: Average of 2.6 inches

Hyattstown and similar soils

Composition of map unit: 35 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Channery silt loam
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from high-base phyllite or low-base schist
Flooding: None
Available water capacity: Average of 2.3 inches

Additional Components

Conestoga and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Letort and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

LyC—Linganore-Hyattstown channery silt loams, 8 to 15 percent slopes

Setting

Landscape: Uplands

Component Description

Linganore and similar soils

Composition of map unit: 50 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Channery silt loam
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from high-base phyllite or high-base schist
Flooding: None
Available water capacity: Average of 2.6 inches

Hyattstown and similar soils

Composition of map unit: 35 percent
Landform: Summits, backslopes, and ridges
Surface layer texture: Channery silt loam
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from high-base phyllite or low-base schist
Flooding: None
Available water capacity: Average of 2.3 inches

Additional Components

Conestoga and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Letort and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Melvin Series

The Melvin series consists of very deep, poorly drained soils. Permeability is moderate. These soils formed in recent alluvial sediments eroded from limestone upland soils. They occur on nearly level, active flood plains. Slopes range from 0 to 3 percent.

Melvin soils are similar to Lindside soils and are commonly adjacent to Combs and Funkstown soils. Combs soils are well drained, and Lindside and Funkstown soils are moderately well drained. Combs soils have a thick, dark brown surface layer. Funkstown soils are in upland drainage swales and formed from local alluvium over limestone residuum.

Typical pedon of Melvin silt loam; Washington County, Maryland; approximately 400 feet north of Benevola Church Road, 600 feet west of State Route 66, in a nearly level hay field adjacent to Little Beaver Creek; lat. 39 degrees 33 minutes 18 seconds N. and long. 77 degrees 39 minutes 01 second W.

Ap—0 to 12 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure parting to strong fine granular; friable; many fine roots; many medium tubular pores; common fine prominent dark brown (7.5YR 3/4) soft iron concretions and many fine and medium dark yellowish brown (10YR 4/6) soft iron masses; 2 percent gravel; slightly alkaline; abrupt smooth boundary.

Bg1—12 to 17 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine and medium faint light yellowish brown (2.5Y 6/4) mottles; moderate medium subangular blocky structure; firm; many fine and medium roots; many fine vesicular and tubular pores and common medium and coarse tubular pores; few fine and medium distinct very dark grayish brown (10YR 3/2) organic films lining pores and on faces of peds; common fine prominent dark brown (7.5YR 3/4) iron and manganese concretions and common fine yellowish brown (10YR 5/6) iron accumulations; 2 percent gravel; slightly alkaline; clear smooth boundary.

Bg2—17 to 23 inches; 65 percent light olive gray (5Y 6/2) and 35 percent yellowish brown (10YR 5/8) silty clay loam; common fine distinct dark yellowish brown (10YR 3/4) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine and very fine roots; many medium and common coarse tubular pores and many fine tubular and vesicular pores; few fine and medium distinct gray (2.5Y 5/1) organic films; common fine and medium prominent gray (N 5/0) manganese concretions; 5 percent gravel; slightly alkaline; clear wavy boundary.

Bg3—23 to 30 inches; yellowish brown (10YR 5/8) and gray (5Y 6/1) silty clay loam; many fine and medium distinct light yellowish brown (2.5Y 6/4) mottles; coarse prismatic structure parting to weak fine subangular blocky; firm; many fine and common medium roots in cracks; many fine tubular pores; common fine and medium prominent gray (N 5/0) iron and manganese concretions; few fine and medium distinct dark brown (10YR 3/3) organic films lining pores and on faces of peds; 5 percent gravel; neutral; clear wavy boundary.

C1—30 to 43 inches; grayish brown (2.5Y 5/2) and brownish yellow (10YR 6/8) loam; common fine and medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; friable; common very fine and fine roots in cracks; many medium gray (N 5/0) iron depletions and common fine and medium light olive brown (2.5Y 5/6) soft iron masses; 10 percent gravel; neutral; clear wavy boundary.

C2—43 to 70 inches; brownish yellow (10YR 6/8) and grayish brown (2.5Y 5/2) gravelly loam; common fine and medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; very friable; common fine gray (N 5/0) soft manganese concretions; 25 percent rock fragments; neutral.

The thickness of the solum ranges from 25 to 40 inches. Depth to bedrock is more than 60 inches. Reaction ranges from moderately acid to slightly alkaline.

The A horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 to 4. Texture is silt loam, loam, or silty clay loam.

The Bg horizon has hue of 10YR to 5Y or is neutral in hue, has value of 4 to 7, and has chroma of 2 or less. Texture is silt loam or silty clay loam.

The C horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 8. Texture is silt loam, loam, or silty clay loam. Layers of stratified sand and gravel are common below a depth of 40 inches.

MaA—Melvin-Lindside silt loams, 0 to 3 percent slopes

Setting

Landscape: River valleys
Note: Ponding may occur for periods of long duration.

Component Description

Melvin and similar soils

Composition of map unit: 55 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Loamy alluvium derived from limestone, sandstone, and shale
Flooding: Frequent
Available water capacity: Average of 12.4 inches

Lindside and similar soils

Composition of map unit: 35 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium derived from sandstone and shale or from limestone
Flooding: Frequent
Available water capacity: Average of 11.7 inches

Additional Components

Combs and similar soils

Composition of map unit: 10 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Montalto Series

The Montalto series consists of very deep, well drained soils. Permeability is moderate. These soils formed in residuum from basic igneous rocks. They are on narrow ridges west of the Mononacy River in Frederick County. Slopes range from 3 to 25 percent.

Montalto soils are similar to Legore soils and are commonly adjacent to Abbottstown, Croton, Klinesville, Lehigh, Penn, Reaville, Readington, and Watchung soils. All of the associated soils, except for Watchung soils, have less than 35 percent clay in the particle-size control section. Abbottstown, Croton, Klinesville, Penn, Reaville, and Readington soils formed from Triassic shale. Klinesville and Penn soils are well drained. Abbottstown, Croton, Reaville, and Readington soils are moderately well drained, somewhat poorly drained, or poorly drained. Legore soils are in landform positions similar to those of the Montalto soils. Lehigh soils are moderately well drained, and Watchung soils are poorly drained.

Typical pedon of Montalto gravelly silt loam in an area of Legore-Montalto gravelly silt loams, 3 to 8 percent slopes, bouldery; approximately 2,200 feet north of the intersection of Tract Road and Waynesboro Road, 300 feet west of Tract Road, near Emmitsburg; lat. 77 degrees 20 minutes 28 seconds N. and long. 39 degrees 43 minutes 05 seconds W.

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

Ap—1 to 4 inches; dark brown (7.5YR 3/2) gravelly silt loam; strong medium subangular blocky structure parting to strong fine subangular blocky; friable; many medium roots throughout; many fine tubular pores; 15 percent gravel; strongly acid; abrupt smooth boundary.

BE—4 to 8 inches; yellowish red (5YR 4/6) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine and medium vesicular and tubular pores; few faint discontinuous reddish brown (5YR 4/4) clay films on faces of peds; 2 percent gravel, 5 percent cobbles, and 5 percent stones; strongly acid; clear wavy boundary.

Bt1—8 to 14 inches; red (2.5YR 4/8) silty clay loam; moderate medium subangular blocky structure parting to moderate fine platy; friable; many fine and medium and common coarse roots; many medium and common coarse tubular pores; few black (N 2.5/0) manganese stains and few red (2.5YR 4/6) clay films on faces of peds and in pores; 2 percent gravel; moderately acid; clear wavy boundary.

Bt2—14 to 32 inches; red (2.5YR 4/8) silty clay; moderate coarse prismatic structure parting to moderate medium subangular blocky; friable; common fine roots throughout; many medium tubular pores; few prominent discontinuous black (N 2.5/0) manganese or iron and manganese stains on faces of peds; moderately acid; gradual wavy boundary.

Bt3—32 to 43 inches; red (2.5YR 4/6) silty clay loam; many medium and coarse yellowish red (5YR 5/6) mottles throughout; moderate thin platy structure; friable; many fine and medium roots throughout; few faint discontinuous black (N 2/0) manganese

stains on faces of peds; 5 percent gravel; moderately acid; gradual wavy boundary.

BC—43 to 85 inches; red (2.5YR 4/8) silty clay loam; weak thin platy structure; friable; many fine and common medium roots throughout; few prominent discontinuous black (N 2/0) manganese stains on faces of peds; moderately acid.

The thickness of the solum ranges from 40 to 60 inches. Depth to bedrock ranges from 5 to 12 feet. Rock fragments, ranging from pebbles to boulders, occur in any or all parts of many pedons but do not exceed 30 percent, by volume. Some pedons have stones on as much as 15 percent of the surface. Reaction ranges from very strongly acid to slightly acid, and acidity decreases as depth decreases.

The A horizon has hue of 5YR to 7.5YR, value of 3 or 4, and chroma of 2 to 4. Texture is loam, silt loam, or silty clay loam.

The B horizon has hue of 10R to 5YR, value of 3 or 4, and chroma of 4 to 8. The BE horizon ranges from silt loam to silty clay loam in the fine-earth fraction. The Bt and BC horizons are dominantly clay or silty clay, but subhorizons may be silty clay loam or clay loam having a high silt content and a low sand content.

The C horizon has a variegated matrix in many pedons. Texture ranges from silt loam to clay loam and silty clay loam.

Morven Series

The Morven series consists of very deep, well drained soils. Permeability is moderate. These soils formed in colluvium from calcareous conglomerate in the Triassic Basin. They are in nearly level and gently sloping upland swales, in saddles, at the head of drainageways, and on footslopes and are primarily located in the south-central and southwestern parts of Frederick County. Slopes range from 0 to 8 percent.

Morven soils are similar to Springwood soils and are commonly adjacent to Athol, Penn, Reaville, Klinesville, Croton, Abbottstown, Trego, and Foxville soils. Penn and Reaville soils have bedrock at a depth of 20 to 40 inches. Klinesville soils have bedrock within a depth of 20 inches and have more than 35 percent rock fragments in the particle-size control section. Croton and Abbottstown soils contain a fragipan. Croton soils are poorly drained, and Abbottstown soils are somewhat poorly drained. Trego and Foxville soils formed from a mix of colluvial and alluvial metamorphic and igneous rocks. Athol soils are on summits and backslopes and have a clay content that decreases as depth decreases. Springwood soils are on convex uplands and average more than 35 percent clay throughout.

Typical pedon of Morven loam, 0 to 3 percent slopes; 1,000 feet west of Ballenger Creek Pike and ½ mile northeast of the Potomac Electric substation, in a cultivated field; lat. 09 degrees 18 minutes 06 seconds N. and long. 77 degrees 30 minutes 26 seconds W.

Ap—0 to 13 inches; brown (7.5YR 4/4) loam; weak coarse subangular blocky structure; firm; common fine and medium roots; common coarse and medium tubular pores and common fine vesicular pores; 10 percent quartz gravel; slightly acid; abrupt smooth boundary.

Bt1—13 to 26 inches; red (2.5YR 4/6) clay loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; common fine and medium tubular pores; common medium black (N 2.5/0) iron and manganese stains on faces of peds; common medium olive brown (2.5YR 4/3) clay films on faces of peds; 5 percent quartz gravel; slightly acid; clear wavy boundary.

Bt2—26 to 36 inches; red (2.5YR 4/8) and dark yellowish brown (10YR 4/6) gravelly clay loam; moderate thin platy structure parting to moderate medium subangular blocky; friable; moderate medium and coarse black (N 2.5/0) manganese stains on faces of peds; 25 percent quartz; moderately acid; clear wavy boundary.

Bt3—36 to 62 inches; yellowish red (5YR 4/6 and 5/6) clay loam; olive yellow (2.5Y 6/6) lithochromic mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm; common very fine and fine roots; common medium prominent pink (7.5YR 7/4) iron concentrations on exteriors of peds; 5 percent quartz; moderately acid; gradual wavy boundary.

BC—62 to 100 inches; red (10R 4/6), light yellowish brown (2.5Y 6/4), and reddish yellow (5YR 6/8) silty clay; olive brown (2.5Y 4/3) lithochromic mottles; massive parting to weak fine subangular blocky structure; few roots in upper part of horizon; few fine tubular and vesicular pores; moderately acid.

The thickness of the solum ranges from 40 to 60 inches or more. Depth to hard bedrock is more than 60 inches. The content of rock fragments ranges from 5 to 25 percent in the solum and from 0 to 20 percent in the substratum. Reaction ranges from strongly acid to slightly acid.

The A or Ap horizon has hue of 5YR or 7.5YR and

value and chroma of 3 or 4. Texture is silt loam in the fine-earth fraction.

The Bt horizon has hue of 2.5YR to 5YR, value of 3 to 5, and chroma of 4 to 8. Texture is clay loam in the fine-earth fraction. In some pedons some subhorizons are clay.

The BC horizon has hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8. Texture is silty clay in the fine-earth fraction.

MbA—Morven loam, 0 to 3 percent slopes

Setting

Landscape: Valleys

Component Description

Morven and similar soils

Composition of map unit: 85 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy residuum from conglomerate
Flooding: None
Available water capacity: Average of 11.2 inches

Additional Components

Springwood and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Athol and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MbB—Morven loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Morven and similar soils

Composition of map unit: 85 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Loamy residuum from conglomerate
Flooding: None
Available water capacity: Average of 11.2 inches

Additional Components

Springwood and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Athol and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Mt. Airy Series

The Mt. Airy series consists of moderately deep, well drained soils. Permeability is moderate or moderately rapid. These soils formed in residuum weathered from micaceous phyllite and schist. They are on nearly level to steep, well dissected uplands. Slopes range from 0 to 65 percent.

Mt. Airy soils are similar to Brinklow soils and are commonly adjacent to Baile, Blocktown, Glenelg, and Glenville soils. Blocktown and Brinklow soils have an argillic horizon. Blocktown soils have bedrock within a depth of 20 inches. Brinklow soils have bedrock within a depth of 40 inches. Baile soils are in concave upland depressions and are poorly drained. Glenville soils are moderately well drained and have a fragipan. Glenelg soils average less than 35 percent rock fragments throughout and are very deep.

Typical pedon of Mt. Airy channery loam, 3 to 8 percent slopes; approximately 1/4 mile north of Roddy,

500 feet east of Route 15, in an orchard; lat. 39 degrees 38 minutes 48 seconds N. and long. 77 degrees 23 minutes 29 seconds W.

Ap—0 to 7 inches; brown (7.5YR 4/3) channery loam; moderate fine granular structure; friable; many fine roots throughout; 35 percent angular schist channers; slightly acid; abrupt wavy boundary.

Bw—7 to 12 inches; strong brown (7.5YR 4/6) very channery silt loam; moderate fine and medium subangular blocky structure; friable; many fine roots; many fine tubular pores and many fine vesicular pores; few fine faint patchy strong brown (7.5YR 5/6) silt films on faces of peds and in pores; 50 percent angular schist channers; slightly acid; clear irregular boundary.

CB—12 to 22 inches; strong brown (7.5YR 4/6) very channery silt loam; weak thick platy structure parting to moderate medium subangular blocky; friable; many fine roots in cracks; many medium and coarse vesicular pores; few fine faint strong brown (7.5YR 5/6) clay films on faces of peds and in pores; 65 percent angular schist channers; strongly acid; clear irregular boundary.

R—22 inches; brown (7.5YR 4/4) and olive yellow (2.5Y 6/6) strongly cemented, highly fractured schist; fine-earth fraction of silt loam filling in fractures; common fine roots in fractures.

The thickness of the solum ranges from 15 to 36 inches and averages about 26 inches. Depth to bedrock ranges from 20 to 40 inches, but most pedons have bedrock at a depth of 36 inches or less. The content of rock fragments ranges from 15 to 60 percent, by volume, in the A horizon, 45 to 75 percent in the B horizon, and 50 to 70 percent in the C horizon. Some pedons have more than 80 percent rock fragments in the C horizon. Reaction ranges from strongly acid to extremely acid throughout the profile except in limed areas.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 1 to 4. Texture is channery silt loam or channery loam or the very channery analogs of these textures.

The B horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. It is channery silt loam, channery loam, channery clay loam, or the very channery or extremely channery analogs of these textures.

The C and CB horizons have hue of 5YR to 10YR, value of 5 to 7, and chroma of 4 to 6. Texture ranges from loam to clay loam in the fine-earth fraction. It ranges from channery to extremely channery.

MeB—Mt. Airy channery loam, 3 to 8 percent slopes

Setting

Landscape: Uplands
Note: In some areas the soil has evidence of weak clay films.

Component Description

Mt. Airy and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from low-base phyllite or low-base schist
Flooding: None
Available water capacity: Average of 2.3 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenelg and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MeC—Mt. Airy channery loam, 8 to 15 percent slopes

Setting

Landscape: Uplands
Note: In some areas the soil has evidence of weak clay films.

Component Description

Mt. Airy and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from low-base phyllite or low-base schist
Flooding: None
Available water capacity: Average of 2.3 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenelg and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MeD—Mt. Airy channery loam, 15 to 25 percent slopes

Setting

Landscape: Uplands
Note: In some areas the soil has evidence of weak clay films. In some areas the soil has very channery surface layers.

Component Description

Mt. Airy and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from low-base phyllite or low-base schist
Flooding: None
Available water capacity: Average of 2.3 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenelg and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MeF—Mt. Airy channery loam, 25 to 65 percent slopes

Setting

Landscape: Uplands
Note: In some areas the soil has very channery surface layers.

Component Description

Mt. Airy and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from low-base phyllite or low-base schist
Flooding: None
Available water capacity: Average of 2.3 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Blocktown and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Mt. Zion Series

The Mt. Zion series consists of very deep, moderately well drained soils. Permeability is moderately slow. These soils formed in residuum or soil creep from greenstone rocks. They are on nearly level to strongly sloping mountain backslopes and footslopes. Slopes range from 0 to 15 percent.

Mt. Zion soils are similar to Ravenrock soils and are commonly adjacent to Catoctin, Highfield, Lantz, Myersville, and Rohrersville soils. Catoctin soils are well drained and moderately deep to bedrock. Ravenrock soils are in the higher landform positions and have more rock fragments throughout than the Mt. Zion soils. Myersville soils are well drained and moderately permeable. Rohrersville and Lantz soils are on the lower, concave broad flats and in drainageways. Rohrersville soils are somewhat poorly drained, and Lantz soils are very poorly drained. Highfield soils are well drained and formed from metarhyolite and meta-andesite.

Typical pedon of Mt. Zion gravelly silt loam, 3 to 8 percent slopes; approximately 3,700 feet east of the intersection of Mt. Zion Church Road and Catoctin Park Trail across from Mt. Zion Church, 30 feet southeast of a trail, in a forested area; lat. 39 degrees 40 minutes 29 seconds N. and long. 77 degrees 29 minutes 09 seconds W.

Oi—0 to 0.5 inch; partially decomposed leaf and twig matter.

Ap1—0.5 inch to 2 inches; very dark grayish brown (10YR 3/2) gravelly silt loam; weak thin platy structure parting to moderate fine granular; very friable; many fine, common medium, and few coarse roots; 15 percent quartz and greenstone gravel; moderately acid; abrupt smooth boundary.

Ap2—2 to 6 inches; dark brown (10YR 3/3) gravelly silt loam; moderate medium subangular blocky structure parting to moderate fine granular; very friable; many fine and common medium and coarse roots; 15 percent quartz and greenstone gravel; strongly acid; abrupt smooth boundary.

BE—6 to 12 inches; dark yellowish brown (10YR 4/4) gravelly silt loam; weak medium subangular blocky structure; friable; many fine and common medium roots; common fine and few medium vesicular and tubular pores; few fine faint dark brown (10YR 3/3) organic films in root channels and pores; 15 percent gravel; strongly acid; clear wavy boundary.

Bt1—12 to 19 inches; dark yellowish brown (10YR 4/6) loam; moderate medium subangular blocky structure; friable; common fine and medium roots; many fine vesicular and tubular pores and few medium tubular pores; common medium faint yellowish brown (10YR 5/6) silt coatings on faces of peds; 10 percent gravel and 3 percent cobbles; strongly acid; clear wavy boundary.

Bt2—19 to 31 inches; yellowish red (5YR 5/6) gravelly loam; common fine and medium prominent reddish brown (2.5YR 5/4) mottles; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; common fine roots in cracks between peds; common fine vesicular and tubular pores and common medium vesicular pores; many fine distinct strong brown (7.5YR 4/6) silt coatings on faces of peds; 2 percent cobbles and 20 percent gravel; moderately acid; clear wavy boundary.

Bt3—31 to 48 inches; yellowish red (5YR 4/6) gravelly silt loam; weak coarse prismatic structure parting to weak thin platy; firm; common fine roots in cracks and along faces of peds; common medium vesicular and tubular pores; common fine distinct strong brown (7.5YR 4/6) silt coatings on faces of peds and lining pores; few medium prominent light yellowish brown (2.5Y 6/4) iron depletions; many fine and medium prominent black (5YR 2/1) manganese stains in pores and on faces of peds; 3 percent cobbles, 20 percent gravel, and 1 percent stones; slightly acid; clear wavy boundary.

BC—48 to 69 inches; strong brown (7.5YR 4/6) very gravelly loam; common fine and medium prominent light yellowish brown (2.5Y 6/4) lithochromic mottles; weak coarse subangular blocky structure; firm; few fine roots; many fine tubular and few fine vesicular pores; common medium light reddish brown (5YR 2.5/1) iron depletions; many fine and medium distinct black (5YR 2.5/1) manganese stains on faces of peds and in pores; 5 percent cobbles, 20 percent

channers, 5 percent gravel, and 10 percent flagstones; slightly acid; abrupt wavy boundary.
R—69 inches; indurated, slightly fractured greenstone.

The thickness of the solum ranges from 30 to 70 inches. Depth to bedrock is more than 5 feet. The content of rock fragments ranges from 0 to 20 percent in the surface layer and the upper part of the subsoil and from 15 to 45 percent in the lower part of the subsoil and in the substratum. The coverage of surface stones ranges from 0 to 10 percent. Reaction ranges from strongly acid to slightly acid.

The A horizon has hue of 10YR to 2.5Y, value of 2 to 5, and chroma of 1 to 4. Texture is silt loam or loam.

The BE horizon has hue of 7.5YR to 2.5Y and value and chroma of 4 to 6. Texture is loam or silt loam.

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

The BC horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, silt loam, clay loam, or silty clay loam.

The C horizon, if it occurs, has variegated hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. Texture is silt loam, loam, clay loam, or silty clay loam.

MmA—Mt. Zion gravelly silt loam, 0 to 3 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Mt. Zion and similar soils

Composition of map unit: 85 percent
Landform: Backslopes and footslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.5 to 4.0 feet
Parent material: Loamy colluvium derived from greenstone or loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 10.6 inches

Additional Components

Rohrersville and similar soils

Composition of map unit: 10 percent
Landform: Swales, depressions, and drainageways

Lantz and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MmB—Mt. Zion gravelly silt loam, 3 to 8 percent slopes

Setting

Landscape: Valleys and mountains
Note: In some areas the soil is more olive in color.

Component Description

Mt. Zion and similar soils

Composition of map unit: 85 percent
Landform: Backslopes and footslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.5 to 4.0 feet
Parent material: Loamy colluvium derived from greenstone or loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 10.6 inches

Additional Components

Rohrersville and similar soils

Composition of map unit: 10 percent
Landform: Swales, depressions, and drainageways

Myersville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MmC—Mt. Zion gravelly silt loam, 8 to 15 percent slopes

Setting

Landscape: Valleys and mountains
Note: In some areas slopes are steeper than 15 percent.

Component Description

Mt. Zion and similar soils

Composition of map unit: 85 percent
Landform: Backslopes and footslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.5 to 4.0 feet
Parent material: Loamy residuum weathered from greenstone or loamy colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 10.6 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Rohrersville and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MnA—Mt. Zion-Rohrersville complex, 0 to 3 percent slopes

Setting

Landscape: Valleys and mountains
Note: In some areas the soils do not have fragic properties.

Component Description

Mt. Zion and similar soils

Composition of map unit: 50 percent
Landform: Backslopes and footslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.5 to 4.0 feet
Parent material: Loamy residuum weathered from greenstone or loamy colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 10.6 inches

Rohrersville and similar soils

Composition of map unit: 45 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 24 to 36 inches to fragic properties
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy alluvium derived from greenstone or loamy colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 9.4 inches

Additional Components

Myersville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MnB—Mt. Zion-Rohrersville complex, 3 to 8 percent slopes

Setting

Landscape: Valleys and mountains
Note: In some areas the soils do not have fragic properties.

Component Description

Mt. Zion and similar soils

Composition of map unit: 50 percent
Landform: Backslopes and footslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.5 to 4.0 feet
Parent material: Loamy residuum weathered from greenstone or loamy colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 10.6 inches

Rohrersville and similar soils

Composition of map unit: 35 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 24 to 36 inches to fragic properties
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy alluvium derived from greenstone or loamy colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 9.4 inches

Additional Components

Myersville and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MoB—Mt. Zion-Codorus complex, 0 to 8 percent slopes

Setting

Landscape: River valleys
Note: This map unit can be highly variable and is generally mapped along the higher gradient streams.

Component Description

Mt. Zion and similar soils

Composition of map unit: 60 percent
Landform: Backslopes and footslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.5 to 4.0 feet
Parent material: Loamy colluvium derived from greenstone or loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 10.6 inches

Codorus and similar soils

Composition of map unit: 40 percent
Landform: Flood plains
Surface layer texture: Gravelly sandy loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.0 to 2.0 feet
Parent material: Loamy colluvium derived from greenstone, quartzite, phyllite, schist, or diabase
Flooding: Occasional
Available water capacity: Average of 7.1 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Murrill Series

The Murrill series consists of very deep, well drained soils. Permeability is moderate. These soils formed in colluvial acid sandstones and quartzite and

overlying residuum limestone. They are on colluvial fans and footslopes that border the Catoctin Mountains in the northwestern and central parts of Frederick County. Slopes range from 3 to 25 percent.

Murrill soils are similar to Braddock soils and are commonly adjacent to Funkstown, Thurmont, Trego, Norton, Braddock, Adamstown, Penn, Reaville, and Readington soils. Braddock soils are redder than the Murrill soils and have a clayey solum. Thurmont and Trego soils are slowly permeable and have a seasonal high water table. Adamstown and Funkstown soils are in concave upland drainageways and on upland flats and are moderately well drained. Norton soils are weathered from colluvium overlying red shales. Penn, Reaville, and Readington soils are derived from red shales.

Typical pedon of Murrill gravelly loam, 3 to 8 percent slopes; 2,000 feet south of Interstate 70, west of Route 85 and east of New Design Road, on a convex side slope in a grassy area; lat. 37 degrees 23 minutes 40 seconds N. and long. 77 degrees 24 minutes 41 seconds W.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky and moderate medium subangular blocky structure; friable; common very fine and fine tubular pores and common fine vesicular pores; 15 percent sandstone fragments; moderately acid; abrupt smooth boundary.

Bt1—9 to 22 inches; yellowish red (5YR 5/6) silty clay loam; weak medium prismatic and moderate medium subangular blocky structure; firm; common very fine and fine roots; common fine and common coarse tubular pores; 10 percent sandstone fragments; moderately acid; clear wavy boundary.

Bt2—22 to 29 inches; yellowish red (5YR 5/6) silty clay loam; weak coarse prismatic structure; firm; common fine roots; common very fine and fine and common coarse tubular pores; 13 percent sandstone fragments; moderately acid; clear wavy boundary.

Bt3—29 to 40 inches; yellowish red (5YR 4/6) gravelly clay loam; moderate coarse prismatic structure; firm; common very fine and fine roots between peds; common fine and common coarse tubular pores and common very fine vesicular pores; 25 percent sandstone fragments; moderately acid; gradual wavy boundary.

CB—40 to 66 inches; yellowish red (5YR 5/6) very gravelly clay; weak medium subangular blocky structure; firm; common fine and common medium tubular pores; 35 percent sandstone fragments; moderately acid; gradual wavy boundary.

2C—66 inches; yellowish red (5YR 5/6) channery silt loam; massive parting to weak medium platy structure inherited from the bedrock; firm; common coarse, common fine, and common medium tubular pores; 30 percent sandstone fragments; strongly acid.

The thickness of the solum ranges from 60 to 80 inches. Depth to limestone bedrock is more than 6 feet. The content of rock fragments ranges from 5 to 30 percent in the solum and from 0 to 40 percent in the substratum. Reaction is moderately acid or strongly acid except in limed areas.

The Ap horizon has hue of 10YR and value and chroma of 3 or 4. Texture is silt loam or loam in the fine-earth fraction.

The Bt horizon has hue of 5YR to 10YR and value and chroma of 4 to 6. Texture is silty clay loam, clay loam, or clay in the fine-earth fraction.

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

The 2C horizon has hue of 2.5YR to 10YR and value and chroma of 4 to 8. Texture is loam, silt loam, clay loam, or silty clay loam.

MrB—Murrill gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Karst land

Note: In some areas, slopes are steeper than 8 percent and/or the soil has cobbly surface layers. Depressions which pond water and active or inactive sinkholes are common. In some areas wetness occurs above a depth of 60 inches.

Component Description

Murrill and similar soils

Composition of map unit: 85 percent
Landform: Undulating old colluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 4 feet
Parent material: Loamy colluvium over limestone
Flooding: None
Available water capacity: Average of 7.3 inches

Additional Components

Dryrun and similar soils

Composition of map unit: 10 percent
Landform: Undulating old colluvial fans

Duffield and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MtB—Murrill-Dryrun-Urban land complex, 0 to 8 percent slopes

Setting

Landscape: Karst land
Note: In some areas, slopes are steeper than 8 percent and/or the soil has cobbly surface layers. Depressions which pond water and active or inactive sinkholes are common.

Component Description

Murrill and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 4 feet
Parent material: Loamy colluvium over limestone
Flooding: None
Available water capacity: Average of 7.3 inches

Dryrun and similar soils

Composition of map unit: 35 percent
Landform: Undulating old colluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.5 feet
Parent material: Gravelly old alluvium derived from limestone, sandstone, and shale
Flooding: None
Available water capacity: Average of 8.0 inches

Urban land

Composition of map unit: 20 percent
Landform: None assigned

Urban land consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Myersville Series

The Myersville series consists of very deep, well drained soils. Permeability is moderate. These soils formed in material weathered from greenstone. They are on nearly level to very steep uplands. Slopes range from 0 to 25 percent.

Myersville soils are similar to Highfield soils and are commonly adjacent to Catoctin, Lantz, Mt. Zion, Ravenrock, and Rohrersville soils. Highfield soils average less than 18 percent clay and contain more rock fragments of metarhyolite and meta-andesite than the Myersville soils. Catoctin soils are moderately deep to bedrock and have more rock fragments throughout the solum. Lantz soils are poorly drained and are in the lower landform positions. Mt. Zion soils are very deep, moderately well drained, and slowly permeable. Rohrersville soils are in upland swales and along intermittent drainageways, have weak fragic properties in some pedons, and have a seasonal high water table within a depth of 20 inches. Ravenrock soils formed from metabasalt and metarhyolite colluvium and have a seasonal high water table at a depth of 40 to 72 inches.

Typical pedon of Myersville silt loam, 3 to 8 percent slopes; Washington County, Maryland; approximately 2,300 feet southeast of Kaetzell Road and an old railroad grade, 2,500 feet west of the intersection of State Route 67 and Main Street in the town of Gapland; lat. 39 degrees 23 minutes 46 seconds N. and long. 77 degrees 39 minutes 59 seconds W.

Ap1—0 to 6 inches; brown (7.5YR 4/3) silt loam; weak fine granular structure; friable; many fine roots;

common medium tubular pores; 10 percent gravel; slightly acid; clear smooth boundary.

Ap2—6 to 12 inches; brown (7.5YR 4/3) loam; moderate fine granular structure; friable; many fine and common medium roots; common coarse and medium and many fine tubular pores and common coarse vesicular pores; 5 percent gravel; neutral; abrupt smooth boundary.

Bt1—12 to 20 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; friable; common fine roots; many fine, common medium, and few coarse tubular pores and common fine and few medium vesicular pores; common distinct discontinuous clay skins on faces of peds and in pores; common medium distinct very dark gray (5YR 3/1) manganese stains in lower part of horizon; 10 percent gravel; slightly acid; clear wavy boundary.

Bt2—20 to 35 inches; strong brown (7.5YR 5/6) loam; few common distinct reddish yellow (7.5YR 6/8) and common coarse prominent yellowish red (5YR 5/8) mottles; moderate fine platy structure parting to weak coarse subangular blocky; friable; common fine roots; common fine tubular and vesicular pores and few medium tubular pores; many prominent discontinuous clay films on faces of peds and in pores; common coarse prominent very dark gray (5YR 3/1) manganese stains; 5 percent gravel; strongly acid; clear wavy boundary.

Bt3—35 to 50 inches; yellowish red (5YR 5/6) clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine and common medium tubular pores; common coarse distinct yellowish red (5YR 4/6) clay films on faces of peds; common medium distinct very dark gray (5YR 3/1) manganese stains on faces of peds; 5 percent gravel; moderately acid; clear wavy boundary.

B/C—50 to 61 inches; brown (7.5YR 4/4) clay loam in the B part and light olive brown (2.5Y 5/4) loam in the C part; moderate coarse subangular blocky structure parting to weak thin platy inherited from the bedrock; friable; few fine roots; common fine and medium tubular pores and few fine vesicular pores; few distinct discontinuous clay skins on faces of peds; common coarse prominent very dark gray (5YR 3/1) manganese stains; 9 percent weathered greenstone coarse fragments; strongly acid; clear irregular boundary.

C—61 to 71 inches; strong brown (7.5YR 4/6) loam; common coarse light olive brown (2.5Y 5/4) mottles; weak coarse platy structure inherited from the bedrock; friable; few fine roots; few fine tubular pores; few distinct discontinuous clay skins; few medium very dark gray (5YR 3/1) manganese stains; 5 percent greenstone coarse fragments; strongly acid; clear irregular boundary.

R1—71 to 80 inches; strongly cemented, highly fractured greenstone; fine-earth fraction of loam filling in fractures.

R2—80 inches; indurated, massive greenstone.

The thickness of the solum ranges from 30 to 60 inches. Depth to paralithic contact ranges from 50 to 80 inches. Depth to lithic contact is more than 60 inches. The content of gravel ranges from 0 to 25 percent in the surface layer and subsoil and from 5 to 30 percent in the substratum. Reaction ranges from slightly acid to strongly acid.

The A horizon has hue of 10YR to 7.5YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam or loam.

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

The C and B/C horizons have variegated colors with hue of 5YR to 5Y, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam, loam, or clay loam.

MuB—Myersville gravelly silt loam, 3 to 8 percent slopes

Setting

Landscape: Valleys and mountains

Note: In some areas the soil averages more than 35 percent clay.

Component Description

Myersville and similar soils

Composition of map unit: 85 percent

Landform: Summits and backslopes

Surface layer texture: Gravelly silt loam

Depth to restrictive feature: More than 6 feet to lithic bedrock

Drainage class: Well drained

Depth to seasonal high water table: More than 6 feet

Parent material: Gravelly residuum weathered from greenstone

Flooding: None

Available water capacity: Average of 8.2 inches

Additional Components

Mt. Zion and similar soils

Composition of map unit: 5 percent

Landform: Backslopes and footslopes

Rohrersville and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

Spoolsville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MuC—Myersville gravelly silt loam, 8 to 15 percent slopes

Setting

Landscape: Valleys and mountains
Note: In some areas the soil averages more than 35 percent clay.

Component Description

Myersville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 7.6 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition of map unit: 5 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MvA—Myersville silt loam, 0 to 3 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Myersville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 8.7 inches

Additional Components

Mt. Zion and similar soils

Composition of map unit: 10 percent
Landform: Backslopes and footslopes

Rohrersville and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MvB—Myersville silt loam, 3 to 8 percent slopes

Setting

Landscape: Valleys and mountains
Note: In some areas the soil averages more than 35 percent clay.

Component Description

Myersville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 8.7 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition of map unit: 5 percent
Landform: Backslopes and footslopes

Rohrersville and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MvC—Myersville silt loam, 8 to 15 percent slopes

Setting

Landscape: Valleys and mountains
Note: In some areas the soil averages more than 35 percent clay.

Component Description

Myersville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 8.7 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Catoctin and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MxA—Myersville-Burkittsville complex, 0 to 3 percent slopes

Setting

Landscape: Valleys

Component Description

Myersville and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained

Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 8.7 inches

Burkittsville and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum derived from granitic gneiss
Flooding: None
Available water capacity: Average of 8.6 inches

Additional Components

Mt. Zion and similar soils

Composition of map unit: 10 percent
Landform: Backslopes and footslopes

Rohrersville and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MxB—Myersville-Burkittsville complex, 3 to 8 percent slopes

Setting

Landscape: Valleys (see figure 9 on page 42)

Component Description

Myersville and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 8.7 inches

Burkittsville and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum from granitic gneiss
Flooding: None
Available water capacity: Average of 8.6 inches

Additional Components

Spoolsville and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MyB—Myersville-Catoctin-Urban land complex, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: This map unit is highly variable and can have both cut and fill material to a depth of 8 feet or more. Bedrock can occur at a depth of less than 20 inches.

Component Description

Myersville and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam

Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 8.2 inches

Catoctin and similar soils

Composition of map unit: 30 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum from greenstone
Flooding: None
Available water capacity: Average of 3.4 inches

Urban land

Composition of map unit: 10 percent
Landform: None assigned

Urban land consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Additional Components

Spoolsville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition of map unit: 5 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

MyC—Myersville-Catoctin-Urban land complex, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: This map unit is highly variable and can have both cut and fill material to a depth of 8 feet or more. Bedrock can occur at a depth of less than 20 inches.

Component Description

Myersville and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 8.2 inches

Catoctin and similar soils

Composition of map unit: 30 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 3.4 inches

Urban land

Composition of map unit: 10 percent
Landform: None assigned

Urban land consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Additional Components

Spoolsville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition of map unit: 5 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Norton Series

The Norton series consists of very deep, well drained soils. Permeability is slow. These soils formed in a mixture of quartzite colluvium over Triassic residuum. They are on nearly level to strongly sloping uplands. Slopes range from 0 to 15 percent.

Norton soils are similar to Montalto soils and are commonly adjacent to Abbottstown, Croton, Klinesville, Penn, Readington, Reaville, Thurmont, and Trego soils. Montalto soils formed from diabase or basalt. Abbottstown, Croton, Readington, and Trego soils have fragipans. Klinesville soils have bedrock within a depth of 20 inches, and Penn soils have bedrock within a depth of 40 inches. Reaville soils are moderately well drained. Thurmont soils have deeper colluvial materials than the Norton soils and are more acid throughout.

Typical pedon of Norton gravelly silt loam, 3 to 8 percent slopes; approximately 200 feet northwest of Hessong Bridge Road, 800 feet south of the intersection of Hessong Bridge Road and Jimtown Road, in an idle field; lat. 39 degrees 39 minutes 53 seconds N. and long. 77 degrees 20 minutes 31 seconds W.

Ap—0 to 9 inches; reddish brown (5YR 4/3) gravelly silt loam; moderate fine and medium subangular blocky structure; friable; many very fine and fine roots; 15 percent quartzite gravel; moderately acid; abrupt smooth boundary.

Bt1—9 to 19 inches; red (2.5YR 4/6) clay; moderate coarse prismatic structure parting to strong medium subangular blocky; firm; many very fine and fine roots; common very fine and fine, common medium, and common coarse tubular pores; 14 percent quartzite gravel; moderately acid; clear wavy boundary.

Bt2—19 to 29 inches; red (2.5YR 4/6) clay; moderate coarse prismatic structure parting to strong fine and medium angular blocky; firm; common fine roots between peds; common fine, common coarse, and common medium tubular pores; 10 percent quartzite gravel; moderately acid; gradual wavy boundary.

Bt3—29 to 38 inches; red (2.5YR 4/6) clay; moderate coarse and very coarse prismatic structure parting to strong coarse angular blocky; very friable; common very fine and fine roots between peds; common very fine and fine and common medium tubular pores; 5 percent quartzite gravel; moderately acid; clear wavy boundary.

2Bt4—38 to 51 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable; 2 percent quartzite gravel; moderately acid; clear wavy boundary.

2Bt5—51 to 64 inches; reddish brown (2.5YR 4/4) silty clay loam; weak medium platy structure parting to moderate fine and medium subangular blocky; friable; slightly acid; gradual wavy boundary.

2Bt6—64 to 86 inches; reddish brown (2.5YR 4/4) silty clay loam; friable; few distinct patchy manganese or iron and manganese stains on faces of peds; common fine and medium prominent light brown (7.5YR 6/4) iron depletions between peds; slightly acid.

The thickness of the solum ranges from 40 to 80 inches or more. Depth to bedrock is more than 60 inches. Coarse fragments are dominantly pebbles or cobbles of quartz, quartzite, or schist. The content of rock fragments ranges from 5 to 20 percent in the A and B horizons and from 0 to 40 percent in the C horizon. Depth to underlying Triassic residuum ranges from 45 to 90 inches. Reaction ranges from very strongly acid to moderately acid except in unlimed areas.

The Ap horizon has hue of 2.5YR to 5YR, value of 3 or 4, and chroma of 2 to 4. Texture is loam or silt loam in the fine-earth fraction.

The Bt horizon has hue of 10R to 2.5YR, value of 3 or 4, and chroma of 3 to 6. Texture is dominantly clay in the fine-earth fraction but ranges from silty clay loam to clay loam.

The C horizon, if it occurs, has hue of 2.5YR to 5YR, value of 3 or 4, and chroma of 4 to 6. Texture ranges from loam to sandy loam.

NoA—Norton gravelly silt loam, 0 to 3 percent slopes

Setting

Landscape: Valleys

Component Description

Norton and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 4 feet
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 6.7 inches

Additional Components

Reaville and similar soils

Composition of map unit: 10 percent
Landform: Saddles and swales

Penn and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

NoB—Norton gravelly silt loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil has a cobbly surface layer.

Component Description

Norton and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 4 feet
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 6.7 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

NoC—Norton gravelly silt loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: In some areas slopes are steeper than 15 percent. In some areas the soil has a cobbly surface layer.

Component Description

Norton and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 4 feet
Parent material: Clayey colluvium derived from quartzite
Flooding: None
Available water capacity: Average of 6.7 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Klinesville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Occoquan Series

The Occoquan series consists of deep, well drained soils. Permeability is moderate to rapid. These soils formed in material weathered from gneiss and schist. They are on broad ridgetops and backslopes in the uplands. Slopes range from 3 to 15 percent.

Occoquan soils are similar to Gaila soils and are commonly adjacent to Brinklow, Blocktown, Glenelg, Glenville, and Mt. Airy soils. Brinklow, Blocktown, and Mt. Airy soils have bedrock at a depth of less than 40 inches. Gaila and Glenelg soils have bedrock at a depth of more than 60 inches. Glenelg soils have better soil development than the Occoquan soils. Glenville soils are in upland drainage swales and are moderately well drained.

Typical pedon of Occoquan loam, 3 to 8 percent slopes; Montgomery County, Maryland; 0.5 mile north of Redland, about 1,400 feet north of the intersection of Muncaster Mill Road and Shady Grove Road:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) loam; weak thick platy structure; friable; many fine roots; about 10 percent channers; slightly acid; abrupt wavy boundary.
Bt—8 to 15 inches; yellowish brown (10YR 5/6) loam; weak coarse subangular blocky structure; friable; few fine roots; common prominent clay films on faces of peds; about 10 percent channers; slightly acid; clear wavy boundary.
BC—15 to 24 inches; strong brown (7.5YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; about 5 percent channers; strongly acid; clear wavy boundary.
C—24 to 59 inches; brownish yellow (10YR 6/8) and strong brown (7.5YR 5/6) fine sandy loam; massive; very friable; about 10 percent channers; strongly acid; abrupt wavy boundary.
Cr—59 inches; moderately cemented weathered schist.

The thickness of the solum ranges from 12 to 24 inches. Depth to weathered bedrock ranges from 40 to 60 inches. Depth to hard bedrock is more than 60 inches. The content of rock fragments ranges from 1 to 15 percent throughout the profile. Mica flakes are common in the B and C horizons. Reaction ranges from extremely acid to strongly acid in unlimed areas.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2 to 4. Texture is sandy loam.

The B and BC horizons have hue of 10YR or 5YR, value of 5 or 6, and chroma of 4 to 8. Texture is loam, fine sandy loam, sandy loam, sandy clay loam, or clay loam.

The C horizon is multicolored in shades of red, yellow, brown, or white. Texture is loam, sandy loam, or loamy sand.

OcB—Occoquan loam, 3 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Occoquan and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from schist
Flooding: None
Available water capacity: Average of 5.6 inches

Additional Components

Glenelg and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenville and similar soils

Composition of map unit: 5 percent
Landform: Concave footslopes, toeslopes, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

OcC—Occoquan loam, 8 to 15 percent slopes

Setting

Landscape: Uplands

Component Description

Occoquan and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from schist
Flooding: None
Available water capacity: Average of 5.6 inches

Additional Components

Brinklow and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Glenelg and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Opequon Series

The Opequon series consists of shallow, well drained soils. Permeability is moderate to slow. These soils formed in residuum weathered from massive dolomitic and argillaceous limestone. They occur on nearly level to steep uplands. Slopes range from 3 to 8 percent.

Opequon soils are similar to Ryder soils and are commonly adjacent to Funkstown, Duffield, and Hagerstown soils. Duffield and Hagerstown soils are very deep to bedrock and have a moderately permeable solum. Funkstown soils are very deep to bedrock, are moderately well drained, and are in concave upland drainageways which flood.

Typical pedon of Opequon silty clay loam; Washington County, Maryland; in the Clear Springs area, 1,000 feet west of the intersection of Maryland Route 40 and St. Pauls Road, 900 feet south of Maryland Route 40, on a northwest-facing, convex slope in a crop field; lat. 39 degrees 39 minutes 23 seconds N. and long. 77 degrees 53 minutes 13 seconds W.

Ap1—0 to 4 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine granular structure; friable; many fine and few medium roots; common fine and few medium tubular pores and few fine vesicular pores; 5 percent gravel; neutral; clear smooth boundary.

Ap2—4 to 7 inches; dark yellowish brown (10YR 4/4) silty clay; strong fine and medium angular blocky structure; firm; common fine and few medium roots; common fine and medium tubular and vesicular pores; 5 percent gravel; neutral; abrupt smooth boundary.

Bt1—7 to 14 inches; strong brown (7.5YR 5/8) silty clay; strong very coarse prismatic structure parting to strong medium subangular blocky; firm; common fine and few medium roots; many fine and medium vesicular pores; common fine, few medium, and few coarse tubular pores; many prominent continuous clay skins on faces of peds and lining pores; common fine distinct black (5YR 2.5/1) iron and manganese stains; 5 percent channers; neutral; clear wavy boundary.

Bt2—14 to 18 inches; strong brown (7.5YR 5/6) clay; moderate very coarse prismatic structure parting

to moderate medium subangular blocky; firm; few fine roots; many fine and medium vesicular pores and few fine and medium tubular pores; many prominent continuous clay skins on faces of peds and lining pores; common fine distinct black (5YR 2.5/1) iron and manganese stains on faces of peds; neutral; abrupt irregular boundary.
R—18 inches; indurated, fractured limestone.

The thickness of the solum ranges from 12 to 19 inches. Depth to bedrock ranges from 12 to 20 inches. The content of rock fragments ranges from 0 to 25 percent throughout the profile. Reaction ranges from moderately acid to mildly alkaline.

The A horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. Texture is loam, silt loam, silty clay loam, or clay loam.

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

Penn Series

The Penn series consists of moderately deep, well drained soils. Permeability is moderate. These soils formed in residuum from noncalcareous red shale, siltstone, and fine-grained sandstone typically of Triassic age. They are on dissected uplands. Slopes range from 0 to 15 percent.

Penn soils are similar to Brecknock soils and are commonly adjacent to Montalto, Legore, Norton, Lehigh, Watchung, Readington, Reaville, and Croton soils. Brecknock, Montalto, Legore, Lehigh, and Watchung soils formed from basic igneous parent material, such as diabase. Norton soils have a higher clay content in the control section than the Penn soils. Readington soils are moderately well drained, Reaville soils are somewhat poorly drained, and Croton soils are poorly drained.

Typical pedon of Penn silt loam, 3 to 8 percent slopes; approximately 600 feet north of the intersection of Pleasant View Road and Route 28, about 99 feet west of Pleasant View Road; lat. 77 degrees 29 minutes 48 seconds N. and long. 39 degrees 16 minutes 28 seconds W.

Ap—0 to 6 inches; reddish brown (5YR 4/4) silt loam; moderate medium granular structure; friable; many fine and common medium roots; many fine tubular pores; 3 percent channers; slightly acid; clear wavy boundary.
Bt1—6 to 13 inches; yellowish red (5YR 4/6) silt loam; moderate medium subangular blocky structure; friable; many fine and common medium roots throughout; many fine tubular pores; 5 percent channers; slightly acid; clear wavy boundary.
Bt2—13 to 30 inches; red (2.5YR 4/6) silt loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; many fine tubular pores; 13 percent channers; moderately acid; clear wavy boundary.
R1—30 to 38 inches; strongly cemented, highly fractured bedrock; dark red (2.5YR 3/6) extremely channery silt loam in the fine-earth fraction; few fine roots; clear irregular boundary.
R2—38 inches; dark red (2.5YR 3/6) very strongly cemented, fractured bedrock.

The thickness of the solum ranges from 17 to 34 inches. Depth to bedrock ranges from 20 to 40 inches. The content of rock fragments, by volume, ranges from 2 to 30 percent in the A horizon, from 5 to 50 percent in the B horizon, and from 30 to 90 percent in the C horizon. The control section averages less than 35 percent rock fragments. Reaction ranges from extremely acid to slightly acid, and acidity decreases as depth decreases.

The Ap horizon has hue of 7.5YR to 10R, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam or loam.

The B horizon has hue of 10R to 5YR, value of 3 to 6, and chroma of 2 to 6. Texture is silt loam, loam, or silty clay loam.

The C horizon has hue of 10R to 5YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam, loam, or sandy loam.

PaB—Penn loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: Internal free water is commonly at the soil-rock interface. In some areas, bedrock is at greater depths and the soil has sandier textures that those described.

Component Description

Penn and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone

Flooding: None
Available water capacity: Average of 4.1 inches

Additional Components

Klinesville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PeB—Penn channery loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: Internal free water is commonly at the soil-rock interface.

Component Description

Penn and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 3.9 inches

Additional Components

Klinesville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PeC—Penn channery loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: Internal free water is commonly at the soil-rock interface.

Component Description

Penn and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 3.9 inches

Additional Components

Klinesville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon

depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PnB—Penn silt loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: Internal free water is commonly at the soil-rock interface. In some areas near Creagerstown, the soil is deeper than is described.

Component Description

Penn and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 4.1 inches

Additional Components

Klinesville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PnC—Penn silt loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: Internal free water is commonly at the soil-rock interface.

Component Description

Penn and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 4.1 inches

Additional Components

Klinesville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PqB—Penn-Reaville-Urban land complex, 0 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Penn and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 4.1 inches

Reaville and similar soils

Composition of map unit: 40 percent
Landform: Saddles and swales
Surface layer texture: Silt loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy residuum weathered from shale, siltstone, or fine-grained sandstone
Flooding: None
Available water capacity: Average of 3.6 inches

Urban land

Composition of map unit: 10 percent
Landform: None assigned

Urban land consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

Additional Components

Klinesville and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

Readington and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PrA—Penn-Reaville silt loams, 0 to 3 percent slopes

Setting

Landscape: Valleys
Note: Ponding can occur for periods of long duration. In some areas the soils are not as red as described and are more olive.

Component Description

Penn and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 4.1 inches

Reaville and similar soils

Composition of map unit: 40 percent
Landform: Saddles and swales
Surface layer texture: Silt loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 3.6 inches

Additional Components

Klinesville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Readington and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

Figure 10.—An area of Penn-Reaville silt loams, 3 to 8 percent slopes. These soils are difficult to manage because of a seasonal high water table and a relatively shallow depth to bedrock.

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

PrB—Penn-Reaville silt loams, 3 to 8 percent slopes

Setting

Landscape: Valleys (fig. 10)

Note: Ponding can occur for periods of long duration. In some areas the soils are not as red as described and are more olive.

Component Description

Penn and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 4.1 inches

Reaville and similar soils

Composition of map unit: 40 percent
Landform: Saddles and swales
Surface layer texture: Silt loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 3.6 inches

Additional Components

Klinesville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Ql—Quarry, limestone

Setting

Landscape: Karst land
Note: There is a very high potential for sinkhole development in and around the quarries.

Component Description

Areas of this map unit are highly disturbed, and many of the original soil characteristics have been altered. Alterations include removal of the original soil to large pits. The outer limits of a quarry may still have unaltered soil material.

Qm—Quarry, marble

Setting

Landscape: Karst land
Note: There is a moderate or high potential for sinkhole development in and around the quarries.

Component Description

Areas of this map unit are highly disturbed, and many of the original soil characteristics have been altered. Alterations include removal of the original soil to large pits. The outer limits of a quarry may still have unaltered soil material. Areas of this unit generally contain both marble and limestone.

Qp—Quarry, phyllite

Setting

Landscape: Karst land

Component Description

Areas of this map unit are highly disturbed, and many of the original soil characteristics have been altered. Alterations include removal of the original soil to large pits. The outer limits of a quarry may still have unaltered soil material.

Ravenrock Series

The Ravenrock series consists of very deep, well drained soils. Permeability is moderate. These soils formed in colluvium weathered from metabasalt and other basic rocks. They are on nearly level to steep mountain backslopes and benches. Slopes range from 0 to 65 percent.

Ravenrock soils are similar to Highfield soils and are commonly adjacent to Myersville, Catoctin, Foxville, Rohrersville, Mt. Zion, and Lantz soils. Highfield soils formed in residuum from metarhyolite and meta-andesite. Myersville and Catoctin soils formed in residuum from greenstone and average less than 35 percent rock fragments. Foxville soils formed from a mixture of alluvium and colluvium and are on high-gradient flood plains. Mt. Zion soils are moderately well drained and have slow permeability. Rohrersville and Lantz soils are on concave broad flats and in drainageways. Rohrersville soils are somewhat poorly drained, and Lantz soils are very poorly drained.

Typical pedon of Ravenrock gravelly loam, 15 to 25 percent slopes, extremely stony; on a moderately steep, convex mountain side slope, in an oak hickory forest, in Catoctin Mountain State Park, off of a service road to a water filtration plant, about 9,500 feet west-southwest of the main parking area, 800 feet northeast of the gate to camper registration; lat. 39 degrees 37 minutes 37 seconds N. and long. 77 degrees 28 minutes 00 seconds W.

A—0 to 4 inches; brown (7.5YR 5/6) gravelly loam; moderate very fine subangular blocky structure; friable; many medium roots; 15 percent gravel; slightly acid; clear wavy boundary.
BE—4 to 7 inches; strong brown (7.5YR 4/6) gravelly silt loam; moderate very fine subangular blocky structure; friable; common fine and medium roots; common very fine tubular pores; 20 percent gravel; moderately acid; gradual wavy boundary.
Bt1—7 to 16 inches; yellowish red (5YR 4/6) very gravelly silt loam; moderate very fine subangular blocky structure; friable; many medium and coarse roots; common very fine tubular pores; many distinct discontinuous clay skins on faces of peds and lining pores; 35 percent gravel; strongly acid; clear wavy boundary.
Bt2—16 to 34 inches; yellowish red (5YR 4/6) very gravelly clay loam; moderate medium subangular blocky structure; friable; common fine roots; common very fine tubular pores; many faint discontinuous clay films on faces of peds and lining pores; 35 percent gravel; strongly acid; abrupt wavy boundary.
2Bt3—34 to 43 inches; red (2.5YR 4/6) very gravelly clay loam; weak fine platy structure; firm; few fine roots; common very fine tubular pores; many distinct discontinuous clay films on faces of peds and lining pores; 25 percent gravel and 30 percent cobbles; moderately acid; abrupt wavy boundary.
2Bt4—43 to 57 inches; red (2.5YR 4/6) gravelly silty clay; moderate medium angular blocky structure; friable; many medium roots; few very fine vesicular pores; many distinct discontinuous clay films on faces of peds and lining pores; 15 percent gravel; strongly acid; abrupt irregular boundary.
2C—57 to 65 inches; red (2.5YR 4/6) gravelly clay loam; massive; firm; many fine roots; few very fine vesicular pores; common distinct yellowish red (5YR 5/6) iron accumulations; 25 percent gravel; strongly acid; abrupt irregular boundary.
R—65 inches; very strongly cemented, slightly fractured metabasalt.

The thickness of the solum ranges from 40 to 80 inches or more. Depth to bedrock is more than 60 inches. The content of rock fragments ranges from 5 to 50 percent on and in the surface layer and from 35 to 70 percent in the solum and substratum. The coverage of surface stones ranges from 0 to 50 percent. Rock outcrops of metabasalt commonly occur on landforms of the Ravenrock soils, making up 0 to 25 percent. Aquic conditions are below a depth of 40 inches. Reaction ranges from very strongly acid to slightly acid.

The A horizon has hue of 5YR to 10YR and value and chroma of 2 to 4. Texture is silt loam or loam.

The BE horizon has hue of 5YR to 10YR and value and chroma of 4 to 6. Texture is silt loam or loam.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. A lithologic discontinuity is evident in the lower part of the horizon in most pedons. The horizon is silt loam, clay loam, or loam.

The BC horizon, if it occurs, has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. Texture is sandy loam, loam, or silt loam.

The 2C horizon has hue of 2.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Texture is sandy loam, loam, or silt loam.

RaD—Ravenrock gravelly loam, 15 to 25 percent slopes, extremely stony

Setting

Landscape: Mountains

Component Description

Ravenrock and similar soils

Composition of map unit: 85 percent
Landform: Shoulders and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 8.5 inches

Additional Components

Highfield and similar soils

Composition of map unit: 10 percent
Landform: Mountain summits and backslopes

Rohrersville and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about

managing this map unit, see the section "Use and Management of the Soils."

ReB—Ravenrock-Highfield-Rock outcrop complex, 0 to 8 percent slopes

Setting

Landscape: Mountains
Note: Spring seeps are common in the lower concave portions of the map unit. In some areas the soils average more than 35 percent clay.

Component Description

Ravenrock and similar soils

Composition of map unit: 50 percent
Landform: Shoulders and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 8.5 inches

Highfield and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Rock outcrop

Composition of map unit: 10 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ReC—Ravenrock-Highfield-Rock outcrop complex, 8 to 15 percent slopes

Setting

Landscape: Mountains
Note: Spring seeps are common in the lower concave portions of the map unit. In some areas the soils average more than 35 percent clay.

Component Description

Ravenrock and similar soils

Composition of map unit: 50 percent
Landform: Shoulders and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 8.5 inches

Highfield and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Rock outcrop

Composition of map unit: 10 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ReD—Ravenrock-Highfield-Rock outcrop complex, 15 to 25 percent slopes

Setting

Landscape: Mountains
Note: Spring seeps are common in the lower concave portions of the map unit.

Component Description

Ravenrock and similar soils

Composition of map unit: 50 percent
Landform: Shoulders and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 8.5 inches

Highfield and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Rock outcrop

Composition of map unit: 10 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ReF—Ravenrock-Highfield-Rock outcrop complex, 25 to 65 percent slopes

Setting

Landscape: Mountains

Component Description

Ravenrock and similar soils

Composition of map unit: 50 percent
Landform: Shoulders and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 8.5 inches

Highfield and similar soils

Composition of map unit: 35 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 6.4 inches

Rock outcrop

Composition of map unit: 15 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RfC—Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony

Setting

Landscape: Mountains

Component Description

Ravenrock and similar soils

Composition of map unit: 50 percent
Landform: Shoulders and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 6 feet to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 3.5 to 6.0 feet
Parent material: Gravelly colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 8.5 inches

Rohrersville and similar soils

Composition of map unit: 35 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 24 to 36 inches to fragic properties
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy alluvium derived from greenstone or loamy colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 10.9 inches

Additional Components

Lantz and similar soils

Composition of map unit: 15 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Readington Series

The Readington series consists of deep, moderately well drained soils. Permeability is moderately slow. These soils formed in material weathered from Triassic siltstone, sandstone, and shale. They are on nearly level to concave uplands and at the head of drainageways. Slopes range from 0 to 8 percent.

Readington soils are similar to Croton soils and are commonly adjacent to Athol, Abbottstown, Penn, Reaville, and Klinesville soils. Croton soils are poorly drained. Abbottstown soils are somewhat poorly drained. Penn, Reaville, and Klinesville soils have bedrock at a depth of less than 40 inches. Athol soils formed in residuum from conglomerate and are well drained.

Typical pedon of Readington silt loam, 0 to 3 percent slopes; Montgomery County, Maryland; about 4 miles southwest of Poolesville, about 1 mile north on Partnership Road from River Road, 1,200 feet west:

Oi—2 inches to 0; litter of partially decomposed, mixed hardwood leaves.
A1—0 to 3 inches; dark grayish brown (10YR 3/2) silt loam; very weak thin platy structure; very friable; many very fine and fine roots; strongly acid; abrupt smooth boundary.
A2—3 to 6 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.
BA—6 to 14 inches; brown (7.5YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; weak silt coatings in root channels; very strongly acid; abrupt smooth boundary.
Bt—14 to 20 inches; yellowish red (5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; many faint clay films on faces of peds; very strongly acid; gradual smooth boundary.
Btx—20 to 30 inches; yellowish red (5YR 4/6) silty clay loam; moderate coarse prismatic structure parting to moderate medium platy; firm and brittle; many faint clay films on faces of peds; many medium prominent light gray (10YR 7/1) iron depletions and strong brown (7.5YR 5/8) iron accumulations; very strongly acid; abrupt smooth boundary.
BC—30 to 44 inches; red (2.5YR 4/6) channery silt loam; massive; friable; about 30 percent weathered siltstone channers; very strongly acid; abrupt wavy boundary.
R—44 inches; strongly cemented, fractured siltstone.

The thickness of the solum ranges from 35 to 60 inches. Depth to bedrock ranges from 40 to 60 inches. Depth to the fragipan ranges from 20 to 36 inches. The content of rock fragments ranges from 0 to 20 percent in the upper part of the solum and from 5 to 50 percent in the lower part. In unlimed areas reaction ranges from slightly acid to extremely acid.

The A horizon has hue of 2.5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam or loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 3 to 6. The Btx and BC horizons have hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 6. The B horizon ranges from loam to silty clay loam in the fine-earth fraction.

RgA—Readington silt loam, 0 to 3 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil does not have fragic properties.

Component Description

Readington and similar soils

Composition of map unit: 85 percent
Landform: Saddles and swales
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to lithic bedrock; 20 to 36 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 4.4 inches

Additional Components

Reaville and similar soils

Composition of map unit: 10 percent
Landform: Swales, depressions, and drainageways

Penn and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

RgB—Readington silt loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil does not have fragic properties.

Component Description

Readington and similar soils

Composition of map unit: 85 percent
Landform: Saddles and swales
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to lithic bedrock; 20 to 36 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: None assigned
Flooding: None
Available water capacity: Average of 4.4 inches

Additional Components

Reaville and similar soils

Composition of map unit: 10 percent
Landform: Saddles and swales

Penn and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Reaville Series

The Reaville series consists of moderately deep, somewhat poorly drained soils. Permeability is slow. These soils formed in residuum from Triassic

interbedded red shale, siltstone, and fine-grained sandstone. They are on nearly level and gently sloping interfluves that have little dissection. Slopes range from 0 to 8 percent.

Reaville soils are similar to Croton and Readington soils and are commonly adjacent to Lehigh, Brecknock, Montalto, Legore, Klinesville, Penn, Bowmansville, Bermudian, Rowland, and Birdsboro soils. Readington soils are deep and moderately well drained. Croton soils are deep, poorly drained, and in drainageways and depressions. Lehigh, Brecknock, Montalto, and Legore soils formed from basic igneous parent material, such as diabase. Klinesville and Penn soils are well drained and have bedrock at a depth of less than 40 inches. Bowmansville, Bermudian, and Rowland soils formed in recent alluvium, are subject to flooding, and are on flood plains. Birdsboro soils are well drained, formed in old alluvium, and are on stream terraces.

Typical pedon of Reaville silt loam, 0 to 3 percent slopes; about 2,500 feet south of the intersection of Routes 77 and 76 in Rocky Ridge, at the Stambaugh Farm, 1,500 feet south of the barn; lat. 39 degrees 35 minutes 43 seconds N. and long. 77 degrees 19 minutes and 01 second W.

Ap—0 to 4 inches; brown (7.5YR 4/3) silt loam; weak fine granular structure; friable; common fine roots; common fine vesicular pores; common fine distinct strong brown (7.5YR 5/6) iron masses between peds; 2 percent channers; slightly acid; clear smooth boundary.

BA—4 to 10 inches; brown (7.5YR 5/3) silt loam; weak fine subangular blocky structure; friable; common fine roots; common fine vesicular pores; common fine prominent yellowish red (5YR 4/6) iron masses between peds; common fine and medium black (N 2/0) iron and manganese accumulations between peds; 2 percent channers; slightly acid; clear wavy boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/6) silty clay loam; weak fine subangular blocky structure; friable; common fine roots; many medium distinct light brownish gray (10YR 6/2) iron depletions and common medium prominent strong brown (7.5YR 5/8) iron masses; common fine and medium prominent strong brown (7.5YR 5/8) iron and manganese nodules between peds; 5 percent channers; slightly acid; clear wavy boundary.

Bt2—14 to 18 inches; yellowish red (5YR 5/6) silty clay loam; moderate medium subangular blocky structure parting to weak medium platy; firm; common medium roots; very few distinct clay films on faces of peds; many coarse prominent gray (10YR 6/1) iron depletions and common medium prominent yellowish red (5YR 4/6) iron masses; 10 percent channers; slightly acid; clear wavy boundary.

Btg—18 to 30 inches; dark reddish gray (5YR 4/2) silty clay loam; moderate coarse prismatic structure; firm; common fine and medium distinct brown (7.5YR 4/4) iron masses; 12 percent channers; slightly acid; clear wavy boundary.

BC—30 to 38 inches; dark reddish brown (2.5YR 3/4) and pinkish gray (5YR 6/2) channery silty clay loam; moderate coarse prismatic structure; firm; very few distinct discontinuous clay films on vertical faces of peds; common medium prominent strong brown (7.5YR 4/6) iron depletions between peds; 20 percent channers; slightly acid; gradual wavy boundary.

R—38 to 42 inches; dark reddish brown (2.5YR 3/4) very strongly cemented, highly fractured Triassic shale; common medium prominent strong brown (7.5YR 4/6) iron and manganese accumulations around stones and pinkish gray (5YR 6/2) silt coatings.

The thickness of the solum ranges from 12 to 24 inches. Depth to the paralithic contact ranges from 20 to 40 inches. The content of rock fragments ranges from 2 to 15 percent in the Ap and Bt horizons and from 30 to 60 percent in the C horizon. Reaction ranges from very strongly acid to slightly acid.

The Ap horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 2 to 4. Texture is silt loam.

The B and BA horizons have hue of 10R to 5YR, value of 4 to 6, and chroma of 3 or 4. Texture is silt loam or silty clay loam. Some Bt horizons have matrix colors outside of the range of characteristics of the Official Series Description.

The C and BC horizons have hue of 10R to 5YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam, loam, or silty clay loam.

RmA—Reaville silt loam, 0 to 3 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil does not have fragic properties.

Component Description

Reaville and similar soils

Composition of map unit: 85 percent
Landform: Saddles and swales
Surface layer texture: Silt loam

Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy residuum weathered from shale and siltstone
Flooding: None
Available water capacity: Average of 3.6 inches

Additional Components

Penn and similar soils

Composition of map unit: 15 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Rohrersville Series

The Rohrersville series consists of very deep, somewhat poorly drained soils. Permeability is slow. These soils formed from colluvial material or soil creep over residuum weathered from greenstone. They are on nearly level to strongly sloping footslopes, at the head of drainageways, and in drainageways. Slopes range from 0 to 15 percent.

Rohrersville soils are similar to Lantz soils and are commonly adjacent to Catoctin, Foxville, Highfield, Mt. Zion, Myersville, and Ravenrock soils. Lantz soils are in the lower landform positions or on broad flats, are poorly drained, and have a darker surface layer than the Rohrersville soils. Catoctin soils have bedrock within a depth of 20 to 40 inches. Foxville soils formed from alluvial sediments and average more than 35 percent rock fragments throughout. Highfield, Mt. Zion, Myersville, and Ravenrock soils are better drained than the Rohrersville soils and are in the higher landform positions.

Typical pedon of Rohrersville silt loam in an area of Ravenrock-Rohrersville complex, 3 to 15 percent slopes, extremely stony; approximately 1 mile east-northeast of Mount Zion Church Road on Catoctin Trail, 60 feet behind a shelter in Catoctin Park, on a 4 percent slope in a woodlot; lat. 39 degrees 40 minutes 43 seconds N. and long. 77 degrees 29 minutes 04 seconds W.

Ap1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; nonsticky; nonplastic; many fine, common medium, and few coarse roots; 5 percent pebbles; slightly acid; abrupt smooth boundary.

Ap2—5 to 9 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure parting to moderate fine granular; friable; nonsticky; nonplastic; common fine, medium, and coarse roots; 5 percent pebbles; moderately acid; abrupt smooth boundary.

E—9 to 15 inches; light olive brown (2.5Y 5/3) silt loam; moderate medium platy structure; friable; nonsticky; nonplastic; common fine roots; few very fine prominent dark brown (7.5YR 3/4) iron and manganese concentrations; 5 percent pebbles; moderately acid; clear smooth boundary.

Bt1—15 to 25 inches; light olive brown (2.5Y 5/4) silt loam; weak medium platy structure parting to strong fine subangular blocky; friable; nonsticky; nonplastic; common fine roots; common medium distinct yellowish brown (10YR 5/6) soft iron masses; common medium distinct light brownish gray (2.5YR 6/2) redoximorphic depletions; few fine prominent iron and manganese nodules; 5 percent pebbles and 1 percent stones; strongly acid; clear wavy boundary.

Bt2—25 to 31 inches; brown (7.5YR 4/4) silt loam; weak medium platy structure parting to strong fine subangular blocky; friable; nonsticky; nonplastic; common fine roots; many medium faint strong brown (7.5YR 5/6) soft iron masses; few medium prominent grayish brown (2.5Y 5/2) redoximorphic depletions on faces of peds; common fine distinct dark brown (7.5YR 3/3) iron and manganese concretions; common fine prominent light olive brown (2.5Y 5/3) clay films on faces of peds; 5 percent pebbles; moderately acid; clear wavy boundary.

Btx—31 to 43 inches; strong brown (7.5YR 4/6) loam; weak very coarse prismatic structure parting to moderate medium platy; firm; brittle in 40 percent of mass; slightly sticky; slightly plastic; few fine roots in cracks between peds; few fine vesicular pores; common medium prominent grayish green (5GY 5/1) redoximorphic depletions along roots; common fine distinct dark brown (7.5YR 3/3) iron and manganese concretions; common fine prominent black (5YR 2.5/1) iron and manganese stains; common medium prominent light olive brown (2.5Y 5/3) clay films on faces of prisms; 11

percent channers; moderately acid; clear wavy boundary.
Btxg—43 to 55 inches; grayish brown (2.5Y 5/2) loam; weak very coarse prismatic structure parting to weak medium platy, parting to weak fine subangular blocky; firm; brittle in 30 percent of mass; slightly sticky; slightly plastic; many fine and few medium vesicular pores and few fine tubular pores; many coarse prominent strong brown (7.5YR 4/6) soft iron masses; common fine and medium prominent dark brown (7.5YR 3/3) iron and manganese concretions; common medium prominent light olive brown (2.5Y 5/3) clay films on faces of prisms; 12 percent channers; moderately acid; clear wavy boundary.
2BC—55 to 62 inches; yellowish red (5YR 4/6) silt loam; weak medium subangular blocky structure; firm; slightly sticky; slightly plastic; few fine roots; few fine vesicular pores; common fine prominent grayish brown (2.5Y 5/2) redoximorphic depletions; 10 percent channers; moderately acid; abrupt irregular boundary.
2R—62 inches; indurated greenstone.

The thickness of the solum ranges from 30 to 60 inches. Depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 10 percent in the surface layer and subsoil and from 5 to 25 in the substratum. Reaction ranges from slightly acid to very strongly acid except in limed areas.

The A horizon has hue of 10YR to 5Y, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam or loam.

The E horizon and the BE horizon, if it occurs, have hue of 10YR to 5Y, value of 4 or 5, and chroma of 3 to 6. Texture is silt loam or loam.

The Bt horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 3 to 6. Texture is silt loam, loam, or silty clay loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. It has the same textures as the Bt horizon. Redoximorphic features are common.

The BC and C horizons have hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. Texture is silt loam, loam, or silty clay loam.

RoB—Rohrersville-Lantz silt loams, 0 to 8 percent slopes

Setting

Landscape: Valleys and mountains
Note: In some areas the soils do not have fragic properties.

Component Description

Rohrersville and similar soils

Composition of map unit: 60 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 24 to 36 inches to fragic properties
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.0 to 1.5 feet
Parent material: Loamy alluvium derived from greenstone or loamy colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 10.9 inches

Lantz and similar soils

Composition of map unit: 30 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Very poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Loamy alluvium derived from greenstone or loamy colluvium derived from greenstone
Flooding: Rare
Available water capacity: Average of 8.0 inches

Additional Components

Mt. Zion and similar soils

Composition of map unit: 10 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Rowland Series

The Rowland series consists of very deep, moderately well drained soils. Permeability is moderate. These soils formed in alluvial sediments derived from red siltstone and sandstone and from conglomerate. They are on flood plains. Slopes range from 0 to 3 percent.

Rowland soils are similar to Bowmansville soils and are commonly adjacent to Bermudian, Birdsboro, Readington, Reaville, Abbottstown, Croton, Penn, and Klinesville soils. Bowmansville soils are poorly drained and on flood plains. Bermudian soils are on flood plains and are well drained. Birdsboro soils are on old terraces and have an argillic horizon. Abbottstown, Croton, Klinesville, Penn, Readington, and Reaville soils are on adjacent uplands and formed in residuum materials from red Triassic bedrock.

Typical pedon of Rowland silt loam, 0 to 3 percent slopes; about 5 miles south of Poolesville, 200 feet south on Sycamore Landing Road from River Road, 75 feet east:

Ap—0 to 11 inches; dark brown (7.5YR 4/4) silt loam; moderate fine granular structure; friable; many fine and very fine roots; common very fine interstitial pores; slightly acid; abrupt wavy boundary.

Bw1—11 to 14 inches; brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few very fine interstitial pores; moderately acid; clear wavy boundary.

Bw2—14 to 34 inches; light brown (7.5YR 6/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; common fine tubular and interstitial pores; many coarse distinct strong brown (7.5YR 5/8) iron accumulations and common fine distinct brown (7.5YR 5/2) iron depletions; strongly acid; gradual smooth boundary.

C—34 to 54 inches; brown (7.5YR 5/4) and light brown (7.5YR 6/4) silt loam; massive; friable; many coarse distinct strong brown (7.5YR 5/8) iron accumulations and common fine distinct brownish gray (10YR 6/2) iron depletions; about 30 percent gravel; moderately acid; clear wavy boundary.

2C—54 to 66 inches; brown (7.5YR 5/4) and light brown (7.5YR 6/4) stratified silt loam and gravelly loamy sand; massive; friable; many coarse distinct strong brown (7.5YR 5/8) iron accumulations and common fine distinct brownish gray (10YR 6/2) iron depletions; about 30 percent gravel; moderately acid.

The thickness of the solum ranges from 24 to 40 inches. Depth to stratified sand and gravel is more than 40 inches. The content of gravel ranges from 0 to 10 percent in the solum, from 0 to 25 percent in the C horizon, and from 30 to 90 percent in the 2C horizon. Reaction ranges from very strongly acid to moderately acid throughout the profile in unlimed areas.

The A horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 6. Texture is silt loam, loam, or sandy loam.

The B horizon has hue of 2.5YR to 7.5YR, value of 3 to 6, and chroma of 3 to 8. Distinct iron accumulations and depletions are within a depth of 24 inches. Texture is silt loam, loam, silty clay loam, or sandy clay loam.

The C horizon has hue of 2.5YR to 7.5YR, value of 3 to 6, and chroma of 2 to 8. Texture is sandy loam to silty clay loam in the fine-earth fraction. The 2C horizon is dominantly stratified sand and gravel but in some pedons has lenses of silt or clay.

RwA—Rowland silt loam, 0 to 3 percent slopes

Setting

Landscape: River valleys

Component Description

Rowland and similar soils

Composition of map unit: 85 percent
Landform: Flood plains
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.0 feet
Parent material: Loamy alluvium derived from sandstone and shale
Flooding: Occasional
Available water capacity: Average of 8.6 inches

Additional Components

Bowmansville and similar soils

Composition of map unit: 15 percent
Landform: Flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Ryder Series

The Ryder series consists of moderately deep, well drained soils. Permeability is moderate. These soils formed in residuum from shaly limestone. They are on

nearly level to moderately steep uplands. Slopes range from 0 to 25 percent.

Ryder soils are similar to Duffield soils and are commonly adjacent to Buckeystown, Dryrun, Funkstown, Hagerstown, Murrill, and Opequon soils. Hagerstown soils are in landform positions similar to those of the Ryder soils and contain more than 35 percent clay in the particle-size control section. Buckeystown soils are very deep and contain more sand throughout the solum than the Ryder soils. Dryrun and Murrill soils formed from mixed sandstone and shale colluvial materials over the underlying limestone. Duffield soils are very deep to bedrock. Funkstown soils formed from a mixture of alluvial and colluvial materials over the underlying limestone. Opequon soils have limestone bedrock between depths of 10 and 20 inches.

Typical pedon of Ryder channery silt loam in an area of Duffield and Ryder channery silt loams, 3 to 8 percent slopes; approximately 2,000 feet south of the intersection of Adamstown Road and New Design Road, 1,750 feet west of New Design Road, in the Adamstown area, in a cultivated field; long. 39 degrees 18 minutes 27 seconds N. and lat. 77 degrees 28 minutes 01 second W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) channery silt loam; moderate fine and medium granular structure; very friable; common fine roots; common fine tubular pores; 15 percent channers; neutral; abrupt smooth boundary.

Bt1—8 to 19 inches; yellowish brown (10YR 5/6) channery silt loam; common medium yellowish red (5YR 4/6) and brownish yellow (10YR 6/8) mottles; moderate fine and medium subangular blocky structure; very friable; common fine roots; many fine and common medium tubular pores; few strong brown (7.5YR 4/6) clay films on faces of peds; 17 percent channers; slightly acid; clear wavy boundary.

Bt2—19 to 31 inches; strong brown (7.5YR 4/6) channery silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many fine vesicular pores and common fine and medium tubular pores; few distinct yellowish red (5YR 5/8) clay films on faces of peds; 25 percent channers; neutral; clear wavy boundary.

CB—31 to 36 inches; strong brown (7.5YR 4/6) and yellowish brown (10YR 5/6) very channery silty clay loam; weak fine and medium subangular blocky structure; very friable; few distinct strong brown (7.5YR 5/6) clay films on rock fragments; 40 percent channers; neutral; clear irregular boundary.

Cr—36 inches; moderately cemented, fractured, interbedded shaly limestone.

The thickness of the solum ranges from 20 to 40 inches. Depth to soft shaly limestone bedrock ranges from 24 to 40 inches. The content of rock fragments, consisting of weathered limestone, quartz, and shale, ranges from 0 to 25 percent in the upper part of the solum and from 25 to 65 percent in the substratum. Reaction ranges from strongly acid to neutral throughout the profile except in limed areas.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam or silty clay loam in the fine-earth fraction.

The B horizon has hue of 10YR, value of 3 to 6, and chroma of 4 to 8. Some pedons have subhorizons with hue of 5YR. Texture is silt loam, loam, clay loam, or silty clay loam. Some pedons have subhorizons of silty clay or clay.

The C and CB horizons have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam, loam, or clay loam in the fine-earth fraction.

Spoolsville Series

The Spoolsville series consists of deep, well drained soils. Permeability is moderately rapid. These soils formed in materials weathered primarily from greenstone schist, metadiorite, and metabasalt. They are on summits and side slopes. Slopes range from 0 to 25 percent.

Spoolsville soils are similar to Highfield and Myersville soils and are commonly adjacent to Braddock, Catoctin, Lantz, Mt. Zion, Rohrersville, Thurmont, and Trego soils. Highfield and Myersville soils contain more than 18 percent clay in the particle-size control section and have a moderate permeability. Catoctin soils have bedrock between depths of 20 and 40 inches and average more than 35 percent rock fragments in the particle-size control section. Braddock, Thurmont, and Trego soils are very deep to bedrock and formed in colluvial sediments on mountain footslopes and backslopes. Lantz soils are poorly drained, Rohrersville soils are somewhat poorly drained, and Mt. Zion soils are moderately well drained.

Typical pedon of Spoolsville silt loam, 3 to 8 percent slopes; 1.3 miles south of Middletown on Old Middletown Road, 50 feet west of Middletown Road, on a ridgetop; lat. 39 degrees 25 minutes 22 seconds N. and long. 77 degrees 32 minutes 42 seconds W.

Ap—0 to 10 inches; brown (7.5YR 4/4) silt loam; moderate medium granular structure; friable; many

fine and few medium roots; few medium and common fine tubular pores; 5 percent quartz fragments; slightly acid; abrupt smooth boundary.

BE—10 to 14 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; many fine roots; common fine tubular and vesicular pores; few fine patchy distinct discontinuous yellowish brown (10YR 5/4) clay coatings on faces of peds; neutral; gradual wavy boundary.

Bt—14 to 26 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine roots; common fine tubular pores and few fine vesicular pores; few fine distinct discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; common fine prominent black (N 2/0) manganese stains on faces of peds; 10 percent greenstone schist channers of which 5 percent are parachanners; moderately acid; clear wavy boundary.

BC—26 to 38 inches; strong brown (7.5YR 5/6) loam; weak medium platy structure; friable; few patchy clay films on faces of peds; 10 percent greenstone schist channers of which 5 percent are parachanners; moderately acid; clear wavy boundary.

C—38 to 58 inches; strong brown (7.5YR 5/6) and pale yellow to yellow (2.5Y 7/4) loam; weak medium platy structure inherited from the bedrock; friable; 25 percent greenstone schist fragments of which 15 percent are parachanners; moderately acid; gradual wavy boundary.

Cr—58 to 62 inches; olive brown (2.5Y 4/3) and yellowish brown (10YR 4/4) moderately cemented greenstone schist; crushes to a fine sandy loam in the fine-earth fraction.

The thickness of the solum ranges from 20 to 40 inches. Depth to soft greenstone schist bedrock ranges from 40 to 60 inches. The content of rock fragments ranges from 0 to 20 percent in the A and B horizons and from 10 to 35 percent in the BC and C horizons. Reaction ranges from slightly acid to moderately acid throughout the profile.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 3 or 4. Texture is silt loam or loam in the fine-earth fraction.

The B and BE horizons have hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. Texture is loam or fine sandy loam in the fine-earth fraction.

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

ScC—Spoolsville-Burkittsville complex, 8 to 15 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Spoolsville and similar soils

Composition of map unit: 60 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: More than 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from greenstone
Flooding: None
Available water capacity: Average of 12.7 inches

Burkittsville and similar soils

Composition of map unit: 30 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from granitic gneiss
Flooding: None
Available water capacity: Average of 8.6 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ScD—Spoolsville-Burkittsville complex, 15 to 25 percent slopes

Setting

Landscape: Valleys and mountains

Note: In some areas slopes are steeper than 25 percent.

Component Description

Spoolsville and similar soils

Composition of map unit: 60 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from greenstone
Flooding: None
Available water capacity: Average of 8.7 inches

Burkittsville and similar soils

Composition of map unit: 30 percent
Landform: Summits and backslopes
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from granitic gneiss
Flooding: None
Available water capacity: Average of 8.6 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SdC—Spoolsville-Catoctin complex, 8 to 15 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Spoolsville and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock; more than 60 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from greenstone
Flooding: None
Available water capacity: Average of 12.7 inches

Catoctin and similar soils

Composition of map unit: 40 percent
Landform: Summits and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from greenstone schist
Flooding: None
Available water capacity: Average of 3.4 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SeA—Spoolsville silt loam, 0 to 3 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Spoolsville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from greenstone
Flooding: None
Available water capacity: Average of 12.7 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition of map unit: 5 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SeB—Spoolsville silt loam, 3 to 8 percent slopes

Setting

Landscape: Valleys and mountains

Component Description

Spoolsville and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Silt loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum from greenstone
Flooding: None
Available water capacity: Average of 12.7 inches

Additional Components

Myersville and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Mt. Zion and similar soils

Composition of map unit: 5 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Springwood Series

The Springwood series consists of very deep, well drained soils. Permeability is moderately slow. These soils formed in residuum from calcareous conglomerate in the Triassic Basin. They are on nearly level to strongly sloping uplands. Slopes range from 0 to 15 percent.

Springwood soils are similar to Athol soils and are commonly adjacent to Croton, Duffield, Hagerstown, Klinesville, Penn, Morven, Readington, and Reaville soils. Athol soils have more than 35 percent clay throughout. Morven soils formed in calcareous conglomerate. Croton soils are poorly drained and have a fragipan. Duffield and Hagerstown soils formed in residuum from limestone. Klinesville, Penn, and Reaville soils have bedrock within a depth of 40 inches. Readington soils are moderately well drained.

Typical pedon of Springwood gravelly loam, 0 to 3 percent slopes; approximately 400 feet west of Maryland Route 15, about 300 feet northeast of Renn Road, in the Feagaville area, in a crop field; lat. 39 degrees 22 minutes 26 seconds N. and long. 77 degrees 29 minutes 03 seconds W.

Ap—0 to 10 inches; reddish brown (5YR 4/4) gravelly loam; moderate fine and medium granular structure; friable; many fine roots; 17 percent quartzite gravel; neutral; abrupt smooth boundary.

BE—10 to 12 inches; red (2.5YR 5/6) loam; strong fine and medium subangular blocky structure; friable; common fine roots; many fine and few coarse tubular pores; 5 percent quartzite gravel; slightly acid; clear discontinuous boundary.

Bt1—12 to 27 inches; red (10R 4/8) clay; weak coarse prismatic structure parting to strong fine and medium subangular blocky; friable; common fine roots; common fine and medium and few coarse tubular pores; slightly acid; clear wavy boundary.
Bt2—27 to 44 inches; red (10R 4/8) clay; weak coarse prismatic structure parting to strong fine angular blocky; friable; common fine roots; many very fine vesicular pores and common medium and few coarse tubular pores; neutral; gradual wavy boundary.
Bt3—44 to 76 inches; red (10R 4/8) clay; moderate fine and medium subangular blocky and weak thin platy structure; friable; few fine roots; neutral; clear wavy boundary.
BC—76 to 104 inches; red (10R 5/6) gravelly silty clay loam; common coarse prominent strong brown (7.5YR 5/6) mottles; weak thin platy structure; friable; 17 percent quartzite gravel; neutral.

The thickness of the solum ranges from 40 to 60 inches. Depth to hard calcareous conglomerate bedrock is more than 60 inches. The content of rock fragments of weathered limestone, quartz, and shale ranges from 0 to 20 percent in the upper part of the solum and from 5 to 35 percent in the substratum. Reaction ranges from strongly acid to neutral.

The A horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam, loam, or silty clay loam in the fine-earth fraction.

The BE horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 8. Texture is silt loam, loam, clay loam, or silty clay loam.

The Bt horizon has hue of 10R or 5YR, value of 3 to 5, and chroma of 4 to 8. Texture is clay loam, silty clay loam, silty clay, or clay.

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

SpA—Springwood gravelly loam, 0 to 3 percent slopes

Setting

Landscape: Valleys

Component Description

Springwood and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from conglomerate
Flooding: None
Available water capacity: Average of 9.3 inches

Additional Components

Morven and similar soils

Composition of map unit: 15 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SpB—Springwood gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: There is a potential for sinkhole development.

Component Description

Springwood and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from conglomerate
Flooding: None
Available water capacity: Average of 9.3 inches

Additional Components

Morven and similar soils

Composition of map unit: 15 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional

information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SpC—Springwood gravelly loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: There is a high potential for sinkhole development.

Component Description

Springwood and similar soils

Composition of map unit: 85 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from conglomerate
Flooding: None
Available water capacity: Average of 9.3 inches

Additional Components

Thurmont and similar soils

Composition of map unit: 15 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SqB—Springwood-Rock outcrop complex, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: There is a high or very high potential for sinkhole development.

Component Description

Springwood and similar soils

Composition of map unit: 65 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from conglomerate
Flooding: None
Available water capacity: Average of 9.3 inches

Rock outcrop

Composition of map unit: 35 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SrB—Springwood-Morven-Urban land complex, 3 to 8 percent slopes

Setting

Landscape: Valleys
Note: There is a very high potential for sinkhole development.

Component Description

Springwood and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Clayey residuum weathered from conglomerate
Flooding: None
Available water capacity: Average of 9.3 inches

Morven and similar soils

Composition of map unit: 35 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: 5.0 to 6.0 feet
Parent material: Loamy colluvium from conglomerate
Flooding: None
Available water capacity: Average of 11.2 inches

Urban land

Composition of map unit: 20 percent
Landform: None assigned

Urban land consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Stumptown Series

The Stumptown series consists of moderately deep, well drained soils. Permeability is moderately rapid. These soils formed partly in slope creep and partly in residuum that weathered from interbedded quartzite, quartz muscovite schist, and phyllite. They are on ridges and side slopes of the Blue Ridge anticlinorium. Slopes range from 0 to 50 percent.

Stumptown soils are similar to Dekalb soils and are commonly adjacent to Airmont, Bagtown, Edgemont, Highfield, Ravenrock, and Weverton soils. Dekalb soils formed from sandstone and do not have an argillic horizon. Airmont, Bagtown, and Ravenrock soils formed in colluvial materials and have bedrock at a depth of more than 60 inches. Edgemont and Highfield soils formed in residuum and have bedrock at a depth of more than 60 inches. Weverton soils have colluvium from quartzite over phyllite residuum and generally are in the lower landform positions.

Typical pedon of Stumptown very gravelly loam in an area of Stumptown-Rock outcrop complex, 0 to 8 percent slopes; approximately 2 miles north of the intersection of State Route 40 and Gambrill Park Road, 100 feet east of Gambrill Park Road, in Gambrill State Park, in a mixed hardwood forest dominated by chestnut oak; lat. 39 degrees 28 minutes 11 seconds N. and long. 77 degrees 27 minutes 41 seconds W. (Colors are for moist soil.)

Oi—0 to 1 inch; partially decomposed hardwood leaves and twigs; 14 percent stones and 10 percent cobbles.

A—1 to 3 inches; dark grayish brown (10YR 4/2) very gravelly loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 30 percent quartzite gravel, 14 percent quartzite stones, and 10 percent cobbles; very strongly acid; clear smooth boundary.

E—3 to 6 inches; light yellowish brown (10YR 6/4) very stony sandy loam; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 25 percent quartzite stones and 20 percent gravel; very strongly acid; clear wavy boundary.

Bt—6 to 14 inches; brownish yellow (10YR 6/6) very stony sandy clay loam; weak fine and medium subangular blocky structure; friable; common fine and medium and few coarse roots; common fine and few medium tubular pores and many fine vesicular pores; few thin clay films on faces of peds; common medium distinct dark grayish brown (10YR 4/2) organic material filling root channels and pores; 25 percent quartzite stones, 20 percent gravel, and 5 percent cobbles; very strongly acid; clear irregular boundary.

CB—14 to 22 inches; brownish yellow (10YR 6/6) and olive yellow (2.5Y 6/6) very stony sandy loam; weak coarse subangular blocky structure; very friable; many fine and medium roots; many fine vesicular pores and common fine and few medium tubular pores; 15 percent quartzite stones, 25 percent gravel, and 5 percent cobbles; very strongly acid; clear irregular boundary.

C—22 to 25 inches; brownish yellow (10YR 6/6) and olive yellow (2.5Y 6/6) very gravelly sandy loam; weak thin platy structure; very friable; common fine and few medium roots; 10 percent quartzite stones, 30 percent gravel, and 5 percent cobbles; very strongly acid; abrupt irregular boundary.

R—25 inches; indurated interbedded quartzite and quartz muscovite mica schist.

The thickness of the solum ranges from 12 to 30 inches. Depth to hard bedrock ranges from 20 to 40 inches. The content of rock fragments, consisting of quartzite gravel, cobbles, and stones, ranges from 35 to 60 percent in the solum and to as much as 70 percent in the C horizon. Stones and boulders as much as 36 inches in diameter cover 0 to 15 percent of the surface. Reaction is very strongly acid or strongly acid except in limed areas.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 3. Texture is loam or sandy loam in the fine-earth fraction.

The E horizon has hue of 7.5YR or 10YR, value of 6 or 7, and chroma of 3 to 6. Texture is loam or sandy loam in the fine-earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. Mottles in shades of red and yellow are common in the lower part of the horizon in some pedons. The horizon is loam, sandy clay loam, or clay loam in the fine-earth fraction.

The C and CB horizons are variegated in shades of yellow, brown, red, and white. Texture is loam, sandy loam, or sandy clay loam in the fine-earth fraction.

The R layer is extremely hard or rigid bedrock of interbedded quartzite and quartz muscovite schist.

StB—Stumptown-Rock outcrop complex, 0 to 8 percent slopes

Setting

Landscape: Mountains
Note: In some areas the Stumptown soil has weak spodic characteristics.

Component Description

Stumptown and similar soils

Composition of map unit: 65 percent
Landform: Summits and tread-riser backslopes
Surface layer texture: Very gravelly loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly colluvium or residuum from quartzite and phyllite
Flooding: None
Available water capacity: Average of 1.8 inches

Rock outcrop

Composition of map unit: 30 percent
Landform: None assigned

Additional Components

Edgemont and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

StC—Stumptown-Rock outcrop complex, 8 to 15 percent slopes

Setting

Landscape: Mountains (fig. 11)
Note: In some areas the Stumptown soil has weak spodic characteristics.

Component Description

Stumptown and similar soils

Composition of map unit: 60 percent
Landform: Summits and tread-riser backslopes
Surface layer texture: Very gravelly loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Residuum from quartzite and phyllite
Flooding: None
Available water capacity: Average of 1.8 inches

Rock outcrop

Composition of map unit: 35 percent
Landform: None assigned

Additional Components

Edgemont and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Figure 11.—A typical landscape of Stumptown-Rock outcrop complex, 8 to 15 percent slopes, at Gambrill State Park. Because of a shallow depth to bedrock and the rock outcrop on the surface, almost all areas of this map unit are forested.

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

StD—Stumptown-Rock outcrop complex, 15 to 25 percent slopes

Setting

Landscape: Mountains
Note: In some areas the Stumptown soil has weak spodic characteristics.

Component Description

Stumptown and similar soils

Composition of map unit: 55 percent
Landform: Summits and tread-riser backslopes
Surface layer texture: Very gravelly loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly colluvium or residuum from quartzite and phyllite
Flooding: None
Available water capacity: Average of 1.8 inches

Rock outcrop

Composition of map unit: 40 percent
Landform: None assigned

Additional Components

Edgemont and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon

depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SuD—Stumptown-Bagtown-Rock outcrop complex, 15 to 25 percent slopes

Setting

Landscape: Mountains
Note: In some areas the soils have weak spodic characteristics.

Component Description

Stumptown and similar soils

Composition of map unit: 50 percent
Landform: Summits and tread-riser backslopes
Surface layer texture: Very gravelly loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly colluvium or residuum from quartzite and phyllite
Flooding: None
Available water capacity: Average of 1.8 inches

Bagtown and similar soils

Composition of map unit: 40 percent
Landform: Backslopes and footslopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: 60 to 72 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 4.0 to 6.0 feet
Parent material: Loamy colluvium derived from quartzite or sandstone
Flooding: None
Available water capacity: Average of 10.2 inches

Rock outcrop

Composition of map unit: 10 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

SuF—Stumptown-Bagtown-Rock outcrop complex, 25 to 65 percent slopes

Setting

Landscape: Mountains

Component Description

Stumptown and similar soils

Composition of map unit: 50 percent
Landform: Summits and tread-riser backslopes
Surface layer texture: Very gravelly loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly colluvium or residuum from quartzite and phyllite
Flooding: None
Available water capacity: Average of 1.8 inches

Bagtown and similar soils

Composition of map unit: 40 percent
Landform: Backslopes and footslopes
Surface layer texture: Cobbly loam
Depth to restrictive feature: 60 to 72 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: 4.0 to 6.0 feet
Parent material: Loamy colluvium derived from quartzite or sandstone
Flooding: None
Available water capacity: Average of 10.2 inches

Rock outcrop

Composition of map unit: 10 percent
Landform: None assigned

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Thurmont Series

The Thurmont series consists of very deep, well drained soils. Permeability is moderate. These soils formed in colluvial materials from a mixture of crystalline rocks. They are on footslopes, colluvial fans, interfluves, and benches. Slopes range from 3 to 35 percent.

Thurmont soils are similar to Airmont soils and are commonly adjacent to Bagtown, Braddock, Dekalb, Trego, and Weverton soils. Airmont and Bagtown soils are moderately well drained. Airmont soils have a fragipan and contain more than 35 percent rock fragments. Bagtown soils contain less than 18 percent clay in the particle-size control section and have a lithologic discontinuity at a depth of more than 60 inches. Braddock soils are in landform positions similar to those of the Thurmont soils and have more than 35 percent clay. Dekalb soils are on ridgetops and have bedrock between depths of 20 to 40 inches. Trego soils occur in the lower concave landform positions, are moderately well drained, and have a fragipan. Weverton soils average more than 35 percent rock fragments throughout and formed from colluvial materials over residuum from phyllite.

Typical pedon of Thurmont gravelly loam, 3 to 8 percent slopes; in an orchard approximately 2,700 feet northeast of the intersection of Orchard Road and Kelbaugh Road, 100 feet north of Kelbaugh Road; lat. 39 degrees 39 minutes 28 seconds N. and long. 77 degrees 23 minutes 43 seconds W.

Ap—0 to 6 inches; dark brown (10YR 4/3) gravelly loam; weak thick platy structure parting to weak fine subangular blocky; firm; many fine and many medium roots; few coarse and common fine tubular pores; 2 percent cobbles and 25 percent mixed quartzite pebbles; strongly acid; abrupt smooth boundary.

Bt1—6 to 13 inches; strong brown (7.5YR 5/6) loam; moderate medium platy structure parting to moderate fine subangular blocky; friable; many fine and medium and common coarse roots; common fine and few medium tubular pores; few faint clay films on faces of peds and in pores; 25 percent mixed pebbles; strongly acid; clear wavy boundary.

Bt2—13 to 27 inches; strong brown (7.5YR 5/8) gravelly loam; weak medium to coarse platy structure parting to moderate medium subangular blocky; friable; many fine, common medium, and few coarse roots; common fine and medium tubular pores; common distinct clay films on faces of peds and in pores; 10 percent mixed quartzite pebbles; strongly acid; gradual wavy boundary.

Bt3—27 to 42 inches; strong brown (7.5YR 5/8) gravelly loam; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; common fine and medium tubular pores and common fine vesicular pores; common distinct clay films on faces of peds and in pores; 10 percent mixed pebbles, 5 percent cobbles, and 1 percent stones; strongly acid; abrupt smooth boundary.

2C—42 to 80 inches; variegated yellowish red (5YR 5/6), red (2.5YR 4/8), and pink (7.5YR 7/4) channery fine sandy loam; weak thin platy structure; very friable; common fine, medium, and coarse roots; many fine vesicular pores and common medium tubular pores; few distinct discontinuous clay films around rock fragments; 25 percent channers; moderately acid; clear irregular boundary.

2Cr—80 inches; variegated brownish yellow (10YR 6/8), light yellowish brown (2.5Y 6/4), and dark brown (7.5YR 3/2) moderately cemented, highly fractured bedrock; isolated pockets of fine sandy loam in the fine-earth fraction occupying voids and fractures in the rock; few prominent clay films around rock fragments; common coarse black (N 2.5/0) iron and manganese stains around rock fragments.

The thickness of the solum ranges from 40 to 60 inches. Depth to bedrock is more than 60 inches. Depth to a lithologic discontinuity ranges from 40 to 60 inches. The content of rock fragments, consisting of pebbles, cobbles, stones, and channers, ranges from 5 to 30 percent in the solum and from 20 to 50 percent in the substratum. Redoximorphic features commonly occur at a depth of about 36 inches. Reaction is strongly acid or very strongly acid except in limed areas.

The A horizon has hue of 10YR to 7.5YR, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam, loam, or sandy loam in the fine-earth fraction.

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

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

The 2C horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, sandy loam, or clay loam in the fine-earth fraction.

TaB—Thurmont gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Thurmont and similar soils

Composition of map unit: 85 percent
Landform: Undulating old colluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 40 inches
Parent material: Loamy colluvium derived from sandstone or quartzite
Flooding: None
Available water capacity: Average of 6.2 inches

Additional Components

Braddock and similar soils

Composition of map unit: 10 percent
Landform: Convex footslopes and toeslopes

Trego and similar soils

Composition of map unit: 5 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

TaC—Thurmont gravelly loam, 8 to 15 percent slopes

Setting

Landscape: Valleys
Note: In some areas the soil has stony surface layers.

Component Description

Thurmont and similar soils

Composition of map unit: 85 percent
Landform: Undulating old colluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 60 inches
Parent material: Loamy colluvium derived from sandstone or quartzite
Flooding: None
Available water capacity: Average of 6.2 inches

Additional Components

Braddock and similar soils

Composition of map unit: 10 percent
Landform: Convex footslopes and toeslopes

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ThB—Thurmont gravelly loam, 3 to 8 percent slopes, very stony

Setting

Landscape: Valleys

Component Description

Thurmont and similar soils

Composition of map unit: 85 percent
Landform: Undulating old colluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: More than 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 40 inches
Parent material: Loamy colluvium derived from sandstone or quartzite
Flooding: None
Available water capacity: Average of 6.2 inches

Additional Components

Braddock and similar soils

Composition of map unit: 10 percent
Landform: Convex footslopes and toeslopes

Weverton and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Trego Series

The Trego series consists of very deep, moderately well drained soils. Permeability is slow. These soils formed in acid alluvial and colluvial materials weathered from metamorphic crystalline rocks. They are on nearly level and gently sloping old alluvial fans and footslopes of the Blue Ridge province. Slopes range from 0 to 8 percent.

Trego soils are similar to Airmont soils and are commonly adjacent to Bagtown, Dekalb, Hazel, Thurmont, and Weverton soils. Airmont soils are in mountain drainageways and have more than 35 percent rock fragments throughout. Bagtown soils are moderately well drained. Thurmont and Weverton soils are well drained and do not have a fragipan. Dekalb soils occur on the summits of ridges, have bedrock at shallower depths than the Trego soils, and do not have a fragipan. Hazel soils formed in residuum from phyllite, do not have a fragipan, and are well drained.

Typical pedon of Trego gravelly loam, 3 to 8 percent slopes; 100 feet west of Roddy Road and 100 feet southwest of the intersection of Roddy Road and Old Kiln Road, in the Ridgeview area, on an east- to northeast-facing aspect in pasture; lat. 39 degrees 38 minutes 56 seconds N. and long. 77 degrees 23 minutes 12 seconds W.

Ap1—0 to 6 inches; brown (10YR 4/3) gravelly loam; moderate fine granular structure; friable; many fine and medium and common coarse roots; many very fine and fine tubular pores; common fine irregular reddish brown (5YR 5/3) iron masses; 15 percent subrounded gravel; slightly acid; clear wavy boundary.

Ap2—6 to 11 inches; light olive brown (2.5Y 5/3) silt loam; moderate medium subangular blocky structure parting to moderate fine granular; friable; many fine and medium and common coarse roots; many fine and medium tubular pores; common fine prominent reddish brown (5YR 5/3) iron masses; 15 percent subrounded quartzite gravel; slightly acid; abrupt wavy boundary.

Bt1—11 to 19 inches; olive yellow (2.5Y 6/6) loam; moderate fine granular structure; friable; many fine and common medium roots; many fine and medium and common coarse tubular pores; common fine prominent brownish yellow (10YR 6/8) iron masses and common coarse faint light yellowish brown (2.5Y 6/4) iron depletions between peds; 10 percent rounded quartzite gravel; slightly acid; clear wavy boundary.

Bt2—19 to 29 inches; yellowish brown (10YR 5/8) loam; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; friable; many fine and common medium roots; many fine and medium and common coarse tubular pores; common coarse prominent pale yellow (2.5Y 7/3) iron depletions between peds and common coarse faint light reddish brown (2.5YR 6/4) iron depletions between peds; 5 percent rounded quartzite cobbles and 7 percent rounded quartzite gravel; slightly acid; clear irregular boundary.

2BC—29 to 41 inches; yellowish brown (10YR 5/6) gravelly sandy clay loam; weak medium platy structure; friable; common fine roots; many fine, common medium, and common coarse tubular pores and many fine vesicular pores; common coarse distinct pale red (2.5YR 7/2) iron depletions and common coarse faint strong brown (7.5YR 5/8) iron masses; 20 percent quartzite gravel; slightly acid; clear wavy boundary.

2CB—41 to 64 inches; dark yellowish brown (10YR 4/6) very gravelly sandy loam; weak fine subangular blocky structure; friable; common medium distinct light brownish gray (10YR 6/2) iron depletions and common medium prominent strong brown (7.5YR 5/8) iron masses; 35 percent quartzite gravel and 2 percent quartzite cobbles; slightly acid.

The thickness of the solum ranges from 40 to 70 inches. Depth to bedrock is more than 6 feet. Depth of the fragipan ranges from 20 to 30 inches. The content of rock fragments, including gravel, cobbles, and some stones, ranges from 5 to 30 percent in the solum and

from 10 to 40 percent in the substratum. Reaction ranges from very strongly acid to moderately acid except in limed areas.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Texture is loam or silt loam in the fine-earth fraction.

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

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

The Btx horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Redoximorphic features are common. Texture is sandy loam, loam, or sandy clay loam in the fine-earth fraction.

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

The C and CB horizons have hue of 2.5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. Texture is sandy loam, loam, sandy clay loam, or clay loam in the fine-earth fraction.

ToA—Trego gravelly loam, 0 to 3 percent slopes

Setting

Landscape: Valleys

Component Description

Trego and similar soils

Composition of map unit: 85 percent
Landform: Undulating old alluvial and colluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: 20 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium and colluvium derived from greenstone, quartzite, phyllite, or schist
Flooding: None
Available water capacity: Average of 6.6 inches

Additional Components

Braddock and similar soils

Composition of map unit: 5 percent
Landform: Convex footslopes and toeslopes

Foxville and similar soils

Composition of map unit: 5 percent
Landform: Narrow, high-gradient flood plains

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

ToB—Trego gravelly loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Trego and similar soils

Composition of map unit: 85 percent
Landform: Undulating old alluvial and colluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: 20 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium and colluvium derived from greenstone, quartzite, schist, or phyllite
Flooding: None
Available water capacity: Average of 6.6 inches

Additional Components

Thurmont and similar soils

Composition of map unit: 10 percent
Landform: Undulating old colluvial fans

Braddock and similar soils

Composition of map unit: 5 percent
Landform: Convex footslopes and toeslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon

depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

TqB—Trego gravelly loam, 3 to 8 percent slopes, very stony

Setting

Landscape: Valleys

Component Description

Trego and similar soils

Composition of map unit: 85 percent
Landform: Undulating old alluvial and colluvial fans
Surface layer texture: Gravelly loam
Depth to restrictive feature: 20 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium and colluvium derived from greenstone, quartzite, schist, or phyllite
Flooding: None
Available water capacity: Average of 6.6 inches

Additional Components

Thurmont and similar soils

Composition of map unit: 10 percent
Landform: Undulating old colluvial fans

Braddock and similar soils

Composition of map unit: 5 percent
Landform: Convex footslopes and toeslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

TrB—Trego cobbly loam, 3 to 8 percent slopes

Setting

Landscape: Valleys

Component Description

Trego and similar soils

Composition of map unit: 85 percent
Landform: Undulating old alluvial and colluvial fans
Surface layer texture: Cobbly loam
Depth to restrictive feature: 20 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium and colluvium derived from greenstone, quartzite, schist, or phyllite
Flooding: None
Available water capacity: Average of 6.6 inches

Additional Components

Thurmont and similar soils

Composition of map unit: 10 percent
Landform: Undulating old colluvial fans

Foxville and similar soils

Composition of map unit: 5 percent
Landform: Narrow, high-gradient flood plains

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

TxB—Trego-Foxville complex, 0 to 8 percent slopes

Setting

Landscape: Valleys
Note: The soil surface is cobbly.

Component Description

Trego and similar soils

Composition of map unit: 60 percent
Landform: Undulating old alluvial and colluvial fans

Surface layer texture: Cobbly loam
Depth to restrictive feature: 20 to 30 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy alluvium and colluvium derived from greenstone
Flooding: None
Available water capacity: Average of 6.6 inches

Foxville and similar soils

Composition of map unit: 35 percent
Landform: Narrow, high-gradient flood plains
Surface layer texture: Cobbly loam
Depth to restrictive feature: None noted
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 0.5 foot to 1.5 feet
Parent material: Loamy alluvium derived from diabase or schist or gravelly alluvium derived from quartzite, phyllite, or greenstone
Flooding: Occasional
Available water capacity: Average of 9.7 inches

Additional Components

Thurmont and similar soils

Composition of map unit: 5 percent
Landform: Undulating old colluvial fans

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UdB—Udorthents, smooth, 0 to 8 percent slopes

Setting

Landscape: None assigned

Component Description

Areas of this map unit are highly disturbed, and many of the original soil characteristics have been altered. The cut and fill material averages from 1 foot to more than 20 feet in thickness. This material can be locally taken from areas onsite or trucked in from areas offsite. The fill material generally consists of rock, concrete, and soil in highly variable amounts.

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UdC—Udorthents, smooth, 8 to 15 percent slopes

Setting

Landscape: None assigned

Component Description

Areas of this map unit are highly disturbed, and many of the original soil characteristics have been altered. The cut and fill material averages from 1 foot to more than 20 feet in thickness. This material can be locally taken from areas onsite or trucked in from areas offsite. The fill material generally consists of rock, concrete, and soil in highly variable amounts. In some areas the map unit has slopes of more than 15 percent.

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

UrA—Urban land, 0 to 3 percent slopes

Setting

Landscape: None assigned

Component Description

This map unit consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material that supports little or no vegetation. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

UrC—Urban land, 3 to 15 percent slopes

Setting

Landscape: None assigned

Component Description

This map unit consists mainly of areas that have been smoothed and where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction. At least 90 percent of the surface is covered by asphalt, concrete, or other impervious material that supports little or no vegetation. Examples of urban structures and works include industrial complexes, shopping malls, business center parking lots, and buildings.

W—Water

This map unit consists of areas inudated with water for most of the year and generally includes rivers, lakes, and ponds. No interpretations are given for this map unit.

Walkersville Series

The Walkersville series consists of very deep, well drained soils. Permeability is moderate. These soils formed in old alluvium over limestone residuum. They are on old river terraces, 10 to 40 feet above the active flood plain. Slopes range from 0 to 15 percent.

Walkersville soils are similar to Downsville soils and are commonly adjacent to Duffield, Hagerstown, Opequon, and Ryder soils. Downsville soils have more than 35 percent rock fragments throughout and are associated with the larger rivers. Duffield and Hagerstown soils formed in residuum weathered from limestone and do not have rounded gravel or sand in the solum. Ryder and Opequon soils are shallower to bedrock than the Walkersville soils.

Typical pedon of Walkersville gravelly loam, 3 to 8 percent slopes; 3,000 feet northeast of the town of Leitersburg, 1,250 feet northwest of Maryland Route 60, in the Leitersburg area, in a northwest-facing crop field; lat. 39 degrees 42 minutes 06 seconds N. and long. 77 degrees 37 minutes 19 seconds W.

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) gravelly loam; moderate fine granular structure; friable; common fine and medium roots; common fine and medium tubular and vesicular pores; 20 percent gravel; neutral; abrupt smooth boundary.

BE—10 to 18 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine roots; many fine vesicular and tubular pores; few faint discontinuous clay films on faces of peds and lining pores; 5 percent gravel; neutral; clear wavy boundary.

Bt1—18 to 61 inches; yellowish red (5YR 5/6) clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many fine tubular and vesicular pores; common distinct continuous clay films lining pores and on faces of peds; 5 percent gravel; moderately acid; gradual wavy boundary.

Bt2—61 to 72 inches; yellowish red (5YR 5/8) clay; common medium prominent light yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky; firm; few fine roots; many fine vesicular and common fine tubular pores; common distinct continuous clay films in pores and on faces of peds; 10 percent gravel; moderately acid.

The thickness of the solum ranges from 60 to 80 inches. Depth to lithologic discontinuity ranges from 30 to 80 inches or more. Depth to lithic contact is more than 60 inches. The content of rounded rock fragments ranges from 5 to 35 percent in the solum. Reaction ranges from neutral to moderately acid throughout the profile.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 3 to 6. Texture is silt loam or loam.

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

The Bt horizon has hue of 5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam, loam, clay loam, clay, sandy clay, or silty clay loam.

WaA—Walkersville gravelly loam, 0 to 3 percent slopes

Setting

Landscape: River valleys
Note: There is a moderate or high potential for sinkhole development.

Component Description

Walkersville and similar soils

Composition of map unit: 85 percent
Landform: Stream terraces
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy old alluvium or colluvium over limestone
Flooding: None
Available water capacity: Average of 8.2 inches

Additional Components

Hagerstown and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WaB—Walkersville gravelly loam, 3 to 8 percent slopes

Setting

Landscape: River valleys
Note: There is a potential for sinkhole development.

Component Description

Walkersville and similar soils

Composition of map unit: 85 percent
Landform: Stream terraces
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy old alluvium or colluvium over limestone
Flooding: None
Available water capacity: Average of 8.2 inches

Additional Components

Hagerstown and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WaC—Walkersville gravelly loam, 8 to 15 percent slopes

Setting

Landscape: River valleys
Note: There is a potential for sinkhole development.

Component Description

Walkersville and similar soils

Composition of map unit: 85 percent
Landform: Stream terraces
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy old alluvium or colluvium over limestone
Flooding: None
Available water capacity: Average of 8.2 inches

Additional Components

Hagerstown and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Ryder and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Watchung Series

The Watchung series consists of very deep, poorly drained soils. Permeability is slow. These soils formed in residuum from basic igneous rock such as diabase. They are in upland depressions and drainageways. Slopes range from 0 to 8 percent.

Watchung soils are not similar to any other soils but are commonly adjacent to Legore, Montalto, Lehigh, Whiteford, Cardiff, Penn, Reaville, Klinesville, Croton, and Abbottstown soils. Legore, Montalto, Whiteford, and Penn soils are well drained. Cardiff and Klinesville soils have more than 35 percent rock fragments in the control section. Lehigh soils average less than 35 percent clay in the particle-size control section. Reaville and Abbottstown soils have redoximorphic depletions at a depth of more than 10 inches. Croton soils have a fragipan.

Typical pedon of Watchung silt loam, 0 to 8 percent slopes; about 1,000 feet from Emmittsburg on Route 140W, directly west, in a drainage area; lat. 39 degrees 43 minutes 05 seconds N. and long. 77 degrees 20 minutes 28 seconds W.

Oa—0 to 1 inch; black (10YR 2/1) muck.
Ap—1 to 9 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.
Btg1—9 to 19 inches; gray (7.5YR 5/1) clay loam; strong medium prismatic and angular blocky structure; firm; common fine and medium roots between prisms; moderately acid; gradual wavy boundary.
Btg2—19 to 61 inches; dark grayish brown (2.5Y 4/2), bluish gray (5B 5/1), and strong brown (7.5YR 5/6) clay; strong coarse prismatic and angular blocky structure; firm; common fine roots between prisms; neutral; clear wavy boundary.
Bt—61 inches; strong brown (7.5YR 5/6) and dark grayish brown (2.5Y 4/2) clay loam; moderate coarse prismatic and weak thin platy structure; firm; neutral.

The thickness of the solum ranges from 24 to 61 inches. Depth to bedrock is more than 60 inches. The content of rock fragments, including cobbles and stones, ranges from 0 to 15 percent throughout the profile.

The A horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 to 4. Texture is loam, silt loam, or silty clay loam.

The Bt horizon has hue of 7.5YR to 5Y or is neutral in hue, has value of 4 to 6, and has chroma of 0 to 3. Texture is clay, silty clay, or silty clay loam.

The C horizon has hue of 7.5YR to 5Y or is neutral in hue, has value of 4 to 6, and has chroma of 0 to 6. It is silt loam, loam, clay loam, or silty clay loam.

WcB—Watchung silt loam, 0 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Watchung and similar soils

Composition of map unit: 85 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: None noted
Drainage class: Poorly drained
Depth to seasonal high water table: 0.0 to 0.5 foot
Parent material: Clayey residuum weathered from diabase
Flooding: None
Available water capacity: Average of 10.0 inches

Additional Components

Legore and similar soils

Composition of map unit: 10 percent
Landform: Backslopes and footslopes

Montalto and similar soils

Composition of map unit: 5 percent
Landform: Backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Weverton Series

The Weverton series consists of deep, well drained soils. Permeability is moderate. These soils formed in colluvium derived from interbedded quartzite and quartz over residuum weathered from muscovite schist and phyllite. They are on gently sloping to steep,

convex mountain backslopes along South Mountain and Elk Ridge. Slopes range from 8 to 45 percent.

Weverton soils are similar to Bagtown soils and are commonly adjacent to Airmont, Braddock, Thurmont, Trego, and Dekalb soils. Airmont soils are in concave landform positions, have a fragipan, and are slowly permeable. Bagtown soils developed in the deeper deposits of colluvium and are moderately well drained. Dekalb soils are on ridgetops and shoulders and are moderately deep to bedrock. Trego soils are in the lower concave positions, have a fragipan, and are moderately well drained. Thurmont soils are in the lower convex colluvial positions and have fewer rock fragments the solum than the Weverton soils. Braddock soils are in the lower landform positions, average less than 35 percent rock fragments throughout, and average more than 35 percent clay.

Typical pedon of Weverton very flaggy loam, 3 to 8 percent slopes; Washington County, Maryland; approximately 200 feet south of the intersection of Route 67 and Main Street in Brownsville, approximately 1,100 feet east of Main Street; lat. 39 degrees 22 minutes 51 seconds N. and long. 77 degrees 39 minutes 13 seconds W.

Oi—0 to 4 inches; partially decomposed leaf and twig matter; 20 percent flagstones.

A—4 to 8 inches; black (10YR 3/1) very flaggy loam; weak fine granular structure; very friable; many fine roots; 20 percent flagstones, 15 percent cobbles, and 5 percent gravel; extremely acid; gradual wavy boundary.

E—8 to 13 inches; yellowish brown (10YR 5/6) extremely gravelly loam; weak medium subangular blocky structure; many fine and medium roots; common fine tubular pores; 65 percent gravel, 10 percent flagstones, and 5 percent cobbles; very strongly acid; clear wavy boundary.

Bt1—13 to 20 inches; brownish yellow (10YR 6/6) extremely gravelly loam; moderate medium subangular blocky structure; friable; common fine and coarse, many medium, and few coarse roots; many fine tubular pores and common fine vesicular pores; common faint discontinuous yellowish brown (10YR 5/6) clay films on faces of peds and in pores; 50 percent gravel and 10 percent channers; strongly acid; clear wavy boundary.

Bt2—20 to 35 inches; yellowish brown (10YR 5/6) very gravelly loam; moderate medium subangular blocky structure; friable; many medium roots and common fine and coarse roots; many fine and common medium tubular pores and common fine vesicular pores; many distinct strong brown (7.5YR 5/6) clay films on faces of peds and in pores; 25 percent gravel and 15 percent channers; very strongly acid; clear smooth boundary.

2Bt3—35 to 48 inches; strong brown (7.5YR 5/6) very channery loam; common fine and medium distinct yellowish brown (10YR 5/6) mottles between peds and common fine prominent light yellowish brown (2.5Y 6/4) mottles in cracks; moderate medium subangular blocky structure; friable; many fine and medium and common coarse roots; common medium tubular pores and many fine vesicular pores; prominent discontinuous strong brown (7.5YR 4/6) clay films on faces of peds and in pores; 25 percent schist channers and 10 percent gravel; strongly acid; clear wavy boundary.

2C—48 to 57 inches; yellowish red (5YR 5/8) and strong brown (7.5YR 5/6) channery loam; common medium prominent light yellowish brown (2.5Y 6/4) mottles; weak fine platy structure parting to massive; firm; common fine and medium roots; common fine tubular pores and common medium and many fine vesicular pores; 10 percent channers; strongly acid; abrupt smooth boundary.

R—57 inches; strongly cemented, highly fractured phyllite and schist.

The thickness of the solum ranges from 30 to 55 inches. Depth to hard bedrock is more than 60 inches. Depth to soft bedrock ranges from 40 to 60 inches. The content of rock fragments of quartzite, including gravel and flagstones, ranges from 35 to 70 percent. As much as 15 percent of the soil surface is covered with stones and boulders. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 to 3. Texture is sandy loam or loam.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6. Texture is sandy loam or loam.

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

The 2C horizon has hue of 5YR to 10YR, value of 5 to 8, and chroma of 5 or 6. Texture is loam, sandy loam, or silt loam.

WeC—Weverton-Hazel complex, 8 to 15 percent slopes, very stony

Setting

Landscape: Mountains

Component Description

Weverton and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Very flaggy loam
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly colluvium derived from quartzite or phyllite or gravelly residuum weathered from phyllite
Flooding: None
Available water capacity: Average of 2.7 inches

Hazel and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from phyllite
Flooding: None
Available water capacity: Average of 3.4 inches

Additional Components

Airmont and similar soils

Composition of map unit: 5 percent
Landform: Swales, depressions, and drainageways

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WeD—Weverton-Hazel complex, 15 to 25 percent slopes, very stony

Setting

Landscape: Mountains

Component Description

Weverton and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Very flaggy loam
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly colluvium derived from quartzite or phyllite or gravelly residuum weathered from phyllite
Flooding: None
Available water capacity: Average of 2.7 inches

Hazel and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from phyllite
Flooding: None
Available water capacity: Average of 3.4 inches

Additional Components

Bagtown and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WeE—Weverton-Hazel complex, 25 to 45 percent slopes, very stony

Setting

Landscape: Mountains

Component Description

Weverton and similar soils

Composition of map unit: 50 percent
Landform: Summits and backslopes
Surface layer texture: Very flaggy loam
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly colluvium derived from quartzite or phyllite or gravelly residuum weathered from phyllite
Flooding: None
Available water capacity: Average of 2.7 inches

Hazel and similar soils

Composition of map unit: 45 percent
Landform: Summits and backslopes
Surface layer texture: Gravelly loam
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from phyllite
Flooding: None
Available water capacity: Average of 3.4 inches

Additional Components

Bagtown and similar soils

Composition of map unit: 5 percent
Landform: Mountain backslopes and footslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Wheeling Series

The Wheeling series consists of very deep, well drained soils. Permeability is moderate. These soils formed in silty or loamy alluvial materials underlain at a depth of more than 40 inches by noncalcareous sand or sand and gravel. They are on nearly level and gently sloping river terraces that are not flooded or are rarely flooded. Slopes range from 0 to 8 percent.

Wheeling soils are similar to Walkersville soils and are commonly adjacent to Combs, Downsville, Lindside, and Melvin soils. Combs, Lindside, and Melvin soils are on active flood plains. Combs soils have a thick dark surface layer. Lindside soils are moderately well drained, and Melvin soils are poorly drained. Downsville soils average more than 35 percent rock fragments throughout. Walkersville soils average more than 35 percent clay throughout.

Typical pedon of Wheeling gravelly loam, 0 to 8 percent slopes; approximately 1,100 feet northwest of the confluence of the Monocacy and Potomac Rivers, 600 feet north of the Potomac River, in a crop field along the river; lat. 39 degrees 13 minutes 47 seconds N. and long. 77 degrees 27 minutes 09 seconds W.

Ap—0 to 9 inches; brown (10YR 4/3) gravelly loam; weak fine granular structure; friable; many fine and few medium roots; common fine and few medium tubular pores and common medium vesicular pores; 15 percent mixed gravel; slightly acid; clear smooth boundary.

Bt—9 to 35 inches; dark yellowish brown (10YR 4/6) clay loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; common fine tubular and vesicular pores and few medium tubular pores; few faint yellowish brown (10YR 5/6) clay films on faces of peds; 10 percent mixed gravel; strongly acid; gradual wavy boundary.

BC—35 to 63 inches; dark yellowish brown (10YR 4/6) sandy loam; weak coarse subangular blocky structure; firm; few fine roots; common fine and few medium tubular pores and many fine vesicular pores; few medium distinct brown (7.5YR 5/4) iron accumulations in pores; common medium prominent black (5YR 2.5/1) iron and manganese stains on faces of peds; 10 percent gravel; strongly acid; gradual wavy boundary.

C—63 to 72 inches; yellowish brown (10YR 5/6) loam; massive; firm; 5 percent mixed gravel; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The content of rock fragments ranges from 0 to 25 percent in the solum and from 0 to 65 percent in the substratum. In some areas noticeable mica flakes occur throughout the profile. In unlimed areas reaction is strongly acid or moderately acid throughout the profile.

The A and Ap horizons have hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. In pedons where the moist value is 3, the dry value is 6. Texture is fine sandy loam, sandy loam, loam, or silt loam.

The BE horizon, if it occurs, has hue of 10YR or

7.5YR, value of 4 or 5, and chroma of 3 to 6. Texture is loam or silt loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Texture is loam, silt loam, clay loam, or silty clay loam in the fine-earth fraction.

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

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. This horizon is stratified and ranges from very fine sand to sand. It has as much as 65 percent rock fragments. Thin strata of fine sandy loam and loam occur in some pedons.

WhB—Wheeling gravelly loam, 0 to 8 percent slopes

Setting

Landscape: River valleys

Component Description

Wheeling and similar soils

Composition of map unit: 85 percent
Landform: Stream terraces
Surface layer texture: Gravelly loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy old alluvium derived from sandstone and shale
Flooding: Rare
Available water capacity: Average of 7.5 inches

Additional Components

Penn and similar soils

Composition of map unit: 10 percent
Landform: Summits and backslopes

Reaville and similar soils

Composition of map unit: 5 percent
Landform: Saddles and swales

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Whiteford Series

The Whiteford series consists of deep, well drained soils. Permeability is moderate. These soils formed in residuum from slate, phyllite, or other fine-grained rock. They are on gently sloping to strongly sloping summits. Slopes range from 3 to 15 percent.

Whiteford soils are similar to Glenelg soils and are commonly adjacent to Buckeystown, Hagerstown, Duffield, Ryder, Adamstown, Funkstown, Penn, Reaville, Legore, Cardiff, and Montalto soils. Glenelg soils formed from micaceous schist. Buckeystown, Hagerstown, Ryder, Funkstown, Duffield, and Adamstown soils formed from limestone parent material. Cardiff soils are moderately deep. Montalto and Legore soils formed from diabase. Penn and Reaville soils formed from Triassic red shale.

Typical pedon of Whiteford channery loam in an area of Whiteford-Cardiff channery loams, 3 to 8 percent slopes; 0.25 mile west of the intersection of Renner Road and Creger Road, 800 feet southwest of Renner Road, in the area of Midway; lat. 39 degrees 33 minutes 56 seconds N. and long. 77 degrees 17 minutes 35 seconds W.

Ap—0 to 4 inches; brown (10YR 4/3) channery loam; moderate medium granular structure; very friable; many fine and common medium roots; 2 percent channers; strongly acid; clear smooth boundary.

AB—4 to 15 inches; brown (10YR 4/3 and 5/3) silt loam; common fine distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure parting to moderate medium granular; friable; many fine roots; 6 percent channers; strongly acid; clear smooth boundary.

Bt1—15 to 22 inches; brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; 12 percent channers; strongly acid; clear wavy boundary.

Bt2—22 to 35 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; many fine roots; few distinct discontinuous brown (7.5YR 5/4) clay films in root channels; 14 percent channers; very strongly acid; gradual wavy boundary.

Ct—35 to 50 inches; yellowish red (5YR 5/8) extremely channery silty clay loam; weak thick platy structure; friable; few distinct discontinuous yellowish brown (10YR 5/4) clay films on rock fragments; 66 percent channers; very strongly acid; clear irregular boundary.

C—50 to 72 inches; brown (7.5YR 5/4) extremely channery silt loam; common medium distinct olive (5Y 5/3) and common medium distinct bluish gray (5B 5/1) mottles around stones; thick platy

structure; friable; few distinct discontinuous strong brown (7.5YR 5/8) iron stains on rock fragments; 68 percent channers; very strongly acid.

The thickness of the solum ranges from 20 to 42 inches. Depth to bedrock is more than 60 inches. The content of flat rock fragments, consisting of slate, channers, and flagstone, ranges from 0 to 25 percent in the solum and from 30 to 70 percent in the substratum. Reaction is strongly acid or very strongly acid except in limed areas, and acidity commonly increases as depth increases.

The A, AB, and E horizons have hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 to 4. Value of 3 only occurs in the A horizon.

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

The C horizon has hue of 7.5YR to 10R, value of 3 to 5, and chroma of 3 to 6. It is silt loam or silty clay loam in the fine-earth fraction.

WrB—Whiteford-Cardiff channery loams, 3 to 8 percent slopes

Setting

Landscape: Uplands

Component Description

Whiteford and similar soils

Composition of map unit: 60 percent
Landform: Ridges, summits, and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from slate
Flooding: None
Available water capacity: Average of 6.7 inches

Cardiff and similar soils

Composition of map unit: 40 percent
Landform: Ridges, summits, and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from slate
Flooding: None
Available water capacity: Average of 4.6 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

WrC—Whiteford-Cardiff channery loams, 8 to 15 percent slopes

Setting

Landscape: Uplands

Component Description

Whiteford and similar soils

Composition of map unit: 60 percent
Landform: Ridges, summits, and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: None noted
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Loamy residuum weathered from slate
Flooding: None
Available water capacity: Average of 6.7 inches

Cardiff and similar soils

Composition of map unit: 40 percent
Landform: Ridges, summits, and backslopes
Surface layer texture: Channery loam
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Depth to seasonal high water table: More than 6 feet
Parent material: Gravelly residuum weathered from slate
Flooding: None
Available water capacity: Average of 4.6 inches

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

Wiltshire Series

The Wiltshire series consists of very deep, moderately well drained soils. Permeability is slow. These soils formed in colluvium weathered from phyllite and schist over marble. They occur in swales and drainageways. Slopes range from 0 to 8 percent.

Wiltshire soils are similar to Funkstown soils and are commonly adjacent to Benevola, Adamstown, Hagerstown, Conestoga, and Letort soils. Funkstown soils do not contain a fragipan. Benevola and Hagerstown soils are well drained. Adamstown soils formed in local colluvium over limestone. Conestoga and Letort soils are well drained and formed from micaceous schist and phyllite.

Typical pedon of Wiltshire silt loam in an area of Wiltshire-Funkstown complex, 0 to 8 percent slopes; approximately 1 mile east of New Market, about 1,650 feet north of Route 144 and 650 feet west of Detrick Road, in a pasture; lat. 39 degrees 23 minutes 25 seconds N. and long. 77 degrees 14 minutes 40 seconds W.

Ap1—0 to 4 inches; dark yellowish brown (10YR 3/4) silt loam; strong fine granular structure; friable; many fine roots; 13 percent mixed igneous and metamorphic gravel; neutral; abrupt smooth boundary.

Ap2—4 to 10 inches; dark brown (7.5YR 3/3) gravelly silt loam; strong medium subangular blocky structure parting to strong medium granular; friable; many fine roots; 25 percent mixed igneous and metamorphic gravel; neutral; abrupt smooth boundary.

BE—10 to 15 inches; brown (7.5YR 4/4) gravelly silt loam; weak coarse subangular blocky structure; friable; many fine roots; many coarse tubular pores; few faint discontinuous brown (7.5YR 4/4, moist) organic stains on faces of peds and in pores; 5 percent mixed igneous and metamorphic gravel; neutral; clear wavy boundary.

Bt—15 to 29 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; friable; many fine roots throughout; many fine and common medium and coarse tubular pores; clay films on faces of peds and in pores; few distinct strong brown (7.5YR 4/6) iron stains on faces of peds and few prominent black (N 2.5/0, moist) manganese stains on faces of peds; 10 percent mixed igneous and metamorphic gravel; neutral; abrupt wavy boundary.

Bx—29 to 43 inches; dark yellowish brown (10YR 4/6) loam; weak coarse and very coarse prismatic structure parting to moderate medium platy; firm; common fine roots between peds; common fine vesicular pores and common very fine and fine tubular pores; common fine and medium distinct grayish brown (10YR 5/2) iron depletions between peds and common fine and medium distinct strong brown (7.5YR 4/6) soft plinthite nodules between peds; 12 percent subrounded mixed igneous and metamorphic gravel; slightly acid; abrupt wavy boundary.

2C1—43 to 51 inches; brown (7.5YR 4/4) very gravelly clay loam; weak thin platy structure; firm in place; friable; 45 percent mixed igneous and metamorphic gravel; slightly acid; abrupt smooth boundary.

2C2—51 to 62 inches; yellowish red (5YR 4/6) extremely gravelly loam; massive; friable; 60 percent mixed igneous and metamorphic gravel; slightly acid; clear smooth boundary.

2C3—62 to 98 inches; (7.5YR 4/4) extremely channery sandy loam; common coarse distinct reddish brown (5YR 4/4) mottles; massive; friable; 80 percent schist basic channers; slightly acid.

The thickness of the solum ranges from 30 to 50 inches. Depth to bedrock is more than 5 feet. Depth to the fragipan ranges from 25 to 45 inches. The content of rock fragments, consisting of mixed igneous and metamorphic rocks such as phyllite, schist, calcareous schist and phyllite, marble, and greenstone, ranges from 0 to 25 percent in the horizons above the fragipan and from 25 to 80 percent in the C horizon. Reaction ranges from strongly acid to neutral.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam, loam, clay loam, or silty clay loam in the fine-earth fraction.

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

The Bt horizon has hue of 5YR to 10YR and value and chroma of 4 to 6. Texture is silt loam, loam, clay loam, or silty clay loam in the fine-earth fraction.

The Bx horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam or loam in the fine-earth fraction. Depth to discontinuity ranges from 25 to 40 inches. Redoximorphic features are common throughout the horizon. Prism faces are approximately 7 to 12 inches apart.

The 2C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. Texture is loam, silt loam, sandy clay loam, or sandy loam in the fine-earth fraction.

WtB—Wiltshire-Funkstown complex, 0 to 8 percent slopes

Setting

Landscape: Valleys
Note: There is a moderate potential for sinkhole development.

Component Description

Wiltshire and similar soils

Composition of map unit: 60 percent
Landform: Concave swales and drainageways
Surface layer texture: Silt loam
Depth to restrictive feature: 28 to 40 inches to a fragipan
Drainage class: Moderately well drained
Depth to seasonal high water table: 1.5 to 3.0 feet
Parent material: Loamy colluvium over marble
Flooding: None
Available water capacity: Average of 8.5 inches

Funkstown and similar soils

Composition of map unit: 30 percent
Landform: Swales, depressions, and drainageways
Surface layer texture: Gravelly silt loam
Depth to restrictive feature: None noted
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.5 feet
Parent material: Colluvium over residuum weathered from limestone
Flooding: Frequent
Available water capacity: Average of 9.6 inches

Additional Components

Adamstown and similar soils

Composition of map unit: 5 percent
Landform: Swales and saddles

Benevola and similar soils

Composition of map unit: 5 percent
Landform: Summits and backslopes

A typical description of each soil is included, in alphabetical order, in this section. Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Contents").

Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

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 forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as 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.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, slightly limited, somewhat limited,* and *very limited.* The suitability ratings are expressed as *well suited, moderately well suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor.*

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

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

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 11. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area 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 also are considered *(13)*.

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

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

Crops other than those shown in table 11 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 forestland or engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their

use to pasture, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in the yields table.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 12. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 10. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Tables 13 and 14 show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste,

application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are generally favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that soil blowing or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that soil blowing or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties

that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of groundwater pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of soil blowing or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Forest Productivity and Management

Mike Kay, Maryland Forest Service, helped prepare this section.

Historical accounts of the early forests of Frederick County indicate that white pine, American chestnut, and other assorted hardwoods dominated the canopy. Many of the species common today (oak, hickory, maple, and ash) occurred to a lesser extent in the early forests. After European settlement of the survey area, there was extensive cutting of the forests to provide fuel and wood products and to clear the land for agriculture. With the dawn of the Industrial Revolution, a renewed emphasis was created to cut

trees for charcoal to fuel the many foundries in the area. Charcoal pits are observable throughout the mountains, several of which were used in the Catoctin Furnace, as well as others. Following the cuttings, the survey area had several large forest fires which may have been intentionally started to promote blueberry cultivation. During the early part of the 20th century, heavy cutting had ended and forest fires were suppressed so that the young forests were allowed to grow. As a result, an even-aged assortment of shade-intolerant species and/or fire-dependent species assumed a dominant position in the canopy (chestnut, oak, tulip poplar, white ash, and pitch pine). In the early 1900's, the chestnut blight fungus entered the country, killing most of the chestnut stems and thus removing them from the forest overstory. As a result, oaks became the dominant species throughout most of the county, especially in the drier upland areas. During the 1980's, the leading edge of gypsy moth passed through the area, leaving behind large areas of defoliated oak stands. This defoliation combined with a number of drought years and other stresses produced heavy mortality rates throughout much of the areas dominated by oak. In certain areas, heavy mortality rates for oak resulted in a more mixed type of forest that includes such species as red maple, sassafras, black birch, and blackgum.

Frederick County is part of the Appalachian Hardwood Region of the United States, and deciduous trees dominate the forest. Evergreens make up a small part of the canopy, rarely forming the dominant trees except on ridgetops and where plantations were established. Most of the large pine plantations in existence were planted during the late 1950's and early 1960's. Nearly 131,000 acres, or 34 percent of the county, is forested. About 92 percent of the woodland is privately owned, and the average tract is 34 acres in size. About 8 percent of the county's wooded acreage is publicly owned. This acreage includes the Frederick City Watershed, Thurmont Watershed, C&O Canal, Catoctin Mountain National Park, Cunningham Falls State Park, Gambrill State Park, and Walkersville and Emmitsburg Watersheds.

The most common trees targeted by the timber industry include red oak, white oak, white ash, tulip poplar, sugar maple, black walnut, and mixed oaks. Approximately 40 logging jobs occur on about 800 acres throughout the county each year. The most common methods of logging are single tree selection and diameter base cutting. Approximately 400 wildfires burn about 200 acres in Frederick County annually, and about 200 acres of trees are planted each year.

The Blue Ridge province from South Mountain to the eastern footslope of Catoctin Mountain, including Sugarloaf Mountain, is dominated by an oak-hickory association. Chestnut oak, scarlet oak, black oak, white oak, red maple, and pine occur on ridges and the upper backslopes, and red oak, white oak, tulip poplar, shagbark hickory, red maple, sugar maple, black cherry, and black walnut occur on middle backslopes down to the footslopes. Sycamore, red maple, silver maple, black walnut, pin oak, swamp white oak, locust, green ash, and boxelder are common in the flood plain areas. In the mountainous areas, Myersville, Catoctin, Spoolsville, Highfield, Edgemont, Stumptown, and Bagtown soils occur on ridges and the upper backslopes; Ravenrock, Highfield, Bagtown, and Airmont soils are on the middle to lower backslopes; and Lantz, Rohrersville, Mt. Zion, Thurmont, Murrill, and Trego soils occur on footslopes and in drainageways. Generally, these soils are too steep and too stony for the production of agricultural crops and for carrying out most agricultural practices.

In the Middletown Valley, located between South and Catoctin Mountains, the composition and location of tree species are identical to those in the mountains, except in the Wolfsville area and northward. The trees in this area are referred to as the Allegheny Hardwoods, where northern tree species such as basswood, ash, hemlock, sugar maple, red oak, and white oak are common, making up the mixed forest that occupies the middle backslope to footslope positions. Soils common throughout the Middletown Valley include Myersville, Catoctin, Spoolsville, and Highfield soils on summits and backslopes, Ravenrock and Highfield soils on middle to lower backslopes, and Lantz, Rohrersville, and Mt. Zion soils in swales, depressions, and drainageways.

The most western portion of the Piedmont Plateau is composed of a sedimentary geology that includes limestone and Triassic red shales. Much of the land in these areas has been cleared for the purpose of farming, and, as a result, forested areas are primarily associated with rock outcrops, drainageways, and areas too wet to be farmed. The oak-hickory association dominates the rocky and drier upland positions while species such as sycamore, locust, boxelder, red maple, silver maple, and swamp white oak are common in wet areas. In the limestone areas, Hagerstown, Duffield, Ryder, and Buckeystown soils are common in the upland positions and Adamstown and Funkstown soils occupy the lower landform positions and drainageways. In areas of the Triassic shale geology, Penn and Klinesville soils are in the drier upland positions, Reaville soils are in the

intermediate landform positions, and Croton and Abbottstown soils are in upland depressions and drainageways.

The remainder of the Piedmont Plateau is composed of metamorphic rocks, such as schist and phyllite. Some areas within these rock types have acidic properties while other areas are basic. Forest composition for this part of the Piedmont Plateau is identical to that of the Blue Ridge province. Oak-hickory dominates the summits and upper backslopes, the mixed hardwoods dominate the middle backslopes to footslopes, and trees such as sycamore, swamp white oak, locust, and ash are in the drainage areas. In the acidic areas, soils on summits are dominantly Glenelg soils, those on shoulders and backslopes are Mt. Airy, Brinklow, and Blocktown soils, and those in drainageways are Glenville, Hatboro, and Codorus soils. In the more highly alkaline areas, the soils on summits are Conestoga soils, those on backslopes are Linganore and Hyattstown soils, and those in swales, depressions, and drainageways are Wiltshire and Funkstown soils.

The health and composition of present and future forests are influenced by several factors. Presently, some of the more obvious threats to the forest are an increasing population, development, high grading of timber stands, introduced or invasive species, insects and disease, and deer browsing. Gypsy moth and the decline of oak populations will continue to affect oak-dominated stands, eventually creating different structural and compositional changes within the forest. Dutch elm disease and elm yellows are presently killing many of the elms in the county, and dogwood anthracnose has impacted many of the flowering dogwoods, especially in the mountainous areas.

The tables in this section can help forest owners or managers plan the use of soils for wood crops. They show the potential productivity of the soils for wood crops and rate the soils according to the limitations that affect various aspects of forest management.

Forest Productivity

In table 15, the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number *(20)*. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Forest Management

In tables 16 through 19, interpretive ratings are given for various aspects of forest management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified forest management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately well suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified forest management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms for fire damage and seedling mortality are expressed as *low, moderate,* and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage or seedling mortality is

highest (1.00) and the point at which the potential is lowest (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils for forest management practices. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet (http://nsscnt.nssc.nrcs.usda.gov/nfm/).

For *limitations affecting construction of haul roads and log landings*, the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding. The limitations are described as slight, moderate, or severe. A rating of *slight* indicates that no significant limitations affect construction activities, *moderate* indicates that one or more limitations can cause some difficulty in construction, and *severe* indicates that one or more limitations can make construction very difficult or very costly.

The ratings of *suitability for log landings* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited to use as log landings.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forest equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Ratings in the column *hazard of off-road or off-trail erosion* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, that the roads or trails may require occasional maintenance; and that simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately well suited, or poorly suited to this use.

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately well suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for use of harvesting equipment* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately well suited, or poorly suited to this use.

Ratings in the column *suitability for mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Recreation

Tim Palmer, Department of Natural Resources of the State of Maryland, and Bob Failor, Assistant Administrator, Bureau of Parks and Recreation, Department of Public Works, Frederick County, helped prepare this section.

Frederick County has a variety of recreational opportunities for local citizens and visiting tourists. The State owns 10,980 acres of park land which includes Cunningham Falls State Park, Washington Monument State Park, Gathland State Park, and Gambrill State Park. The major activities in these parks are hunting, fishing, hiking, camping, swimming, bird-watching, and boating. Within the State Parks are designated wildlife management areas, fish management areas, and natural management areas which provide hunting and fishing.

Federal recreation areas include Monocacy National Battlefield, Sugarloaf Mountain, C&O Canal Towpath, and Catoctin National Park. These areas offer recreational opportunities that include golf, fishing, hunting, water activities, and biking and walking trails.

There are 15 county parks in Frederick County that have a variety of facilities, including ball fields, picnic shelters and tables, fishing areas, soccer fields, tennis courts, and trails. These parks are accessible to the public and are scattered throughout the county.

The best soils in the county for most recreational uses are deep, well drained soils that have few or no stones on the surface. Soils in areas of Catoctin Mountain and South Mountain have stony surfaces and are severely limited for intensive recreational use. These soils, however, have potential for recreational uses that require only slight land alteration, for example, hiking trails such as the Appalachian Trail. The soils that have the poorest potential for recreational use are poorly drained and very poorly drained soils and steep and very steep soils.

The soils of the survey area are rated in tables 20 and 21 according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 20 and 21 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

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 ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas.

The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability,

the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology *(3, 9, 17, 18)*. Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part *(5)*. These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or a nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established *(6)*. These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" *(16)* and "Keys to Soil Taxonomy" *(15)* and in the "Soil Survey Manual" *(14)*.

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" *(8)*.

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

The following map units meet the definition of hydric soils and, in addition, have at least one of the hydric soil indicators. The list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site *(8, 9)*.

BcB Baile-Glenville silt loams, 0 to 8 percent slopes
CgA Codorus and Hatboro silt loams, 0 to 3 percent slopes
CrA Croton-Abbottstown silt loams, 0 to 3 percent slopes
CrB Croton-Abbottstown silt loams, 3 to 8 percent slopes
FxA Foxville and Hatboro soils, 0 to 3 percent slopes
GuB Glenville-Baile silt loams, 3 to 8 percent slopes
HdA Hatboro-Codorus silt loams, 0 to 3 percent slopes
LaB Lantz-Rohrersville silt loams, 0 to 8 percent slopes, extremely stony
MaA Melvin-Lindside silt loams, 0 to 3 percent slopes
RoB Rohrersville-Lantz silt loams, 0 to 8 percent
WcB Watchung silt loam, 0 to 8 percent slopes

Map units that are made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The following map unit, in general, does not meet the definition of hydric soils because it does not have one of the hydric soil indicators. A portion of this map unit, however, may include hydric soils. Onsite investigation is recommended to determine whether hydric soils occur and the location of the included hydric soils.

RmA Reaville silt loam, 0 to 3 percent slopes

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified *(21)*. 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 between the surface and a depth of 5 to 7 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 particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, 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

Figure 12.—A storm water management pond in an area of Duffield-Hagerstown-Urban land complex, 3 to 8 percent slopes, helps to control runoff and filter sediment. Storm water management and groundwater contamination are major concerns in the limestone regions of Frederick County.

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 (fig. 12), 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

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 22 and 23 show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and

numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

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 soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table;

ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Tables 24 and 25 show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

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 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

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. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Groundwater contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, 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. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless

otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of groundwater pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid 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. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

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. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to soil blowing.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

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. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Tables 26 and 27 give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

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 26, only the likelihood 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 Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is an unlikely source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential

sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In table 27, 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 whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a 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 AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

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. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

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 28 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned

construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

Aquifer-fed excavated ponds are pits or dugouts that extend to a groundwater aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained 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 particle-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 are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 29 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

USDA 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 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

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

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-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 particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

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

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

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

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-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 generally omitted in the table.

Physical Properties

Table 30 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 30, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and 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 $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). *The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.*

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

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 30, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 30 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

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

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to soil blowing in cultivated areas. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility to soil blowing, or the tons per acre per year that can be expected to be lost to soil blowing. There is a close correlation between soil blowing and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence soil blowing.

Chemical Properties

Table 31 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of groundwater pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

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

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Water Features

Table 32 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four

groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 32 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 32 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

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

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

Soil Features

Table 33 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

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

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

References

(1) American Association of State Highway and Transportation Officials (AASHTO). 2000. Standard specifications for transportation materials and methods of sampling and testing. 20th edition, 2 volumes.

(2) American Society for Testing and Materials (ASTM). 2001. Standard classification of soils for engineering purposes. ASTM Standard D 2487-00.

(3) Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

(4) Edwards, Jonathon. Various quads in Frederick County. Geology map of the Frederick Valley, Maryland. Department of Natural Resources, Maryland Geological Survey.

(5) Federal Register. July 13, 1994. Changes in hydric soils of the United States.

(6) Federal Register. February 24, 1995. Hydric soils of the United States.

(7) Frederick County Department of Planning and Zoning. October 1998. Frederick County comprehensive plan, Volume 1. pp. 5-1 to 5-4.

(8) Hurt, G.W., P.M. Whited, and R.F. Pringle, editors. Version 4.0, 1998. Field indicators of hydric soils in the United States.

(9) National Research Council. 1995. Wetlands: Characteristics and boundaries.

(10) Olsen, Eileen. Frederick County, Maryland: Its proud historic past, desirable present, and a confident future. The Historical Society of Frederick County, Inc.

(11) Regional Economic Information System, Bureau of Economic Analysis. Bearfacts, Frederick Maryland, 1987-1997. (http://govinfo.library.orst.edu/cgi-bin/bfact?8_9_05_021>md)

(12) Rhienhart, Juergen. 1974. Geology map of the Frederick Valley, Maryland.

(13) Robinette, C.E. 1975. Corn yield study on selected Maryland Soil Series.

(14) Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

(15) Soil Survey Staff. 1998. Keys to soil taxonomy. 8th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

(16) Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

(17) Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

(18) United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

(19) United States Department of Agriculture. 1960. Soil survey of Frederick County, Maryland.

(20) United States Department of Agriculture, Forest Service. 1976. Volume, yield, and stand tables for second-growth southern pines. Forest Service Miscellaneous Publication 50.

(21) United States Department of Agriculture, Natural Resources Conservation Service. National engineering handbook. (Available in the State Office of the Natural Resources Conservation Service in Annapolis, Maryland)

(22) United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (http://www.statlab.iastate.edu/soils/nssh/)

Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

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.

Alluvial cone. The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas 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

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and

other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse-grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological 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 ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, 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.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

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.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

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 as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

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.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Head out. To form a flower head.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

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 the 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

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
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.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

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 wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

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.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

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 movement of water through the soil.

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 or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

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.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

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.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in

situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. An exposure of bedrock at the surface of the earth.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-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. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

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.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

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.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

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.

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 generally is 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 percent
Gently sloping	3 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	45 to 65 percent

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Sodic (alkali) 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.

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

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
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 material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide

vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

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.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse-grained particles that are well distributed

over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).