United States
Department of
Agriculture

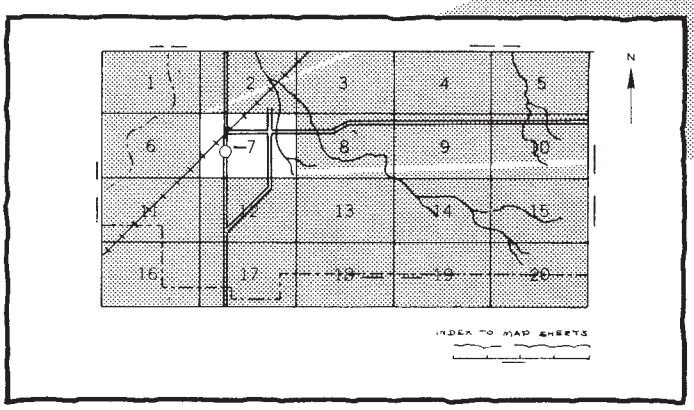
Soil
Conservation
Service
and Forest Service

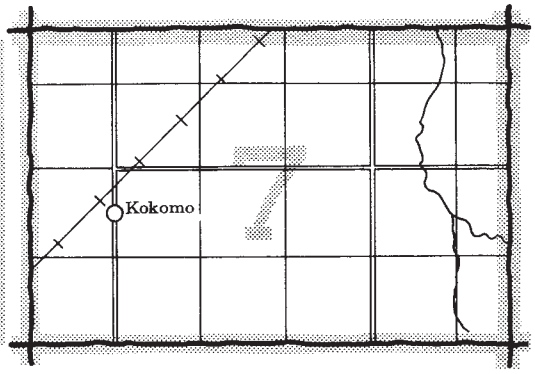
In cooperation with
Virginia Polytechnic Institute and
State University

Soil Survey of Pulaski County, Virginia

HOW TO USE

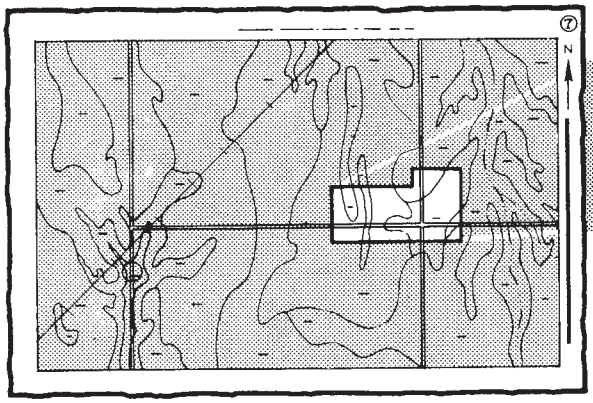
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

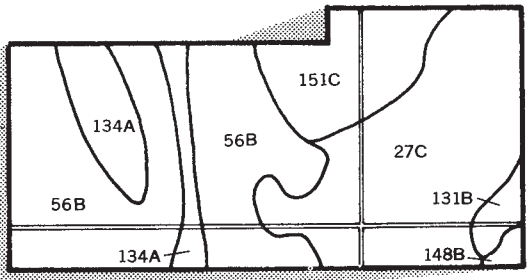




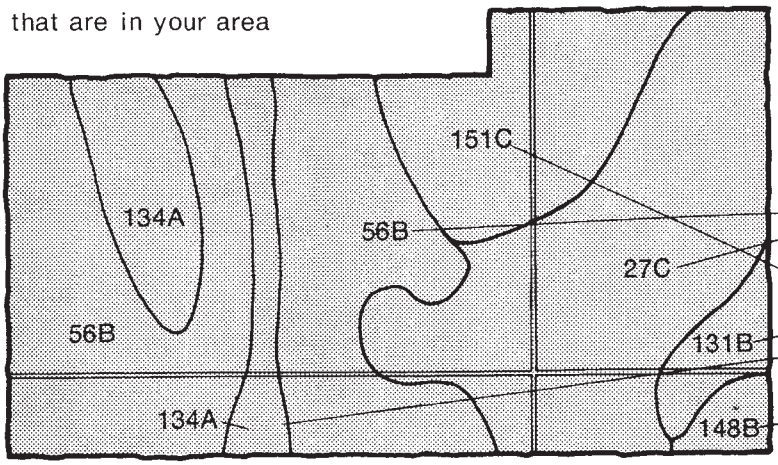
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

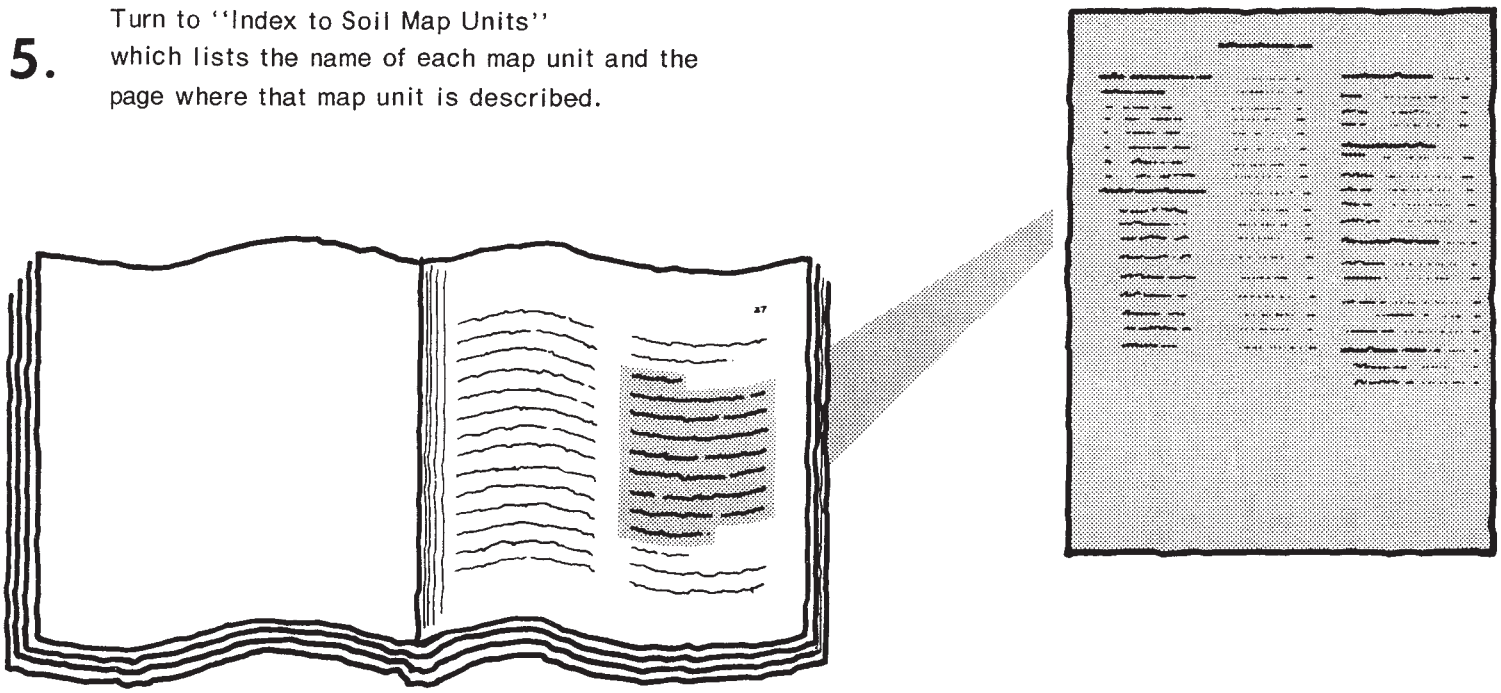


Symbols

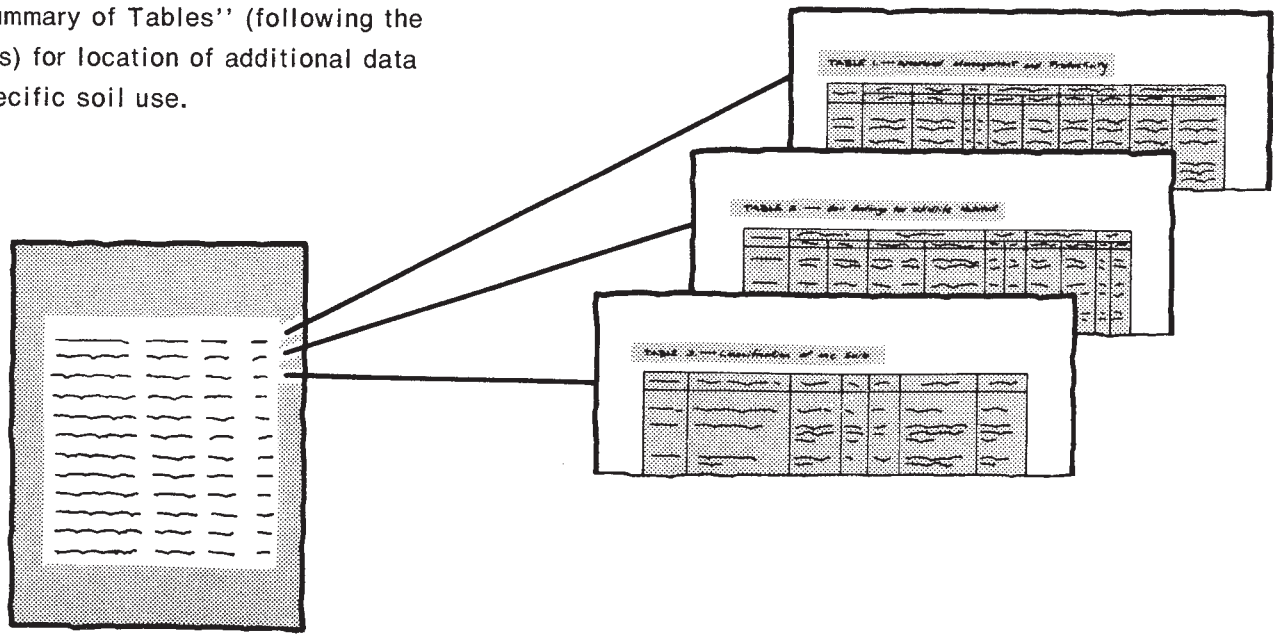
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



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



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

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

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, the Radford Army Ammunition Plant, U.S. Department of the Army, and the Virginia Polytechnic Institute and State University. The survey was financed in part by the Virginia Soil and Water Conservation Commission and the Pulaski County Board of Supervisors. The survey is part of the technical assistance furnished to the Skyline Soil and Water Conservation District.

Cover: Groseclose and Poplimento silt loams, 7 to 15 percent slopes, are well suited to hay production and are important farmland in this county.

Contents

Soil Series

Issued May 1985

Index to Map Units

Summary of Tables

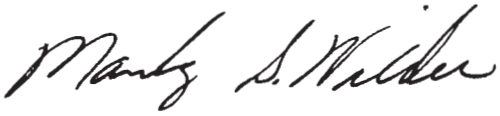
Foreword

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

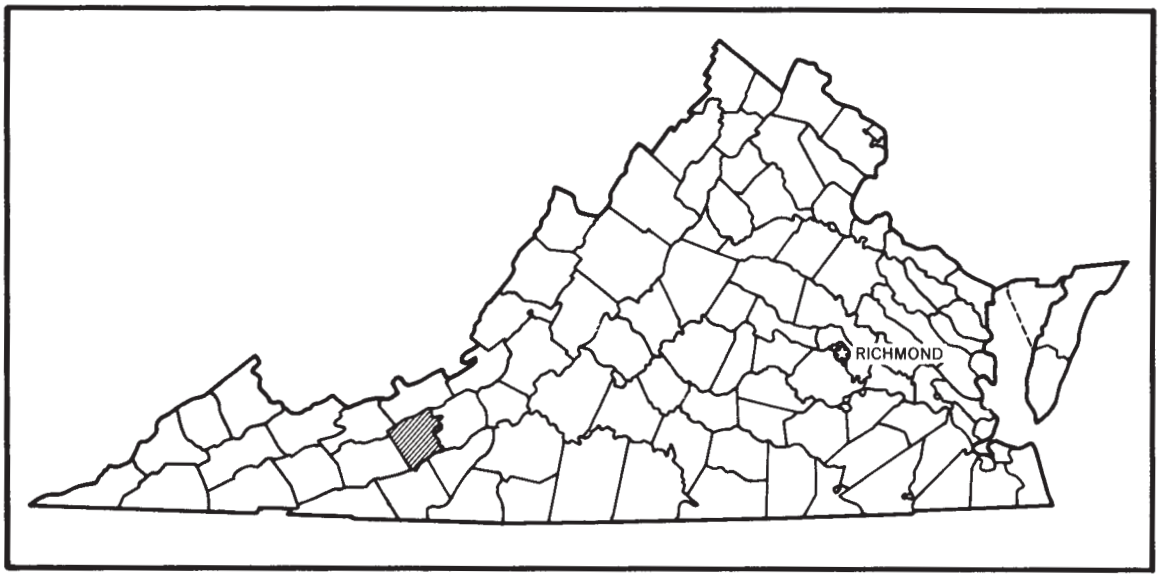
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey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

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

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



Manly S. Wilder
State Conservationist
Soil Conservation Service



Location of Pulaski County in Virginia.

Soil survey of
Pulaski County, Virginia

By Phil M. Cauley, Robert K. Conner, Roy L. Vick,
Bruce A. Poulon, Richard C. Cronce, Tom L. Arnold,
Calvin K. Staples, and Dean A. Gall

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

PULASKI COUNTY is in southwestern Virginia about 70 miles west-southwest of Roanoke. The county consists of 190,080 acres. The population of the county is about 20,000.

In 1839 an act of the Virginia General Assembly formed Pulaski County from parts of Montgomery and Wythe Counties. The same act named the county in honor of Count Casimir Pulaski, a Polish nobleman who fought under George Washington during the Revolution.

Most of Pulaski County is in the Southern Appalachian Ridge and Valley major land resource area, but a small area in the southern part of the county is in the Blue Ridge major land resource area (*3*).

Livestock farming and dairying are the major farm enterprises in the county. Many of the farms are small and are operated on a part-time basis. The major farming areas are in the rolling valley in the central part of the county. The main nonfarm industries consist of mining and the production of textiles, furniture, paint pigments, and trucking equipment.

Interstate Route 81, which traverses the center of the county in a northeast-southwest direction, and US Route 11 are the major traffic arteries in the county. Local air service is available at the New River Valley airport near Dublin, and rail service is available at Dublin, Pulaski, Draper, Hiwassi, and Allisonia.

Water Supply

Water for the communities and industries in Pulaski County comes from many different sources. The towns of Pulaski and Dublin obtain water from the Gatewood and Hogan Reservoirs. These two reservoirs have a combined capacity of about 1.5 billion gallons. A plant with a rated capacity of 3 million gallons per day treats an average daily flow of about 2.5 million gallons. The distribution system provides a total storage capacity of about 3 million gallons.

Some industry in the county obtains water from Claytor Lake. About 2.25 million gallons per day is treated before delivery to storage reservoirs with a total capacity of 2 million gallons. The community of Fairlawn has its own water system consisting of two wells and 3 tanks with a combined capacity of 11,000 gallons. The State of Virginia operates two water systems in the county, both of which use a well as their water source.

Drilled wells are a source of water for many subdivisions in the county, and most homes in the rural areas of the county use well or spring water.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Pulaski in the period 1960 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 32 degrees F, and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred at Pulaski on January 16, 1972, is -12 degrees. In summer the average temperature is 70 degrees, and the average daily maximum temperature is 82 degrees.

The highest recorded temperature, which occurred at Pulaski on June 30, 1968, is 96 degrees.

Growing degree days are shown in table 3. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 37 inches. Of this, 20 inches, or 55 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 17 inches. The heaviest 1-day rainfall during the period of record was 3.75 inches at Pulaski on May 29, 1973. Thunderstorms occur on about 40 days each year, and most occur in summer.

The average seasonal snowfall is about 8 inches. The greatest snow depth at any one time during the period of record was 11 inches. On an average of 15 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southeast. Average windspeed is highest, 10 miles per hour, in winter.

How This Survey was Made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General Soil Map Units" and "Detailed Soil Map Units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, and woodland managers, engineers, planners, developers and builders, home buyers, and others.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

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

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

Soil Descriptions

Dominantly sloping to steep soils that are deep to shallow

These map units consist mainly of loamy soils formed in materials weathered from sandstone and shale in mountainous areas. The units are on long, narrow ridgetops and long, smooth, convex side slopes. Numerous deep, parallel drainageways dissect the side slopes.

The soils in these map units are best suited to woodland. Many of the soils are too steep or too stony for cultivated crops. Some sloping and moderately steep areas are used for pasture and hay, but the soils are droughty. The soils in these units generally are poorly suited to most types of community development. The depth to bedrock and the slope are the main limitations.

1. Nolichucky-Berks

Deep or moderately deep, sloping to steep soils that have a loamy subsoil; formed in colluvial material weathered from sandstone or in material weathered from shale

This unit consists of a long, southeast-facing mountain ridgetop, of side slopes, and of a valley floor. The ridgetop is narrow and uniform in elevation. The upper part of the side slopes consists of steep, concave slopes and broad benches. The lower parts are dissected by many parallel drainageways. Slopes range from 7 to 65 percent.

This unit makes up about 4 percent of the survey area. The unit is about 50 percent Nolichucky soils, 13 percent Berks soils, and 37 percent minor soils.

The Nolichucky soils generally are on the upper concave side slopes and benches. They are more than 60 inches deep to bedrock, and they have a surface layer of brown very gravelly sandy loam and a subsoil of yellowish brown gravelly loam or loam and yellowish red clay loam.

The Berks soils are on the lower slopes. They are 20 to 40 inches deep to bedrock, and they have a surface layer of brown shaly silt loam and a subsoil of yellowish brown very shaly silt loam.

The dominant minor soils are Cotaco soils on the valley floor, Gilpin soils along the lower side slopes, and Lily and Ramsey soils along the ridgetop.

Almost all of the acreage of this unit is steep, mountainous terrain. Upland oaks and hickory cover the slopes near the ridge. On the lower slopes, Virginia pine, eastern white pine, and Table-Mountain pine dominate the western slopes, and upland oaks, hickory, and yellow poplar dominate the eastern slopes. The potential productivity for woodland is high or moderately high on northeast-facing slopes and moderately high or moderate on southwest-facing slopes. The Jefferson National Forest occupies part of this unit.

Slope makes the soils generally unsuited to farming and is the main limitation for community development.

2. Berks-Gilpin

Moderately deep, moderately steep to very steep soils that have a loamy subsoil; formed in material weathered from shale

This unit consists of a long, northwest-facing side slope on Little Walker Mountain and Cloyds Mountain and most of Draper Mountain, Chestnut Mountain, and Robinson Tract Mountain. The soils are dissected by many deep, V-shaped valleys. Slopes range from 15 to 65 percent.

This unit makes up about 9 percent of the survey area. The unit is about 40 percent Berks soils, 30 percent Gilpin soils, and 30 percent minor soils. The Berks and

Gilpin soils are intermingled on narrow ridgetops and steep, convex side slopes.

The Berks soils are 20 to 40 inches deep to bedrock, and they have a surface layer of brown shaly silt loam and a subsoil of yellowish brown very shaly silt loam.

The Gilpin soils are 20 to 40 inches deep to bedrock and have a surface layer of yellowish brown silt loam and a subsoil of reddish yellow silty clay loam and shaly silty clay loam.

The dominant minor soils are Monongahela soils on lower, concave slopes, Nolichucky soils on toe slopes, and rock outcrop and Klinesville soils on steep, convex side slopes.

Almost all of the acreage of this unit is steep, mountainous terrain. Upland oaks and hickory cover the slopes near the ridge. On the lower slopes, Virginia pine, eastern white pine, and Table-Mountain pine dominate the western slopes, and upland oaks, hickory, and yellow poplar dominate the eastern slopes. The potential productivity for woodland is high or moderately high on northeast-facing slopes and moderately high or moderate on southwest-facing slopes. The Jefferson National Forest occupies part of this unit.

Slope makes the soils generally unsuited to farming and is the main limitation for community development.

3. Leck Kill-Rayne-Gilpin

Deep and moderately deep, sloping to steep soils that have a loamy subsoil; formed in material weathered from shale

This unit consists of a long, southeast-facing mountain ridgetop, a side slope, and foot slopes. The ridgetop is narrow and uniform in elevation. The side slope consists mainly of steep, convex slopes and heads of drainageways. The foot slopes have long, narrow benches cut by deep, parallel drainageways. Slopes range from 7 to 65 percent.

This unit makes up about 5 percent of the survey area. The unit is about 21 percent Leck Kill soils, 21 percent Rayne soils, 18 percent Gilpin soils, and 40 percent minor soils.

The Leck Kill soils are sloping or moderately steep and are on the lower side slopes and foot slopes. The Leck Kill soils are 40 to 60 inches deep to bedrock and have a surface layer of dark reddish gray silt loam and a subsoil of red and reddish brown silty clay loam.

The Rayne soils are sloping or moderately steep and are more than 40 inches deep to bedrock. They are on the lower side slopes and foot slopes. They have a surface layer of brown silt loam and a subsoil of strong brown loam and very shaly loam.

The Gilpin soils are along the ridgetop and on the upper side slopes. They are sloping to steep and are 20 to 40 inches deep to bedrock. They have a surface layer of yellowish brown silt loam and a subsoil of reddish yellow silty clay loam and shaly silty clay loam.

The dominant minor soils are Lily soils along the ridgetop and upper side slopes, Klinesville soils in deep drainageways that dissect the foot slopes, and Berks soils also along the drainageways of foot slopes.

Almost all of the acreage of this unit is covered by woodland. A few small areas on the foot slopes are used for farming. The dominant trees in the area are upland oaks and hickory, eastern white pine, Virginia pine, and Table-Mountain pine. Yellow poplar is common in the coves and drainageways of foot slopes. The Jefferson National Forest occupies part of this unit.

Slope limits the unit for farming and, along with the depth to bedrock, is a major limitation for community development.

4. Klinesville-Berks

Shallow and moderately deep, sloping to steep soils that have a loamy subsoil; formed in material weathered from shale

This unit consists of ridgetops and side slopes and a few wide drainageways and small areas of bottom land. The ridgetops are long and have a wide range in size. The side slopes are steep and meet at narrow, V-shaped drainageways. Slopes range from 7 to 65 percent.

This unit makes up 2 percent of the survey area. The unit is about 41 percent Klinesville soils, 27 percent Berks soils, and 32 percent minor soils.

The Klinesville soils are 10 to 20 inches deep to bedrock. They have a surface layer of dark reddish brown shaly silt loam and a subsoil of reddish brown shaly silt loam and very shaly silt loam.

The Berks soils are 20 to 40 inches deep to bedrock. They have a surface layer of brown shaly silt loam and a subsoil of yellowish brown very shaly silt loam.

The dominant minor soils are Leck Kill and Rayne soils on ridgetops and side slopes and Nolin and Wheeling soils along wide drainageways.

Almost all of the acreage of this unit is covered by woodland. Some of the Wheeling soils along wide drainageways and some of the ridgetops are used for community development. A few small areas along the wide drainageways are used for pasture or hay crops. The major trees in the area are Virginia pine, eastern white pine, upland oaks, and hickory. The potential productivity of the soils for woodland is moderate or low.

Slope is the main limitation of the unit for farming and, along with the depth to bedrock and flooding in a few areas, is a major limitation for community development.

5. Rayne-Berks-Klinesville-Groseclose

Deep to shallow, sloping to steep soils that have a loamy or clayey subsoil; formed in material weathered from shale interbedded with limestone

This unit consists of long, narrow ridges and convex side slopes and is dissected by numerous U- and V-

shaped drainageways. Slopes dominantly range from 15 to 65 percent.

This map unit makes up about 16 percent of the county. The unit is about 28 percent Rayne soils, 25 percent Berks soils, 15 percent Klinesville soils, 13 percent Groseclose soils, and 19 percent minor soils.

The Rayne soils are on rolling to steep, convex side slopes. The soils are more than 40 inches deep to bedrock and have a surface layer of brown silt loam and a subsoil of strong brown loam and very shaly loam.

The Berks soils are sloping to steep and are on long, narrow ridgetops and on shoulders of convex side slopes. The soils are 20 to 40 inches deep to bedrock and have a surface layer of brown shaly silt loam and a subsoil of yellowish brown very shaly silt loam.

The Klinesville soils are sloping to steep and are on long, narrow ridgetops. The soils are 10 to 20 inches deep to bedrock and have a surface layer of dark reddish brown shaly silt loam and a subsoil of reddish brown shaly silt loam and very shaly silt loam.

The Groseclose soils are on rolling or hilly convex side slopes. The soils are more than 48 inches deep to bedrock and have a surface layer of dark yellowish brown silt loam and a subsoil of strong brown silty clay and clay.

The dominant minor soils are Monongahela soils on concave side slopes and along drainageways, Braddock soils on high terraces, and areas of rock outcrop and shallow soils along upland waterways.

Areas used mainly for pasture and hay make up about 60 percent of the acreage of this unit. The rest of the acreage mainly is steep soils covered by mixed hardwoods and conifers. The major tree species are upland oaks, hickory, black locust, Virginia pine, and eastern white pine. The potential productivity ranges from high to moderate for woodland on north-facing slopes and from high to low on south-facing slopes.

Slope and an erosion hazard are the main limitations of this unit for cultivated crops. Slope, the depth to bedrock, and a seepage hazard are the main limitations for community development.

6. Lily-Ramsey-Berks-Gilpin

Moderately deep or shallow, moderately steep to very steep soils that have a loamy subsoil; formed in material weathered from sandstone shale, quartzite, and phyllite

This map unit is along the Blue Ridge. It consists of very stony mountain ridges, side slopes, and narrow drainageways. Slopes dominantly range from 15 to 65 percent.

This unit makes up about 16 percent of the county. The unit is about 21 percent Lily soils, 17 percent Ramsey soils, 15 percent Berks soils, 15 percent Gilpin soils, and 32 percent minor soils.

The Lily soils are on ridgetops and convex side slopes. The soils are 20 to 40 inches deep to bedrock and have a surface layer of dark brown sandy loam and a subsoil of yellowish brown and dark yellowish brown gravelly loam.

The Ramsey soils are on ridgetops and convex side slopes. The soils are 10 to 20 inches deep to bedrock and have a surface layer of dark brown gravelly sandy loam and a subsoil of yellowish brown loam.

The Berks soils are on ridgetops and convex side slopes. The soils are 20 to 40 inches deep to bedrock and have a surface layer of brown shaly silt loam and a subsoil of yellowish brown very shaly silt loam.

The Gilpin soils are on ridgetops and convex side slopes. The soils are 20 to 40 inches deep to bedrock. They have a surface layer of yellowish brown silt loam and a subsoil of yellowish brown silt loam in the upper part and reddish yellow silty clay loam and shaly silty clay loam in the lower part.

The dominant minor soils are Nolichucky soils on concave side slopes and benches, Sherando soils along narrow drainageways, areas of sandstone rock outcrop on ridgetops and side slopes, and Cotaco and Monongahela soils on terraces.

Almost all of the acreage of this unit is very stony, mountainous terrain covered by woodland. The major tree species are upland oaks, Table-Mountain pine, Virginia pine, eastern white pine, and hickory. The potential productivity for trees is moderately high or moderate.

Slope makes the soils generally unsuitable for farming and, along with the depth to bedrock, is a major limitation for community development.

Dominantly undulating to steep soils that are deep or moderately deep

These units consist of clayey and loamy soils formed in material weathered from limestone and shale in the valley area of the county. The units are dominantly made up of broad ridgetops and smooth convex side slopes and are dissected by numerous U-shaped drainageways.

These units are dominantly used for farming, but the soils have high potential productivity for woodland. The undulating and rolling areas of the soils in these units generally are well suited or moderately well suited to farming. The hilly areas are poorly suited to cultivated crops and moderately well suited to very well suited to pasture and hay. A high shrink-swell potential, moderately slow permeability, the depth to bedrock, and slope are limitations of the soils for community development.

7. Groseclose-Poplimento-Frederick

Deep, undulating to hilly soils that have a clayey subsoil; formed in material weathered from limestone and shale

This unit consists of narrow and broad ridgetops and smooth, convex side slopes. Numerous U-shaped

drainageways dissect the unit. Slopes range from 2 to 30 percent.

This map unit makes up about 17 percent of the county. The unit is about 22 percent Groseclose soils, 21 percent Poplimento soils, 17 percent Frederick soils, and 40 percent minor soils.

The Groseclose soils are on smooth, broad ridgetops and convex side slopes. The soils are more than 48 inches deep to bedrock and have a surface layer of dark yellowish brown silt loam and a subsoil of strong brown silty clay and clay.

The Poplimento soils are on smooth, broad ridgetops and convex side slopes. The soils are more than 48 inches deep to bedrock and have a surface layer of dark yellowish brown silt loam and a subsoil of strong brown and reddish yellow clay.

The Frederick soils are on narrow ridgetops and smooth, convex side slopes. The soils are more than 60 inches deep to bedrock and have a surface layer of yellowish brown loam and a subsoil of strong brown and yellowish red clay.

The dominant minor soils are Carbo soils on ridgetops and smooth side slopes, Lodi soils on narrow ridgetops and side slopes, Slabtown soils at the heads of drainageways and on concave side slopes, and Lindside soils along nearly level drainageways.

Most of the acreage of this unit is used for farming, but some areas are used for community development and some steep areas are in woodland, mostly mixed hardwoods. The unit is suited to all of the crops grown in the county and supports many dairy and beef cattle operations. The hazard of erosion is a major farming concern. The major trees in the area are upland oaks, hickory, and black locust. The potential productivity for trees is high.

Moderately slow or moderate permeability, the clayey subsoil, a high or moderate shrink-swell potential, and slope are the main limitations of this unit for community development.

8. Carbo-Lowell-Groseclose

Moderately deep or deep, undulating to hilly soils that have a clayey subsoil; formed in material weathered from limestone and shale

This unit consists of narrow and broad ridgetops and hills and smooth, convex side slopes. Numerous U-shaped drainageways dissect the unit. Slopes range from 2 to 45 percent.

This unit makes up about 22 percent of the county. The unit is about 25 percent Carbo soils, 20 percent Lowell soils, 13 percent Groseclose soils, and 42 percent minor soils.

The Carbo soils are on rolling to steep side slopes commonly adjacent to drainageways. The soils are 20 to 40 inches deep to bedrock, and in some areas the bedrock is exposed at the surface. The soils have a surface layer of dark yellowish brown silty clay loam and a subsoil of strong brown clay.

The Lowell soils are undulating to hilly and are on broad ridgetops and smooth, convex side slopes. The soils are more than 40 inches deep to bedrock and have a surface layer of dark yellowish brown silt loam and a subsoil of strong brown and reddish yellow clay and silty clay.

The Groseclose soils are undulating to hilly and are on smooth, broad ridgetops and side slopes. The soils are more than 48 inches deep to bedrock and have a surface of dark yellowish brown silt loam and a subsoil of strong brown silty clay and clay.

The dominant minor soils are Wurno soils on ridgetops and side slopes, Frederick soils on narrow ridgetops and convex side slopes, and Slabtown soils at the heads of drainageways and on concave side slopes.

The soils in this unit are dominantly used for pasture and hay, some cultivated crops, and a few types of community development. Some steep areas are in woodland, mainly mixed hardwoods. The unit is suited to most of the crops grown in the county, and it supports many dairy and beef cattle operations. The hazard of erosion is a major farming concern. The major trees are upland oaks, hickory, and black locust. The potential productivity for trees is high or moderately high.

Moderately slow or slow permeability, the clayey subsoil, a high or moderately high shrink-swell potential, and slope are the main limitations of the unit for community development.

Dominantly nearly level to hilly soils that are deep

These map units consist of loamy and clayey soils formed in alluvial sediments and from material weathered from limestone and shale. The soils are on flood plains, terraces, and adjacent upland positions along the New River and other large streams in the county.

The soils in these units are suited to cultivated crops and to pasture and hay. The soils are dominantly used for farming but have good potential productivity for woodland.

The soils in these units generally are poorly suited to community development. A seasonal high water table, a clay subsoil, and slope are the main limitations.

9. Cotaco-Dunning-Groseclose

Deep, nearly level to hilly soils that have a loamy or clayey subsoil; formed in alluvium and in material weathered from limestone and shale

This unit consists of flood plains, terraces, and upland hills. Slopes range from 0 to 30 percent.

This unit makes up about 2 percent of the survey area. The unit is about 24 percent Cotaco soils, 17 percent

Dunning soils, 16 percent Groseclose soils, and 43 percent minor soils.

The Cotaco soils are on nearly level to rolling, low terraces adjacent to flood plains. The soils have a surface layer of brown loam and a subsoil of brownish yellow loam and clay loam.

The Dunning soils are on nearly level flood plains along streams and have a seasonal high water table in winter and spring. The soils have a surface layer of very dark grayish brown silty clay loam and a subsoil of very dark gray silty clay loam.

The Groseclose soils are on undulating to hilly, broad ridges and convex side slopes. The soils have a surface layer of dark yellowish brown silt loam and a subsoil of strong brown silty clay and clay.

The dominant minor soils are Poplimento soils on broad ridges and convex side slopes, Slabtown soils at the heads of drainageways and on concave side slopes, and Newark Variant soils on flood plains along streams.

Most of the acreage of this unit is used for cultivated crops and pasture and hay. Some of the steeper areas and some areas along drainageways are in woodland, generally mixed hardwoods. The unit is suited to most of the crops grown in the county, and it supports many dairy and beef cattle operations. The erosion hazard is a major farming concern. The major trees are upland oaks, hickory, black locust, and sycamore. The potential productivity for trees is high or very high.

A seasonal high water table, moderately slow permeability, and slope are the major limitations of the unit for community development.

10. Braddock

Deep, undulating to hilly soils that have a clayey subsoil; formed in alluvium

This unit consists of high terraces, broad ridgetops, and convex side slopes. Slopes range from 2 to 30 percent.

This unit makes up about 4 percent of the county. The unit is about 45 percent Braddock soils and 55 percent minor soils.

The Braddock soils are on old, high terraces. They have a surface layer of dark yellowish brown loam and a subsoil of yellowish red and red clay.

The dominant minor soils are Zoar soils in depressions on low terraces, Cotaco soils on low terraces, and Fluvaquents on long, narrow flood plains adjacent to streams.

About half of the acreage of this unit is used for cultivated crops, pasture, hay, and a few types of community development. The rest of the acreage is mainly steep and wooded. The soils are suited to most of the crops grown in the county and are mainly used for pasture for beef operations. The hazard of erosion is a major farming concern. The major trees are upland oaks, eastern white pine, Virginia pine, black locust, and hickory. The potential productivity for trees is high.

Permeability, a clayey subsoil, and slope are the main limitations for community development. A few areas have a seasonal high water table.

11. Braddock-Wheeling

Deep, nearly level to hilly soils that have a clayey or loamy subsoil; formed in alluvium

This unit consists of high and low terraces. Slopes range from 0 to 30 percent.

This unit makes up about 3 percent of the survey area. The unit is about 40 percent Braddock soils, 12 percent Wheeling soils, and 48 percent other soils.

The Braddock soils are on undulating to hilly, high terraces. The soils have a surface layer of dark yellowish brown loam and a subsoil of yellowish red and red clay.

The Wheeling soils are on nearly level, low terraces near streams. The soils have a surface layer of dark brown sandy loam and a subsoil of dark brown sandy clay loam.

The dominant minor soils are Carbo soils on convex side slopes and along small streams, Cotaco soils on low terraces, and Fluvaquents on long, narrow flood plains adjacent to streams.

Most of the acreage of this unit is used for cultivated crops, pasture, hay, and a few types of community development. Some of the steeper areas are wooded. The soils are suited to all of the crops grown in the county and support many dairy and beef cattle operations. The hazard of erosion is a major farming concern. The major trees are upland oaks, eastern white pine, Virginia pine, hickory, and black locust. The potential productivity for trees is high.

Permeability, a clayey subsoil, and slope are the main limitations of the unit, especially the Braddock soils, for community development.

Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Braddock loam, 2 to 7 percent slopes, is one of several phases in the Braddock series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Berks-Gilpin complex, 7 to 15 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils 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 in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Groseclose and Poplimento silt loams, 2 to 7 percent slopes, is an undifferentiated group in this survey area.

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

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

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

Soil Descriptions

1C—Berks-Gilpin complex, 7 to 15 percent slopes. This unit is made up of strongly sloping soils that are 20 to 40 inches deep to bedrock and that do not have a seasonal high water table. These areas are on smooth ridgetops and are long and narrow. They range from 2 to 250 acres. The unit is about 50 percent Berks soils, 40 percent Gilpin soils, and 10 percent other soils. The Berks and Gilpin soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Berks soils is brown shaly silt loam 7 inches thick. The subsoil is yellowish brown very shaly silt loam 20 inches thick. Reddish yellow shale bedrock is at a depth of 27 inches.

Typically, the surface layer of the Gilpin soils is yellowish brown silt loam 4 inches thick. The subsoil is 19 inches thick. The upper 5 inches is yellowish brown silt loam, and the lower 14 inches is reddish yellow shaly silty clay loam. Shale bedrock is at a depth of 23 inches.

Included with this unit in mapping are small areas of Groseclose, Monongahela, and Rayne soils, all of which are more than 40 inches deep to bedrock. Also included are small areas of rock outcrop. The Groseclose and

Rayne soils are in saddles and swales. The Monongahela soils are on concave toe slopes and at the heads of drainageways. The rock outcrops are on narrow ridges and elevated knobs.

The permeability of these Berks and Gilpin soils is moderate or moderately rapid, and the available water capacity is low or very low. Runoff is medium or rapid. These soils are low in natural fertility and moderately low in organic matter content. Reaction in the Berks soil ranges from extremely acid through slightly acid and in the Gilpin soil from extremely acid through strongly acid. The subsoil has a low shrink-swell potential and has a low frost-action potential in the Berks soil and a moderate frost-action potential in the Gilpin soil.

Most areas of this unit are wooded. Some areas are in pasture.

The soils in this unit are moderately well suited to cultivated crops. The hazard of erosion is severe and is a major management concern. Conservation tillage, contour strip cropping, and using cover crops are management practices that help to control erosion. Using grasses and legumes in the cropping system and adding manure and other organic material to the soil help to improve fertility and increase the water holding capacity. The addition of lime and fertilizer helps offset the natural acidity and low fertility of these soils. Using crop residue on or in the surface layer reduces runoff.

The soils are well suited to pasture and hay but are quite droughty in late summer and early fall. Adding lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices. Overgrazing on these soils kills desirable grasses and legumes, reduces yields, and increases runoff and erosion.

The potential productivity for trees on these soils is high or moderately high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

The depth to bedrock and slope are the main limitations of these soils for community development. The depth to bedrock limits the soils for building sites, excavations, septic tank absorption fields, sanitary landfills, and sewage lagoons. Slope is a limitation for building sites and sewage lagoons.

Capability subclass: IIIe.

1D—Berks-Gilpin complex, 15 to 35 percent slopes. This unit consists of moderately steep to steep soils that are 20 to 40 inches deep to bedrock and that do not have a seasonal high water table. The areas of this unit are long and narrow and range from 10 to 300 acres. The unit is about 50 percent Berks soils, 40 percent Gilpin soils, and 10 percent other soils. The Berks and Gilpin soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Berks soils is brown shaly silt loam 7 inches thick. The subsoil is yellowish brown very shaly silt loam 20 inches thick. Reddish yellow shale bedrock is at a depth of 27 inches.

Typically, the surface layer of the Gilpin soils is yellowish brown silt loam 4 inches thick. The subsoil is 19 inches thick. The upper 5 inches is yellowish brown silt loam, and the lower 14 inches is reddish yellow shaly silty clay loam. Shale bedrock is at a depth of 23 inches.

Included with this complex in mapping are small areas of Groseclose, Monongahela, and Rayne soils, all of which are more than 40 inches deep to bedrock. Also included are small areas of rock outcrop. The Groseclose and Rayne soils are in saddles and swales. The Monongahela soils are on concave toe slopes and at the heads of drainageways. The rock outcrops are on slightly elevated convex areas on upper side slopes.

The permeability of these Berks and Gilpin soils is moderate or moderately rapid, and the available water capacity is low or very low. Runoff is rapid. These soils are low in natural fertility and moderately low in organic matter content. Reaction in the Berks soil ranges from extremely acid through slightly acid and in the Gilpin soil from extremely acid through strongly acid. The subsoil has a low shrink-swell potential and has a low frost-action potential in the Berks soil and a moderate frost-action potential in the Gilpin soil.

Most areas of this unit are wooded. Some areas are in pasture.

Slope and a very severe erosion hazard make these soils generally unsuitable for cultivated crops. The soils are moderately well suited to pasture and hay but are quite droughty in late summer and early fall. Adding lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices. Overgrazing on these soils kills desirable grasses and legumes, reduces yields, and increases runoff and erosion.

The potential productivity for trees on these soils ranges from high to moderate. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

The depth to bedrock and slope are the main limitations of these soils for community development. The depth to bedrock limits the soils for building sites, excavations, septic tank absorption fields, sanitary landfills, and sewage lagoons. Slope is a limitation for sewage lagoons.

Capability subclass: VIe.

1F—Berks-Gilpin complex, 35 to 65 percent slopes. This unit consists of very steep soils that are 20 to 40 inches deep to bedrock and that do not have a seasonal high water table. The areas of the unit are on convex side slopes, are long and narrow, and range from 10 to 300 acres. They consist of about 50 percent Berks soils, 40 percent Gilpin soils, and 10 percent other soils. The Berks and Gilpin soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Berks soils is brown shaly silt loam 7 inches thick. The subsoil is yellowish brown very shaly silt loam 20 inches thick. Reddish yellow shale bedrock is at a depth of 27 inches.

Typically, the surface layer of the Gilpin soils is yellowish brown silt loam 4 inches thick. The subsoil is 19 inches thick. The upper 5 inches is yellowish brown silt loam, and the lower 14 inches is reddish yellow shaly silty clay loam. Shale bedrock is at a depth of 23 inches.

Included with this complex in mapping are small areas of Monongahela and Rayne soils, both of which are more than 40 inches deep to bedrock. Also included are small areas of soils less than 20 inches deep to bedrock and small areas of rock outcrop. The Rayne soils dominantly are on smooth areas on lower side slopes. The rock outcrops and soils less than 20 inches deep to bedrock are on elevated convex areas at the crest of slopes and on steep convex side slopes. The Monongahela soils are in saddles, in concave areas, and at the heads of drainageways.

The permeability of these Berks and Gilpin soils is moderate or moderately rapid, and the available water capacity is low or very low. Runoff is very rapid. These soils are low in natural fertility and moderately low in organic matter content. Reaction in the Berks soil ranges from extremely acid through slightly acid and in the Gilpin soil from extremely acid through strongly acid. The subsoil has a low shrink-swell potential and has a low frost-action potential in the Berks soil and a moderate frost-action potential in the Gilpin soil.

Most areas of this unit are wooded. A few areas are in pasture.

Slope and a very severe erosion hazard make these soils generally unsuitable for cultivated crops and poorly suited to pasture and hay. Slope makes it difficult to establish and maintain pasture and hay fields. Weed control is a major pasture management concern. Using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer are the main pasture management practices. Overgrazing on these soils increases runoff and erosion. Grazing during wet periods damages sod and compacts the surface layer.

The potential productivity for trees on these soils ranges from high to moderate. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices. Slope limits the kinds of woodland harvesting and planting equipment that can be used on these soils.

The depth to bedrock and slope are the main limitations of these soils for community development. The depth to bedrock limits the soils for building sites, excavations, septic tank absorption fields, sanitary landfills, and slope is a limitation for sewage lagoons.

Capability subclass: VIIe.

2B—Braddock loam, 2 to 7 percent slopes. This soil is gently sloping. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. Most areas of this soil are narrow and winding and range from 3 to 150 acres in size. The areas are on high terraces mainly along the New River.

Typically, the surface layer is dark yellowish brown loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red clay and red clay.

Included with this soil in mapping are small areas, generally less than 1 acre each, with a surface layer of gravelly loam or cobbly loam. Also included are small depressional areas of Cotaco soils and small areas of soils with a surface layer of fine sandy loam. Included areas make up less than 5 percent of the map unit.

The permeability of this Braddock soil is moderate, and surface runoff is medium. The soil is very friable and easy to till throughout a wide range of moisture conditions. Natural fertility is low, and organic matter content is moderately low. The soil in unlimed areas is strongly acid or very strongly acid throughout. Available water holding capacity is moderate, and the rooting depth is more than 50 inches. The soil has a moderate shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are used for cultivated crops or hay and pasture. Some areas are used for pine trees.

This soil is prime farmland and is well suited to all locally grown cultivated crops. The hazard of erosion is moderate and is a major management concern. Conservation tillage and using cover crops and grasses and legumes in the cropping system are practices that increase organic matter content, maintain tilth, reduce runoff, and help to control erosion. The addition of lime and fertilizer helps to offset the natural acidity and low fertility of the soil. Using cover crops and adding manure and other organic material to the soil are practices that improve fertility and increase water infiltration.

This soil is very well suited to all locally grown hay and pasture crops. The prevention of overgrazing is a major pasture management concern. Overgrazing will kill desirable grasses and legumes and increase runoff and erosion. Using proper stocking rates, rotational and deferred grazing, and using lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main woodland management practices.

The permeability of this soil, low strength, the clay subsoil, and the shrink-swell potential are the main limitations for community development. The permeability limits the soil as a site for septic tank absorption fields, and low strength is a limitation of the soil as a source of roadfill. The shrink-swell potential limits the soil as a building site. The clay subsoil is soft when wet, limiting vehicular traffic in unpaved areas.

Capability subclass: IIe.

2C—Braddock loam, 7 to 15 percent slopes. This soil is strongly sloping. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The areas of this soil range from 3 to 80 acres. They are on high terraces mainly along the New River.

Typically, the surface layer is dark yellowish brown loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red and red clay.

Included with this soil in mapping are small areas of Cotaco soils in depressional areas and at the heads of drainageways. Also included are areas with a surface layer of gravelly loam or cobbly loam and small severely eroded areas. Some areas have a surface layer of fine sandy loam. Included areas make up less than 5 percent of the unit.

The permeability of this Braddock soil is moderate, and surface runoff is medium or rapid. The soil is very friable and easy to till throughout a wide range of moisture conditions. Natural fertility is low, and organic matter content is moderately low. The soil in unlimed areas is strongly acid or very strongly acid throughout. Available water holding capacity is moderate, and the rooting depth is more than 50 inches. The soil has a moderate shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are used for cultivated crops or for hay and pasture.

This soil is moderately well suited to all locally grown cultivated crops. The hazard of erosion is severe and is a major management concern. Conservation tillage and using cover crops and grasses and legumes in the cropping system are practices that increase organic matter content, maintain tilth, reduce runoff, and help to control erosion. The addition of lime and fertilizer helps to offset the natural acidity and low fertility of the soil. Using cover crops and adding manure and other organic material to the soil are practices that help to improve fertility and increase water infiltration.

This soil is suited to locally grown hay and pasture crops. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, increasing soil losses by erosion. Using proper stocking rates, rotational and deferred grazing, and adding lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main woodland management practices.

The permeability of the soil, slope, low strength, the clay subsoil, and the shrink-swell potential are the main limitations for community development. The permeability and slope limit the soil as a site for septic tank absorption fields, and the slope and shrink-swell potential are limitations of the soil as a building site. Low strength limits the soil as a source of roadfill. The clay subsoil is soft when wet, limiting vehicular traffic in unpaved areas.

Capability subclass: IIIe.

2D—Braddock loam, 15 to 30 percent slopes. This soil is moderately steep and steep. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. Most areas of this soil are long and narrow and range from 3 to 50 acres. The areas are on side slopes of terraces mainly along the New River.

Typically, the surface layer is dark yellowish brown loam 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red and red clay in the lower part.

Included with this soil in mapping are areas with a cobbly or very cobbly surface layer and areas of Cotaco soils in drainageways. Also included are small severely eroded areas and areas with bedrock at a depth of 40 to 60 inches. Some areas have a surface layer of fine sandy loam. Included areas make up 20 percent of the unit.

The permeability of this Braddock soil is moderate, and surface runoff is rapid. This soil is very friable and easy to till throughout a wide range of moisture conditions. Natural fertility is low, and organic matter content is moderately low. The soil is strongly acid or very strongly acid throughout. The available water holding capacity is moderate, and the rooting depth is more than 50 inches. The soil has a moderate shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are wooded. A few areas are used for hay or pasture or cultivated crops.

Slope and a very severe erosion hazard make this soil poorly suited to cultivated crops. Conservation tillage and using cover crops and grasses and legumes in the cropping system are practices in cultivated areas that increase organic matter content, maintain tilth, reduce runoff, and help to control erosion. The addition of lime and fertilizer helps to offset the natural acidity and low fertility of the soil. Using cover crops and manure and other organic material are practices that help to improve fertility and increase water infiltration.

This soil is moderately well suited to locally grown hay and pasture crops. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, increasing soil losses by erosion. Use of proper stocking rates, rotational and deferred grazing, and using lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main woodland management practices.

The permeability of the soil, slope, low strength, the clay subsoil, and the shrink-swell potential are the main limitations for community development. The permeability

and slope limit the soil as a site for septic tank absorption fields, and the slope and shrink-swell potential are limitations of the soil as a building site. Low strength limits the soil as a source of roadfill. The clay subsoil is soft when wet, limiting vehicular traffic in unpaved areas.

Capability subclass: IVe.

3B—Braddock-Urban land complex, 0 to 7 percent slopes. This unit consists of nearly level and gently sloping Braddock soils and urbanized areas that have been altered by grading or filling for housing developments, shopping centers, and other similar uses. Most of the areas are square or rectangular and range from 5 to 50 acres. The unit is about 50 percent Braddock soils, 40 percent urbanized areas, and 10 percent other soils. The soils and urbanized areas are so intermingled that it was not practical to map them separately.

Typically, the Braddock soils have a surface layer of brown loam 10 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is strong brown loam, the middle part is yellowish red clay loam, and the lower part is red clay.

Included with this unit in mapping are small areas of Cotaco soils in depressions and drainageways. Also included are areas of soils that have slopes of as much as 20 percent and a few small areas that have a cobbly surface layer. As much as 36 inches of fill material, mostly from surrounding soils that have been cut or graded, has been added to some areas, and as much as 50 percent of the soil has been removed from other areas.

The areas of this unit that are undisturbed have moderate permeability. Permeability in areas that have been cut or filled is highly variable. Runoff in this unit is slow to medium. Available water capacity is moderate. The shrink-swell potential is moderate. The soil mainly is strongly or very strongly acid throughout, but reaction in the surface layer varies according to liming practices.

The areas of this unit that are not Urban land include yards, gardens, and open areas around buildings. These areas range from 200 square feet to 3 acres each. The permeability and shrink-swell potential of the soil and the clayey texture of the subsoil are limitations for community development, and in many areas the topsoil has been removed, making it difficult to establish lawns and gardens. The clay subsoil is a limitation for excavations. The permeability is a limitation of the unit as a site for septic tank absorption fields, and the shrink-swell potential is a limitation for dwelling sites. Areas where sufficient topsoil is available are well suited to landscaping.

Onsite investigation is needed to determine limitations of the unit for any use.

Capability subclass: not assigned.

4C—Carbo silty clay loam, 7 to 15 percent slopes. This soil is strongly sloping. It has bedrock at a depth of 20 to 40 inches but does not have a seasonal high water table. This soil is on ridgetops and side slopes. It is in irregularly shaped areas that range from 2 to 20 acres.

Typically, the surface layer is dark yellowish brown silty clay loam 5 inches thick. The subsoil is strong brown clay 26 inches thick. Limestone bedrock is at a depth of 31 inches.

Included with this soil in mapping are small areas of Slabtown, Faywood, Lowell, Groseclose, Newbern, Poplimento, and Wurno soils. Also included are a few areas of limestone rock outcrops and sinkholes on side slopes and at the bottom of slopes. The Slabtown soils are at the heads of drainageways and in small depressions. The Faywood, Newbern, and Wurno soils are on ridgetops and convex side slopes. The Groseclose and Poplimento soils are on smooth convex ridgetops. Included areas make up about 15 percent of the unit and are generally less than 2 acres each.

The permeability of this Carbo soil is slow, and runoff is medium. Available water capacity is low. Natural fertility is high, and the organic matter content is moderately low. Reaction is slightly acid or neutral in the surface layer and neutral or mildly alkaline in the subsoil. The subsoil has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are in pasture. A few areas are cultivated or in woodland.

This soil is moderately well suited to cultivated crops. The hazard of erosion is severe and is a major management concern. Conservation tillage and using cover crops and grasses and legumes in the cropping system are practices in cultivated areas that increase organic matter content, maintain tilth, reduce runoff, and help to control erosion. Using crop residue on or in the surface layer helps to reduce runoff. Adding fertilizer and other organic material helps to improve fertility and increase water infiltration. Cultivating when this soil is wet causes clods in the surface layer.

This soil is well suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing will kill desirable grasses and legumes, reduce yields, increase runoff, and increase erosion. Grazing during wet periods damages the sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and using fertilizer are the main pasture management practices.

This soil has moderately high potential productivity for trees. During wet periods the soil is soft and slippery, limiting the use of heavy timber equipment. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices.

The depth to bedrock is the main limitation of this soil for community development. It limits the soil as a site for

septic tank absorption fields, sewage lagoons, sanitary landfills, buildings, and roads. The permeability of the soil is a further limitation for septic tank absorption fields, and the shrink-swell potential also limits building and road construction.

Capability subclass: IIIe.

4D—Carbo silty clay loam, 15 to 35 percent slopes. This soil is moderately steep and steep. It has bedrock at a depth of 20 to 40 inches but does not have a seasonal high water table. The soil is on convex side slopes and along drainageways. It is in irregularly shaped areas that range from 2 to 25 acres.

Typically, the surface layer is dark yellowish brown silty clay loam 5 inches thick. The subsoil is strong brown clay 26 inches thick. Limestone bedrock is at a depth of 31 inches.

Included with this soil in mapping are small areas of Slabtown, Faywood, Lowell, Groseclose, Newbern, Poplimento, and Wurno soils. Also included are a few areas of limestone rock outcrops and sinkholes on side slopes and at the bottom of slopes. The Slabtown soils are at the heads of drainageways and in small depressions. The Faywood, Newbern, and Wurno soils are on ridgetops and convex side slopes. The Groseclose and Poplimento soils are on smooth convex ridgetops. Included areas make up about 15 to 20 percent of the unit and are generally less than 2 acres each.

The permeability of this Carbo soil is slow, and runoff is rapid. Available water capacity is low. Natural fertility is high, and the organic matter content is moderately low. Reaction is slightly acid or neutral in the surface layer and neutral or mildly alkaline in the subsoil. The subsoil has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are in pasture. A few areas are cultivated or woodland.

Slope and a very severe erosion hazard make this soil poorly suited to cultivated crops. Conservation tillage and the use of cover crops and grasses and legumes in the cropping system are practices in cultivated areas that increase organic matter content, maintain tilth, reduce runoff, and help to control erosion. Using crop residue on or in the surface layer helps to reduce runoff. Adding manure and other organic material helps to improve fertility and increase water infiltration. Cultivating when the soil is wet causes clods in the surface layer.

This soil is moderately well suited to hay and pasture. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of fertilizer are the main pasture management practices.

This soil has moderately high potential productivity for trees. During wet periods the soil is soft and slippery, limiting the use of heavy timber equipment. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main woodland management practices.

Slope and the depth to bedrock are the main limitations of this soil for community development. Both limit the soil as a site for septic tank absorption fields, landfills and sewage lagoons, and roads and buildings. The permeability of the soil is a further limitation for septic tank absorption fields, and the shrink-swell potential is also a limitation for road and building construction.

Capability subclass: IVe.

5C—Carbo silty clay loam, very rocky, 7 to 15 percent slopes. This unit consists of strongly sloping soils that are 20 to 40 inches deep to bedrock and that do not have a seasonal high water table. The soil is on ridgetops and side slopes. It is in irregularly shaped areas that range from 2 to 40 acres. Rock outcrops cover 1 to 10 percent of the surface area.

Typically, the surface layer of this soil is dark yellowish brown silty clay loam 5 inches thick. The subsoil is strong brown clay 26 inches thick. Bedrock is at a depth of 31 inches.

Included with this soil in mapping are intermingled areas, mainly less than 2 acres each, that do not have rock outcrops. Also included are small areas of Slabtown soils at the heads of drainageways and areas of Lindside and Nolin soils in drainageways. In some areas bedrock is near the surface or at a depth of 60 inches or more. Included areas make up about 5 percent of the unit.

The permeability of this Carbo soil is slow, and runoff is medium to rapid. Available water capacity is low. Natural fertility is high, and the organic matter content is moderately low. Reaction is slightly acid or neutral in the surface layer and neutral or mildly alkaline in the subsoil. The subsoil has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are used for pasture or hay. Some small areas are used for cultivated crops or are wooded.

This soil is poorly suited to cultivated crops. The surface layer becomes lumpy and cloddy if plowed when too wet. The exposed rock limits the types of farm machinery that can be used on this soil, making plowing and disking difficult or impractical.

This soil is moderately well suited to hay and pasture. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational

and deferred grazing, and the use of fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices. The rock outcrops limit the kinds of harvesting and planting equipment that can be used on this soil.

The exposed rock and the depth to bedrock are the main limitations of this soil for community development. Both limit the soil as a site for septic tank absorption fields, sanitary landfills, and buildings and roads. The permeability of the soil is a further limitation of the soil for septic tank absorption fields, and the shrink-swell potential is also a limitation for road and building construction.

Capability subclass: IVs.

5D—Carbo silty clay loam, very rocky, 15 to 30 percent slopes. This unit consists of moderately steep and steep soils on convex side slopes along drainageways. The soil is 20 to 40 inches deep to bedrock but does not have a seasonal high water table. This soil is in irregularly shaped areas that range from 2 to 75 acres. Rock outcrops cover 1 to 10 percent of the surface area.

Typically, the surface layer of this soil is dark yellowish brown silty clay loam 5 inches thick. The subsoil is strong brown clay 26 inches thick. Bedrock is at a depth of 31 inches.

Included with this soil in mapping are intermingled areas, mainly less than 2 acres each, that do not have rock outcrops. Also included are small areas of Slabtown soils at the heads of drainageways and areas of Lindside and Nolin soils in drainageways. In some areas bedrock is near the surface or at a depth of 60 inches or more. Included areas make up about 5 percent of the unit.

The permeability of this Carbo soil is slow, and runoff is rapid. Available water capacity is low. Natural fertility is high, and the organic matter content is moderately low. Reaction is slightly acid or neutral in the surface layer and neutral or mildly alkaline in the subsoil. The subsoil has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are wooded or in pasture. A few small areas are used for hay.

This soil generally is not suited to cultivated crops. The rock outcrops and the slope limit the types of farm machinery that can be used on this soil, making plowing and disking difficult or impractical.

This soil is moderately well suited to hay and pasture. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices. The rock outcrops limit the kinds of harvesting and planting equipment that can be used on this soil.

Slope, the depth to bedrock, and the exposed rock are the main limitations of this soil for community development. They limit the soil as a site for septic tank absorption fields, buildings and roads, and landfills. The permeability of the soil is an additional limitation for septic tank absorption fields, and the shrink-swell potential further limits building and road construction.

Capability subclass: VIs.

6E—Carbo-Rock outcrop complex, 10 to 45 percent slopes. This unit consists of strongly sloping to steep soils and areas of exposed rock. The soils are 20 to 40 inches deep to bedrock and do not have a seasonal high water table. The areas of exposed rock cover 10 to 50 percent of the surface area. This unit is in irregularly shaped areas along drainageways. The areas range from 5 to 120 acres. The unit is about 60 percent Carbo soils, 30 percent exposed rock, and 10 percent other soils. The soils and exposed rock are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Carbo soils is dark yellowish brown silty clay loam 5 inches thick. The subsoil is strong brown clay 26 inches thick. Limestone bedrock is at a depth of 31 inches.

Included with this soil in mapping are small areas that do not have rock outcrops, small areas of Lindside and Nolin soils, small areas of Slabtown soils, and areas of soils that are less than 20 inches deep to bedrock. The areas that do not have rock outcrops are throughout the unit. The Lindside and Nolin soils are on flood plains along drainageways. The Slabtown soils are in saddles and in concave positions at the heads of drainageways.

The permeability of this Carbo soil is slow, and runoff is very rapid. Available water capacity is low. Natural fertility is high, and the organic matter content is moderately low. Reaction is slightly acid or neutral in the surface layer and neutral or mildly alkaline in the subsoil. The subsoil has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this unit are wooded. Some areas are in pasture.

This unit generally is not suited to cultivated crops and is poorly suited to hay and pasture. The rock outcrops and slope limit the types of farm equipment that can be used on this soil, making plowing, disking, and other operations difficult or impractical. The use of proper stocking rates, rotational and deferred grazing, and the use of fertilizer are the main pasture management

practices. Overgrazing of pastures kills desirable grasses and legumes, increases runoff, and increases erosion. Grazing during periods of wetness damages the sod and compacts the surface layer.

The potential productivity for trees on this unit is moderately high. Some areas of this unit have a high rate of seedling mortality, and uprooting is a hazard in some areas where rooting is restricted. The rock outcrops limit the kinds of woodland harvesting and planting equipment that can be used on this soil. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices.

Slope, the depth to bedrock, and the exposed rock are the main limitations of this soil for community development. They limit the soil as a site for septic tank absorption fields, buildings and roads, and landfills. The permeability of the soil is an additional limitation for septic tank absorption fields, and the shrink-swell potential further limits building and road construction.

Capability subclass: VIIs.

7A—Cotaco loam, 0 to 2 percent slopes. This soil is nearly level. It has a seasonal high water table at a depth of 1-1/2 to 2-1/2 feet and is more than 60 inches deep to bedrock. The soil is on high terraces along major streams. It is in irregularly shaped areas that range from 5 to 25 acres.

Typically, the surface layer is brown loam 9 inches thick. The subsoil extends to a depth of 60 inches or more. It mainly is yellowish brown and brownish yellow loam and clay loam and is mottled with reddish yellow, brownish yellow, strong brown, and light gray.

Included with this soil in mapping are areas of Braddock, Wheeling, and Zoar soils. The Braddock soils are on hills and ridges, and the Zoar soils are in small depressions. The Wheeling soils are on lower terraces. Included soils make up less than 10 percent of the unit.

The permeability of this Cotaco soil is moderate, and runoff is slow. Natural fertility is low, and organic matter content is moderately low. Reaction in the subsoil commonly is strongly acid or very strongly acid; reaction varies in the surface layer because of liming practices. Available water capacity is moderate. The subsoil has a low shrink-swell potential.

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

This soil is prime farmland and is well suited to cultivated crops grown in the area. The hazard of erosion is slight and is not a major concern in management. The seasonal high water table in the spring sometimes delays planting. The use of cover crops and grasses and legumes in the cropping system and using crop residue on or in the surface layer are practices that help to increase organic matter content and maintain tilth. Applying lime and fertilizer and adding manure and other organic material to the soil help to improve fertility.

This soil is well suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet are major pasture management concerns. Overgrazing kills desirable grasses and legumes and reduces yields. Grazing during wet periods, especially in the spring, damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices. The seasonal high water table sometimes makes the surface layer soft, limiting the use of farm equipment.

This soil has high potential productivity for trees. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices. During wet periods, especially spring, some areas are soft for extended periods, limiting the use of heavy timber equipment.

The permeability and seasonal high water table are the main limitations of this soil for community development. The seasonal high water table limits the soil as a site for septic tank absorption fields, sewage lagoons, sanitary landfills, shallow excavations, and roads and buildings. The permeability causes a hazard of seepage in landfills.

Capability subclass: IIw.

7B—Cotaco loam, 2 to 7 percent slopes. This soil is gently sloping. It has a seasonal high water table at a depth of 1-1/2 to 2-1/2 feet and is more than 60 inches deep to bedrock. The soil is on high terraces along streams. It is in irregularly shaped areas that range from 3 to 15 acres.

Typically, the surface layer is brown loam 9 inches thick. The subsoil extends to a depth of 60 inches or more. It mainly is yellowish brown and brownish yellow loam and clay loam and is mottled with reddish yellow, brownish yellow, strong brown, and light gray.

Included with this soil in mapping are areas of Braddock, Wheeling, and Zoar soils. The Braddock soils are on hills and ridges, and the Zoar soils are in small depressions. The Wheeling soils are on lower terraces. Included soils make up less than 10 percent of the unit.

The permeability of this Cotaco soil is moderate, and runoff is medium. Natural fertility is low, and organic matter content is moderately low. Reaction in the subsoil commonly is strongly acid or very strongly acid; reaction varies in the surface layer because of liming practices. Available water capacity is moderate. The subsoil has a low shrink-swell potential.

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

This soil is prime farmland and is well suited to cultivated crops grown in the area. The hazard of erosion is moderate and is a major management concern. The seasonal high water table in the spring

sometimes delays planting. The use of cover crops and grasses and legumes in the cropping system and using crop residue on or in the surface layer are practices that increase organic matter content, maintain tilth, reduce runoff, and help to control erosion. Applying lime and fertilizer and adding manure and other organic material to the soil help to improve fertility.

This soil is well suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes and reduces yields. Grazing during wet periods, especially in the spring, damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices. The seasonal high water table sometimes makes the surface layer soft, limiting the use of farm equipment.

This soil has high potential productivity for trees. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices. During wet periods, especially spring, some areas are soft for extended periods, limiting the use of heavy timber equipment.

The permeability and seasonal high water table are the main limitations of this soil for community development. The seasonal high water table limits the soil as a site for septic tank absorption fields, sewage lagoons, sanitary landfills, shallow excavations, and roads and buildings. The permeability causes a hazard of seepage in landfills.

Capability subclass: IIe.

7C—Cotaco loam, 7 to 15 percent slopes. This soil is strongly sloping. It has a seasonal high water table at a depth of 1-1/2 to 2-1/2 feet and is more than 60 inches deep to bedrock. The soil is on high terraces along major streams. It is in irregularly shaped areas that range from 3 to 30 acres.

Typically, the surface layer is brown loam 9 inches thick. The subsoil extends to a depth of 60 inches or more. It mainly is yellowish brown and brownish yellow loam and clay loam and is mottled with reddish yellow, brownish yellow, strong brown, and light gray.

Included with this soil in mapping are areas of Braddock, Wheeling, and Zoar soils. The Braddock soils are on hills and ridges, and the Zoar soils are in small depressions. The Wheeling soils are on lower terraces. Included soils make up less than 10 percent of the unit.

The permeability of this Cotaco soil is moderate, and runoff is medium. Natural fertility is low, and organic matter content is moderately low. Reaction in the subsoil commonly is strongly acid or very strongly acid; reaction varies in the surface layer because of liming practices. Available water capacity is moderate. The subsoil has a low shrink-swell potential.

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

This soil is moderately well suited to cultivated crops grown in the area. The hazard of erosion is severe and is a major concern in management. The seasonal high water table in the spring sometimes delays planting. Conservation tillage, contour stripcropping, using cover crops, and using crop residue on or in the soil are management practices that help to control erosion. Using grasses and legumes in the cropping system and adding manure and other organic material help to improve fertility, reduce crusting, and increase water infiltration. The use of lime and fertilizer helps to offset the natural acidity and low fertility of this soil.

This soil is well suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes and reduces yields. Grazing during wet periods, especially in the spring, damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices. The seasonal high water table sometimes makes the surface layer soft, limiting the use of farm equipment.

This soil has high potential productivity for trees. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices. During wet periods, especially spring, some areas are soft for extended periods, limiting the use of heavy timber equipment.

Slope, the seasonal high water table, and the permeability of the soil are the main limitations for community development. Slope and the water table limit the soil as a site for small commercial buildings and local roads and streets. The water table limits the soil for septic tank absorption fields, sewage lagoons, and building sites. The permeability causes a hazard of seepage in landfills.

Capability subclass: IIIe.

8—Dunning silty clay loam. This soil is nearly level. It is more than 60 inches deep to bedrock and has a high water table at or near the surface during most of the year. The soil is on flood plains along small streams. It is in narrow areas that range from 10 to 60 acres.

Typically, the surface layer is very dark grayish and very dark gray silty clay loam 17 inches thick. The subsoil is dark gray and very dark gray silty clay loam 30 inches thick and has yellowish brown mottles. The substratum extends to a depth of 60 inches or more. It is very dark gray and dark gray sandy clay loam with yellowish brown mottles.

Included with this soil in mapping are small areas of Newark and Cotaco soils and small areas with water on the surface. The Newark and Cotaco soils are generally on slightly higher areas in the part of the unit next to

higher terraces and uplands. The areas with water on the surface are in old oxbows and stream scars near the present streambed. Also included are small intermingled areas of soils with a sandy or very gravelly substratum. Included areas make up about 15 percent of the unit.

The permeability of this Dunning soil is slow, and runoff is very slow. The subsoil has a moderate shrink-swell potential. The available water capacity is high. The soil is high in organic matter content and natural fertility. It is mildly alkaline to medium acid throughout. The soil is frequently flooded for brief periods, especially during the spring.

Most areas of this soil are in pasture. A few small areas are cultivated.

Areas of this soil that have been drained and protected from flooding are prime farmland and are well suited to cultivated crops. Crops are damaged by flooding in the spring in some years, and in places drainage outlets are difficult to establish. Alfalfa is short lived because of seasonal wetness. Crops respond well to fertilizer. This soil is wet and cold in the spring, which often delays tillage and seed germination. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay. The use of proper stocking rates, rotational and deferred grazing, and the use of fertilizer are the main pasture management practices. Overgrazing and grazing when the soil is wet damage the stand of grasses and legumes and reduce yields.

The potential productivity of this soil for trees is very high. Seedlings survive and grow well if competing vegetation is controlled. This soil is soft for long periods, limiting the use of heavy timber equipment. Fencing woodland areas to keep livestock from damaging young trees is a main woodland management practice.

The seasonal high water table and flooding are the major limitations of this soil for community development.

Capability subclass: IIIw.

9—Fluvaquents, nearly level. This unit consists of soils on long, narrow flood plains. The soils are more than 60 inches deep to bedrock and have a seasonal high water table at or near the surface. The areas range from 3 to 50 acres and are mostly along the New River, but a few are along smaller streams. Slopes range from 0 to 2 percent.

The soil is unconsolidated, stratified alluvium. It varies widely in texture. Many areas are gravelly, cobbly, or stony in the surface layer and gravelly or cobbly in the substratum. These areas are strewn with debris such as lumber, trees, tires, tin cans, and other items deposited during flooding.

Included with this soil in mapping are small areas with water on the surface and areas of well drained soils where the depth to the water table is more than 3 feet. The areas with water on the surface are in depressions and old channels, and the well drained soils are on elevated areas. Included areas make up as much as 5 percent of the unit.

Reaction, permeability, available water capacity, natural fertility, organic matter content, and other chemical and physical properties are variable in this unit.

A hazard of flooding, variability of texture, and the water table make this soil unsuited to most uses other than for wetland wildlife habitat.

Capability subclass: VIIw.

10B—Frederick loam, 2 to 7 percent slopes. This soil is gently sloping and is on ridgetops. The soil is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The areas of this soil are irregularly shaped and range from 10 to 25 acres.

Typically, the surface layer is yellowish brown loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is strong brown clay, the middle part is strong brown silty clay, and the lower part is yellowish red clay.

Included with this soil in mapping are a few random areas of exposed limestone bedrock, sinkholes, and soils with a surface layer of cherty loam. Also included are small areas of severely eroded soils and Slabtown soils. The severely eroded soils are on the steeper convex slopes, and the Slabtown soils are in depressions and at the heads of drainageways. Included areas make up as much as 10 percent of the unit.

The permeability of this Frederick soil is moderate, and runoff is medium. Organic matter content is moderately low, and natural fertility is low. The reaction in the subsoil is strongly acid to very strongly acid. Reaction varies in the surface layer because of liming practices. Available water capacity of the soil is moderate. The subsoil has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are cultivated. Some areas are in community development, and a few areas are in pasture or woodland.

This soil is prime farmland and is well suited to cultivated crops (fig. 1). A moderate hazard of erosion is a major management concern. A crust commonly forms on the surface after hard rains, particularly where the plow layer contains material from the subsoil. Conservation tillage, contour stripcropping, using cover crops, and using crop residue on or in the soil are practices that help to control erosion. Using grasses and legumes in the cropping system and adding manure and other organic material to the soil help to improve fertility, reduce crusting, and increase water infiltration. The

Figure 1.—An area of Frederick loam, 2 to 7 percent slopes.

addition of lime and fertilizer helps to offset the natural acidity and low fertility of this soil.

This soil is well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing causes soil compaction and kills desirable grasses and legumes. Adding lime and fertilizer to the soil, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices.

The potential productivity for trees on this soil is high. Removing competing vegetation and fencing to protect trees from livestock are the main woodland management practices. The soil is soft and slippery during wet periods, limiting the use of heavy timber equipment.

Low strength and the permeability and shrink-swell potential of the soil are the main limitations for community development. The low strength limits the soil as a site for local roads and streets and as a source of roadfill. The permeability is a limitation of the soil as a site for septic tank absorption fields, and the shrink-swell potential limits building sites. The clay subsoil is sticky when wet, limiting vehicular traffic in unpaved areas.

Capability subclass: IIe.

10C—Frederick loam, 7 to 15 percent slopes. This soil is strongly sloping and is on ridgetops and side slopes. The soil is at least 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The areas of this soil are irregularly shaped and range from 10 to 40 acres.

Typically, the surface layer is yellowish brown loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is strong brown clay, the middle part is strong brown silty clay, and the lower part is yellowish red clay.

Included with this soil in mapping are a few random areas of exposed limestone bedrock, sinkholes, and soils with a surface layer of cherty loam. Also included are small areas of severely eroded soils and Slabtown soils. The severely eroded soils are on the steeper convex slopes, and the Slabtown soils are in depressions and at

the heads of drainageways. Included areas make up as much as 10 percent of the unit.

The permeability of this Frederick soil is moderate, and runoff is medium to rapid. Organic matter content is moderately low, and natural fertility is low. The reaction in the subsoil is strongly acid to very strongly acid. Reaction varies in the surface layer because of liming practices. The available water capacity of the soil is moderate. The subsoil has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are cultivated. Some areas are in community development, and a few areas are in pasture or woodland.

This soil is moderately well suited to cultivated crops. A severe hazard of erosion is a major management concern. A crust forms on the surface after hard rains, particularly where the soil is severely eroded and the plow layer contains material from the subsoil. Conservation tillage, contour stripcropping, using cover crops, and using crop residue on or in the soil are management practices that help to control erosion. Using grasses and legumes in the cropping system and adding manure and other organic material help to improve fertility, reduce crusting, and increase water infiltration. Lime and fertilizer help to offset the natural acidity and low fertility of this soil.

This soil is suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing causes soil compaction and kills desirable grasses and legumes. Adding lime and fertilizer to the soil, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices.

The potential productivity for trees on this soil is high. Removing competing vegetation and fencing to protect trees from livestock are the main woodland management practices. The soil is soft and slippery during wet periods, limiting the use of heavy timber equipment.

Slope, low strength, and the shrink-swell potential and slow permeability of the soil are the main limitations for community development. The slope and permeability are limitations of the soil as a site for septic tank absorption fields. The low strength limits the soil as a source of roadfill and as a site for local roads and streets, and the shrink-swell potential is a limitation for building sites. The clay subsoil is sticky when wet, limiting vehicular traffic in unpaved areas.

Capability subclass: IIIe.

10D—Frederick loam, 15 to 30 percent slopes. This soil is moderately steep and steep and is on side slopes. It is at least 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The areas of this soil are irregularly shaped and range from 5 to 20 acres.

Typically, the surface layer is yellowish brown loam 6 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is strong brown clay, the middle part is strong brown silty clay, and the lower part is yellowish red clay.

Included with this soil in mapping are a few random areas of exposed limestone bedrock and areas with slopes of more than 30 percent. Also included are small areas of severely eroded soils and Slabtown soils. The severely eroded soils are on convex slopes. The Slabtown soils are at the heads of drainageways. Included areas make up as much as 10 percent of the unit.

The permeability of this Frederick soil is moderate, and runoff is rapid. Organic matter content is moderately low, and natural fertility is low. The reaction in the subsoil is strongly acid to very strongly acid. Reaction varies in the surface layer because of liming practices. Available water capacity of the soil is moderate. The subsoil has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are cultivated or in pasture. A few areas are in woodland.

Slope and a very severe erosion hazard make this soil poorly suited to cultivated crops. Conservation tillage, contour stripcropping, using cover crops, and using crop residue on or in the soil are management practices in cultivated areas that help to control erosion. Using grasses and legumes in the cropping system and adding manure and other organic material to the soil help to improve fertility, reduce crusting, and increase water infiltration. Lime and fertilizer help to offset the natural acidity and low fertility of this soil.

This soil is moderately well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing causes soil compaction and kills desirable grasses and legumes. Adding lime and fertilizer to the soil, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices.

The potential productivity for trees on this soil is high. Removing competing vegetation and fencing to protect trees from livestock are the main woodland management practices. The soil is soft and slippery during wet periods, limiting the use of heavy timber equipment.

Slope, low strength, and the shrink-swell potential and slow permeability of the soil are the main limitations for community development. The slope and permeability are limitations of the soil as a site for septic tank absorption fields. The low strength limits the soil as a source of roadfill and as a site for local roads and streets, and the shrink-swell potential is a limitation for building sites. The clay subsoil is sticky when wet, limiting vehicular traffic in unpaved areas.

Capability suclass: IVe.

11C—Gilpin-Lily complex, 7 to 15 percent slopes. This unit consists of strongly sloping soils that are 20 to 40 inches deep to bedrock and that do not have a

seasonal high water table. The unit is in the mountainous area of the county, and most areas are on nearly inaccessible ridgetops. The areas are long and narrow and range from 5 to 50 acres. The unit is about 50 percent Gilpin soils, 40 percent Lily soils and 10 percent other soils. The Gilpin and Lily soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Gilpin soils is yellowish brown silt loam 4 inches thick. The subsoil is 19 inches thick. The upper 5 inches is yellowish brown silt loam, and the lower 14 inches is reddish yellow silty clay loam and shaly silty clay loam. Shale bedrock is at a depth of 23 inches.

Typically, the surface layer of the Lily soils is dark brown sandy loam 3 inches thick. The subsoil is yellowish brown and dark yellowish brown gravelly loam 31 inches thick. Sandstone bedrock is at a depth of 34 inches.

Included with this unit in mapping are small areas of Berks soils, Ramsey soils, soils that are more than 40 inches deep to bedrock, soils where 3 to 15 percent of the surface is covered with stones, and bedrock outcrops. The Berks and Ramsey soils and the bedrock outcrops are on knobs. The soils that are more than 40 inches deep to bedrock are in saddles and swales.

Permeability is moderate in these Gilpin soils and moderately rapid in these Lily soils. Available water capacity is low. Runoff is medium or rapid. These soils are low in natural fertility and moderately low in organic matter content. Reaction is strongly acid through extremely acid. The subsoil of both soils has a low shrink-swell potential and a moderate frost-action potential.

The soils in this unit are moderately well suited to cultivated crops. The hazard of erosion is severe and is a major management concern. Conservation tillage, contour stripcropping, using cover crops, and using crop residue on and in the soil are management practices in cultivated areas that help to control erosion. Using grasses and legumes in the cropping system and adding manure and other organic material to the soils help to improve fertility and increase the water holding capacity. Lime and fertilizer help to offset the natural acidity and low fertility of these soils.

This unit is well suited to pasture and hay, but the soils are droughty in late summer and early fall. Adding lime and fertilizer to the soil, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion.

The potential productivity for trees on this unit is moderate on the Lily soils and high on the Gilpin soils. Most areas are wooded. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main woodland management practices.

Slope and the depth to bedrock are the main limitations of this unit for community development. Both limit the soils as a site for sewage lagoons and buildings with basements. The depth to bedrock limits the unit as a site for septic tanks and sanitary landfills.

Capability subclass: IIIe.

11D—Gilpin-Lily complex, 15 to 35 percent slopes. This unit consists of moderately steep and steep soils that are 20 to 40 inches deep to bedrock and that do not have a seasonal high water table. The unit is in mountainous areas on nearly inaccessible side slopes. The areas are long and narrow and range from 5 to 100 acres. The unit is about 50 percent Gilpin soils, 40 percent Lily soils, and 10 percent other soils. The Gilpin and Lily soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Gilpin soils is yellowish brown silt loam 4 inches thick. The subsoil is 19 inches thick. The upper 5 inches is yellowish brown silt loam, and the lower 14 inches is reddish yellow silty clay loam and shaly silty clay loam. Shale bedrock is at a depth of 23 inches.

Typically, the surface layer of the Lily soils is dark brown sandy loam 3 inches thick. The subsoil is yellowish brown and dark yellowish brown gravelly loam 31 inches thick. Sandstone bedrock is at a depth of 34 inches.

Included with this unit in mapping are small areas of Berks soils, Ramsey soils, soils that are more than 40 inches deep to bedrock, soils where 3 to 15 percent of the surface is covered with stones, and bedrock outcrops. The Berks and Ramsey soils and the bedrock outcrops are on knobs. The soils that are more than 40 inches deep to bedrock are in saddles and swales.

Permeability is moderate in these Gilpin soils and moderately rapid in these Lily soils. Available water capacity is low. Runoff is rapid. These soils are low in natural fertility and moderately low in organic matter content. Reaction is strongly acid through extremely acid. The subsoil of both soils has a low shrink-swell potential and a moderate frost-action potential.

Slope and a very severe erosion hazard make this unit generally unsuitable for cultivated crops. The unit is moderately well suited to pasture and hay, but the soils are droughty in late summer and early fall. Adding lime and fertilizer to the soil, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion.

The potential productivity for trees on this unit is moderate on the Lily soils and high on the Gilpin soils. Most areas are wooded. Controlling competing

vegetation and fencing to keep livestock from damaging young trees are the main woodland management practices.

Slope and the depth to bedrock are the main limitations of this unit for community development. Both limit the soils as a site for sewage lagoons and buildings with basements. The depth to bedrock limits the unit as a site for septic tanks and sanitary landfills.

Capability subclass: VIe.

11F—Gilpin-Lily complex, 35 to 65 percent slopes. This unit consists of very steep soils that are 20 to 40 inches deep to bedrock and that do not have a seasonal high water table. The unit is in nearly inaccessible mountainous areas of the county. The areas are long and narrow and range from 5 to 200 acres. The unit is about 50 percent Gilpin soils, 40 percent Lily soils, and 10 percent other soils. The Gilpin and Lily soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Gilpin soils is yellowish brown silt loam 4 inches thick. The subsoil is 19 inches thick. The upper 5 inches is yellowish brown silt loam, and the lower 14 inches is reddish yellow silty clay loam and shaly silty clay loam. Shale bedrock is at a depth of 23 inches.

Typically, the surface layer of the Lily soils is dark brown sandy loam 3 inches thick. The subsoil is yellowish brown and dark yellowish brown gravelly loam 31 inches thick. Sandstone bedrock is at a depth of 34 inches.

Included with this unit in mapping are small areas of Berks soils, Ramsey soils, soils that are more than 40 inches deep to bedrock, soils where 3 to 15 percent of the surface is covered with stones, and bedrock outcrops. The Berks and Ramsey soils and the bedrock outcrops are on knobs. The soils that are more than 40 inches deep to bedrock are in saddles and swales.

Permeability is moderate in these Gilpin soils and moderately rapid in these Lily soils. Available water capacity is low. Runoff is rapid. These soils are low in natural fertility and moderately low in organic matter content. Reaction is strongly acid through extremely acid. The subsoil of both soils has a low shrink-swell potential and a moderate frost-action potential.

Slope and a very severe erosion hazard make this unit generally unsuitable for cultivated crops and poorly suited to pasture and hay. The soils are droughty in late summer and early fall. Adding lime and fertilizer to the soils, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion.

The potential productivity for trees on this unit is moderate on the Lily soils and high on the Gilpin soils. Most areas are wooded. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main woodland management practices.

Slope and the depth to bedrock are the main limitations of this unit for community development. Both limit the soils as a site for sewage lagoons and buildings with basements. The depth to bedrock limits the unit as a site for septic tanks and sanitary landfills.

Capability subclass: VIIe.

12B—Groseclose-Urban land complex, 2 to 7 percent slopes. This unit consists of gently sloping Groseclose soils and areas that have been partly altered by grading or filling for housing developments, shopping centers, factories, and other similar uses. The unit is about 50 percent Groseclose soils, 40 percent urbanized areas, and 10 percent other soils. The Groseclose soils and urbanized areas are so intermingled that it was not practical to map them separately. The areas of the unit dominantly are square or rectangular and range from 3 to 130 acres in size.

Typically, the Groseclose soils have a surface layer of dark yellowish brown silt loam 8 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is strong brown silty clay, the middle part is strong brown clay, and the lower part is strong brown silty clay loam.

Included with this unit in mapping are small areas of Carbo, Faywood, Lowell, Newbern, Slabtown, and Wurno soils and small areas of rock outcrops. The Carbo, Faywood, Lowell, Newbern, and Wurno soils are on slightly higher convex areas throughout the unit. The areas of rock outcrops are throughout the unit. The Slabtown soils are in saddles and in concave positions at the heads of drainageways. Fill material, mostly from surrounding soils, has been added to some areas. The fill material is as much as 36 inches deep in some areas and more than 36 inches deep in others. As much as 50 percent of the soil has been removed from some other areas.

The areas of this unit that are undisturbed have slow permeability. Permeability in areas that have been cut or filled is variable. Runoff in this unit is medium. Available water capacity is moderate. The shrink-swell potential is high. The soil mainly is strongly acid or very strongly acid throughout, but reaction in the surface layer and upper part of the subsoil varies according to liming practices.

The areas of this unit that are not Urban land include yards, gardens, and open areas around buildings. These areas range from 200 square feet to 3 acres each. The permeability, depth to rock, shrink-swell potential, and clayey subsoil are limitations for community development. In many areas the topsoil has been removed, making it difficult to establish lawns and gardens. The clay subsoil and depth to rock are limitations for excavations and trench sanitary landfills.

Permeability is a limitation of the unit as a site for septic tank absorption fields, and the shrink-swell potential is a limitation for dwelling sites and road construction.

Onsite investigation is necessary to determine limitations of the unit for any land use.

Capability subclass: not assigned.

12C—Groseclose-Urban land complex, 7 to 15 percent slopes. This unit consists of strongly sloping Groseclose soils and areas that have been partly altered by grading or filling for housing developments, shopping centers, factories, and other similar uses. The unit is about 50 percent Groseclose soils, 40 percent urbanized areas, and 10 percent other soils. The Groseclose soils and urbanized areas are so intermingled that it was not practical to map them separately. The areas of the unit dominantly are square or rectangular and range from 3 to 130 acres in size.

Typically, the Groseclose soils have a surface layer of dark yellowish brown silt loam 8 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is strong brown silty clay, the middle part is strong brown clay, and the lower part is strong brown silty clay loam.

Included with this unit in mapping are small areas of Carbo, Faywood, Lowell, Newbern, Slabtown, and Wurno soils and small areas of rock outcrops. The Carbo, Faywood, Lowell, Newbern, and Wurno soils are on slightly higher convex areas throughout the unit. The areas of rock outcrops are throughout the unit. The Slabtown soils are in saddles and in concave positions at the heads of drainageways. Fill material, mostly from surrounding soils, has been added to some areas. The fill material is as much as 36 inches deep in some areas and more than 36 inches deep in others. As much as 50 percent of the soil has been removed from some other areas.

The areas of this unit that are undisturbed have slow permeability. Permeability in areas that have been cut or filled is variable. Runoff on this unit is medium or rapid. Available water capacity is moderate. The shrink-swell potential is high. The soil mainly is strongly or very strongly acid throughout, but reaction in the surface layer and upper part of the subsoil varies according to liming practices.

The areas of this unit that are not Urban land include yards, gardens, and open areas around buildings. These areas range from 200 square feet to 3 acres each. Permeability, depth to rock, shrink-swell potential, slope, and the clayey subsoil are limitations for community development. In many areas the topsoil has been removed, making it difficult to establish lawns and gardens. The clay subsoil and depth to rock are limitations for excavations and trench sanitary landfills. Permeability and slope are limitations of the unit as a site for septic tank absorption fields, and the shrink-swell potential and slope are limitations for dwelling sites and road construction.

Onsite investigation is needed to determine the limitations of the unit for any land use.

Capability subclass: not assigned.

13B—Groseclose and Poplimento silt loams, 2 to 7 percent slopes. This unit consists of gently sloping soils that are at least 48 inches deep to bedrock and that do not have a seasonal high water table. The unit is on smooth, broad ridgetops and on side slopes. It is in irregularly shaped areas that range from 3 to 80 acres. Some areas consist mostly of Groseclose soils, some mostly of Poplimento soils, and some of both. The soils were mapped together because they have no major differences in use and management. The total acreage of the unit is about 45 percent Groseclose soils, 40 percent Poplimento soils, and 15 percent other soils.

The Groseclose soils typically have a surface layer of dark yellowish brown silt loam 8 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is strong brown silty clay, the middle part is yellowish red and strong brown clay, and the lower part is brownish yellow silty clay loam. The substratum is brownish yellow silty clay loam to a depth of at least 67 inches.

The Poplimento soils typically have a surface layer of dark yellowish brown silt loam 7 inches thick. The subsoil is 37 inches thick. The upper part is strong brown silt loam, the middle part is yellowish brown and strong brown clay, and the lower part is reddish yellow clay. The substratum is reddish yellow and strong brown silty clay loam to a depth of at least 60 inches.

Included with these soils in mapping are small areas of Carbo, Wurno, Newbern, Faywood, and Lowell soils and small areas of rock outcrops and Slabtown soils. The Carbo, Wurno, Newbern, Faywood, and Lowell soils are on convex areas throughout the unit. The areas of rock outcrops are throughout the unit. The Slabtown soils are in saddles and in concave positions at the heads of drainageways.

The permeability is slow in these Groseclose soils and moderately slow in these Poplimento soils. Available water capacity is moderate. Surface runoff is medium. The Poplimento soils are medium in natural fertility, and the Groseclose soils are low. Both soils are moderately low in organic matter content. Reaction is strongly acid or very strongly acid in the Groseclose soils and very strongly acid to medium acid in the Poplimento soils. The subsoil of both has a high shrink-swell potential and a moderate frost-action potential.

This unit is prime farmland and is well suited to cultivated crops. Most areas are cultivated (fig. 2). The hazard of erosion is moderate. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. The

Figure 2.—An area of Groseclose and Poplimento silt loams, 2 to 7 percent slopes.

addition of lime and fertilizer helps to offset the acidity and increase the fertility of these soils. Adding manure and other organic material to the soils helps increase water infiltration.

These soils are well suited to hay and pasture crops grown in the area. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on these soils is high. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices.

The clayey subsoil, shrink-swell potential, and permeability are the main limitations of these soils for community development. In some areas the depth to bedrock is less than 60 inches and is a further limitation of the soils, especially for excavations and as a site for sanitary landfills. The clayey subsoil also limits excavations, is a limitation of the soils as a site for trench sanitary landfills, and is soft when wet, limiting vehicular traffic in unpaved areas. The permeability limits the soils as a site for septic tank absorption fields, and the shrink-swell potential is a limitation for building sites.

Capability subclass: IIe.

13C—Groseclose and Poplimento silt loams, 7 to 15 percent slopes. This unit consists of strongly sloping soils that are at least 48 inches deep to bedrock and that do not have a seasonal high water table. The unit is on smooth, broad ridgetops and on side slopes. It is in irregularly shaped areas that range from 3 to 275 acres. Some areas consist mostly of Groseclose soils, some mostly of Poplimento soils, and some of both. The soils were mapped together because they have no major differences in use and management. The total acreage of the unit is about 45 percent Groseclose soils, 40 percent Poplimento soils, and 15 percent other soils.

The Groseclose soils typically have a surface layer of dark yellowish brown silt loam 8 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is strong brown silty clay, the middle part is yellowish red and strong brown clay, and the lower part is brownish

yellow silty clay loam. The substratum is brownish yellow silty clay loam to a depth of at least 67 inches.

The Poplimento soils typically have a surface layer of dark yellowish brown silt loam 7 inches thick. The subsoil is 37 inches thick. The upper part is strong brown silt loam, the middle part is yellowish brown and strong brown clay, and the lower part is reddish yellow clay. The substratum is reddish yellow and strong brown silty clay loam to a depth of at least 60 inches.

Included with these soils in mapping are small areas of Carbo, Wurno, Newbern, Faywood, and Lowell soils and small areas of rock outcrops and Slabtown soils. The Carbo, Wurno, Newbern, Faywood, and Lowell soils are on convex areas throughout the unit. The areas of rock outcrops are throughout the unit. The Slabtown soils are in saddles and in concave positions at the heads of drainageways.

The permeability is slow in these Groseclose soils and moderately slow in these Poplimento soils. Available water capacity is moderate. Surface runoff is medium or rapid. The Poplimento soils are medium in natural fertility, and Groseclose soils are low. Both soils are moderately low in organic matter content. Reaction is strongly or very strongly acid in the Groseclose soils and very strongly to medium acid in the Poplimento soils. The subsoil of both has a high shrink-swell potential and a moderate frost-action potential.

These soils are moderately well suited to most of the cultivated crops grown in the area. Most areas are cultivated. The hazard of erosion is severe. Conservation tillage and using winter cover crops and grasses and legumes in the cropping system are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Using crop residue on or in the surface layer helps to reduce crusting and erosion. Applying lime and fertilizer helps to offset the acidity and increase the fertility of these soils. Adding manure and other organic material to the soil improves fertility and increases water infiltration.

These soils are well suited to hay and pasture crops grown in the area. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on these soils is high. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices.

The clayey subsoil, shrink-swell potential, permeability, and slope are the main limitations of these soils for community development. In some areas the depth to bedrock is less than 60 inches and is a further limitation of the soils, especially for excavations and as a site for sanitary landfills. The clayey subsoil also limits excavations, is a limitation of the soils as a site for trench sanitary landfills, and is soft when wet, limiting vehicular traffic in unpaved areas. The permeability and slope limit the soils as a site for septic tank absorption fields, and the shrink-swell potential and slope are limitations for building sites.

Capability subclass: IIIe.

13D—Groseclose and Poplimento silt loams, 15 to 30 percent slopes. This unit consists of moderately steep and steep soils that are at least 48 inches deep to bedrock and that do not have a seasonal high water table. The unit is on side slopes and ridgetops. It is in irregularly shaped areas that range from 5 to 100 acres. Some areas consist mostly of Groseclose soils, some mostly of Poplimento soils, and some of both. The soils were mapped together because they have no major differences in use and management. The total acreage of the unit is about 45 percent Groseclose soils, 40 percent Poplimento soils, and 15 percent other soils.

The Groseclose soils typically have a surface layer of dark yellowish brown silt loam 8 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is strong brown silty clay, the middle part is yellowish red and strong brown clay, and the lower part is brownish yellow silty clay loam. The substratum is brownish yellow silty clay loam to a depth of at least 67 inches.

The Poplimento soils typically have a surface layer of dark yellowish brown silt loam 7 inches thick. The subsoil is 37 inches thick. The upper part is strong brown silt loam, the middle part is yellowish brown and strong brown clay, and the lower part is reddish yellow clay. The substratum is reddish yellow and strong brown silty clay loam to a depth of at least 60 inches.

Included with these soils in mapping are small areas of Carbo, Wurno, Newbern, Faywood, and Lowell soils and small areas of rock outcrops and Slabtown soils. The Carbo, Wurno, Newbern, Faywood, and Lowell soils are on convex areas throughout the unit. The areas of rock outcrops are throughout the unit. The Slabtown soils are in saddles and in concave positions at the heads of drainageways.

The permeability is slow in these Groseclose soils and moderately slow in these Poplimento soils. Available water capacity is moderate. Surface runoff is rapid. The Poplimento soils are medium in natural fertility, and Groseclose soils are low. Both soils are moderately low in organic matter content. Reaction is strongly or very strongly acid in the Groseclose soils and very strongly to medium acid in the Poplimento soils. The subsoil of both has a high shrink-swell potential and a moderate frost-action potential.

Most areas of this unit are used for hay and pasture.

Slope and a severe erosion hazard make these soils poorly suited to cultivated crops. Conservation tillage,

using winter cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Lime and fertilizer help to offset the acidity and increase the fertility of these soils. Adding manure and other organic material helps increase water infiltration.

These soils are moderately well suited to hay and pasture crops grown in the area. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on these soils is high. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main woodland management practices.

The clayey subsoil, shrink-swell potential, permeability, and slope are the main limitations of these soils for community development. In some areas the depth to bedrock is less than 60 inches and is a further limitation of the soils, especially for excavations and as a site for sanitary landfills. The clayey subsoil also limits excavations, is a limitation of the soils as a site for trench sanitary landfills, and is soft when wet, limiting vehicular traffic in unpaved areas. The permeability and slope limit the soils as a site for septic tank absorption fields, and the shrink-swell potential and slope are limitations for building sites.

Capability subclass: IVe.

14C—Klinesville-Berks shaly silt loams, 7 to 15 percent slopes. This unit consists of strongly sloping soils that do not have a seasonal high water table. Bedrock is 10 to 20 inches below the surface in the Klinesville soils and 20 to 40 inches below the surface in the Berks soils. The unit is on smooth ridgetops in long, narrow areas that range from 2 to 50 acres. It is about 55 percent Klinesville soils, 35 percent Berks soils, and 10 percent other soils. The Klinesville and Berks soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Klinesville soils is dark reddish brown shaly silt loam 2 inches thick. The subsoil is 12 inches thick. The upper 5 inches is reddish brown shaly silt loam, and the lower 7 inches is reddish brown very shaly silt loam. Shale bedrock is at a depth of 14 inches.

Typically, the surface layer of the Berks soils is brown shaly silt loam 7 inches thick. The subsoil is yellowish brown very shaly silt loam 20 inches thick. Shale bedrock is at a depth of 27 inches.

Included with these soils in mapping are small areas of Frederick and Groseclose soils in saddles and swales. Also included are areas of Monongahela soils in depressions and at the heads of drainageways and areas of rock outcrops on narrow ridges and elevated knobs.

The permeability of these Klinesville and Berks soils is moderate or moderately rapid, and the available water capacity is very low. Runoff is medium or rapid. The subsoil has a low shrink-swell potential and a low frost-action potential. These soils are low in natural fertility and low or moderately low in organic matter content. Reaction mainly is strongly acid to medium acid in the Klinesville soils and extremely acid to slightly acid in the Berks soils. The surface layer in some areas is less acid because of liming.

About half of the acreage of this unit has been cleared, and about half is wooded. The cleared areas are dominantly in hay or pasture. A few small areas are cultivated.

Slope and a severe erosion hazard make this unit poorly suited to cultivated crops. There is a hazard of damage to cultivating equipment because of the depth to bedrock. Conservation tillage, contour stripcropping, using cover crops, and using crop residue on or in the soils are management practices that help to control erosion in cultivated areas. Using grasses and legumes in the cropping system and adding manure and other organic material to the soils help to improve fertility and increase the water holding capacity. Lime and fertilizer help to offset the natural acidity and low fertility of the soils.

This unit is moderately well suited to pasture and hay. Because of the shallow rooting depth, alfalfa usually is short lived. These soils are droughty in late summer and early fall. Using lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion.

The potential productivity for trees is moderately high on the Berks soils and moderate on the Klinesville soils. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices. Some trees on this unit are susceptible to uprooting during windy periods and have a high rate of seedling mortality.

The depth to rock and the permeability of the soils are the main limitations for community development. Both limit the soils as a site for landfills. The depth to bedrock limits the soils as a site for buildings, excavations, septic tanks, and sewage lagoons.

Capability subclass: IVe.

14F—Klinesville-Berks shaly silt loams, 30 to 65 percent slopes. This unit is made up of steep and very

steep soils that do not have a seasonal high water table. Bedrock is 10 to 20 inches below the surface in the Klinesville soils and 20 to 40 inches below the surface in the Berks soils. This unit is on side slopes in long, narrow areas that range from 3 to 250 acres. It is about 55 percent Klinesville soils, 35 percent Berks soils, and 10 percent other soils. The Klinesville and Berks soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Klinesville soils is dark reddish brown shaly silt loam 2 inches thick. The subsoil is 12 inches thick. The upper 5 inches is reddish brown shaly silt loam, and the lower 7 inches is reddish brown very shaly silt loam. Shale bedrock is at a depth of 14 inches.

Typically, the surface layer of the Berks soils is brown shaly silt loam 7 inches thick. The subsoil is yellowish brown very shaly silt loam 20 inches thick. Shale bedrock is at a depth of 27 inches.

Included with this complex in mapping are small areas of Groseclose, Monongahela, Leck Kill, and Rayne soils. Also included are small areas of rock outcrops. The Groseclose, Leck Kill, and Rayne soils are in smooth areas on lower side slopes. The Monongahela soils are in concave areas on lower side slopes, in depressions, and at the heads of drainageways. The rock outcrops are in narrow convex areas on upper side slopes.

The permeability of these Klinesville and Berks soils is moderate or moderately rapid, and the available water capacity is very low. Runoff is very rapid. The subsoil has a low shrink-swell potential and a low frost-action potential. These soils are low in natural fertility and low or moderately low in organic matter content. Reaction mainly is strongly acid to medium acid in the Klinesville soils and extremely acid to slightly acid in the Berks soils. The surface layer in some areas is less acid because of liming.

Most areas of this unit are wooded. Some areas are in pasture.

Slope and a very severe erosion hazard make these soils generally unsuited to cultivated crops and poorly suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing increases runoff and erosion, and grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees is moderately high or moderate on the Berks soils and low or moderate on the Klinesville soils. Potential productivity is lower on south-facing slopes than on north-facing slopes. Some trees on this unit have a high rate of seedling mortality, and some are susceptible to uprooting during windy periods. Slope limits the kinds of woodland harvesting and planting equipment that can be used on these soils. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main management practices.

Slope, the depth to bedrock, and the permeability of the soils are the main limitations for community development. All three limit the soils as a site for landfills and sewage lagoons. Slope and the depth to bedrock limit the soils as a site for buildings, septic tanks, and excavations.

Capability subclass: VIIe.

15C—Leck Kill-Rayne silt loams, 7 to 15 percent slopes. This unit consists of strongly sloping soils that do not have a seasonal high water table. Bedrock is at a depth of at least 40 inches in both soils. The unit is on smooth ridgetops in long, narrow areas that range from about 5 to 60 acres. It is about 60 percent Leck Kill soils, 30 percent Rayne soils, and 10 percent other soils. The Leck Kill and Rayne soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Leck Kill soils is dark reddish gray silt loam 4 inches thick. The subsoil is 27 inches thick. The upper 4 inches is reddish brown silt loam, and the lower 23 inches is reddish brown and red silty clay loam. The substratum is red shaly silty clay loam to a depth of 60 inches or more.

Typically, the surface layer of the Rayne soils is brown silt loam 7 inches thick. The subsoil is 36 inches thick. The upper 11 inches is brown loam, the next 15 inches is strong brown silt loam, and the lower 10 inches is strong brown very shaly clay loam. The substratum is strong brown very shaly clay loam to a depth of 60 inches or more.

Included with this unit in mapping are small areas of Klinesville, Berks, Groseclose, and Monongahela soils and small areas of bedrock outcrops. The Klinesville and Berks soils and the areas of bedrock outcrops are on knobs and convex side slopes. The Groseclose soils are in less sloping areas near drainageways. The Monongahela soils are in concave areas and at the heads of drainageways. Also included in some units are a few areas that have a seasonal high water table 3 to 6 feet below the surface from November through April.

Permeability is moderate or moderately rapid in these Leck Kill soils and moderate in these Rayne soils. Available water capacity is moderate. Runoff is medium or rapid. Organic matter content is moderately low, and natural fertility is low. Reaction in the surface layer and subsoil is strongly acid or very strongly acid. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

Most areas of this unit are wooded. Some areas are in pasture.

This unit is moderately well suited to cultivated crops. The hazard of erosion is severe and is a major management concern. Conservation tillage, contour stripcropping, and using cover crops are management

practices that help to control erosion. Lime and fertilizer help to offset the natural acidity and low fertility. Using grasses and legumes in the cropping system and adding manure and other organic matter to the soils help to improve fertility, reduce crusting, and increase water infiltration. Using crop residue on or in the surface layer helps to improve organic matter content.

This unit is well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing causes soil compaction and kills desirable pasture species, thus reducing yields and increasing runoff and erosion. Using lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices.

The potential productivity for oaks is moderately high on the Leck Kill soils and high on the Rayne soils. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

Slope and the permeability of the soils are the main limitations for community development. The depth to bedrock is a further limitation in areas where bedrock is at a depth of less than 60 inches. The slope, depth to rock, and permeability limit the soils as a site for septic tank absorption fields, and slope is a limitation for building sites. The moderately rapid permeability in the Leck Kill soils causes a hazard of ground-water pollution in areas used for landfills or sewage lagoons.

Capability subclass: IIIe.

15D—Leck Kill-Rayne silt loams, 15 to 30 percent slopes. This unit consists of moderately steep and steep soils that do not have a seasonal high water table. Bedrock is at a depth of at least 40 inches in both soils. The unit is on smooth side slopes in irregularly shaped areas that range from about 5 to 90 acres. It is about 60 percent Leck Kill soils, 30 percent Rayne soils, and 10 percent other soils. The Leck Kill and Rayne soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Leck Kill soils is dark reddish gray silt loam 4 inches thick. The subsoil is 27 inches thick. The upper 4 inches is reddish brown silt loam, and the lower 23 inches is reddish brown and red silty clay loam. The substratum is red shaly silty clay loam to a depth of 60 inches or more.

Typically, the surface layer of the Rayne soils is brown silt loam 7 inches thick. The subsoil is 36 inches thick. The upper 11 inches is brown loam, the next 15 inches is strong brown silt loam, and the lower 10 inches is strong brown very shaly clay loam. The substratum is strong brown very shaly clay loam to a depth of 60 inches or more.

Included with this unit in mapping are small areas of Klinesville, Berks, Groseclose, and Monongahela soils and small areas of bedrock outcrops. The Klinesville and Berks soils and the areas of bedrock outcrops are on knobs and convex side slopes. The Groseclose soils are in less sloping areas near drainageways. The Monongahela soils are in concave areas and at the heads of drainageways. Also included in some units are a few areas that have a seasonal high water table 3 to 6 feet below the surface from November through April.

Permeability is moderate or moderately rapid in these Leck Kill soils and moderate in these Rayne soils. Available water capacity is moderate. Runoff is rapid. Organic matter content is moderately low, and natural fertility is low. Reaction in the surface layer and subsoil is strongly or very strongly acid. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

Most areas of this unit are wooded. Some areas are in pasture.

Slope and a very severe erosion hazard make this unit poorly suited to cultivated crops. Conservation tillage, contour stripcropping, and using cover crops are management practices in cultivated areas that help to control erosion. Lime and fertilizer help to offset the natural acidity and low fertility. Using grasses and legumes in the cropping system, adding manure and other organic material to the soil, and using crop residue on or in the soil help to improve fertility, reduce rusting, and increase water infiltration.

This unit is moderately well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing causes soil compaction and kills desirable pasture species, thus reducing yields and increasing runoff and erosion. Using lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices.

The potential productivity for oaks is moderately high on the Leck Kills and high on the Rayne soils. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

Slope and the permeability of the soils are the main limitations for community development. The depth to bedrock is a further limitation in areas where bedrock is at a depth of less than 60 inches. The slope, depth to rock, and permeability limit the soils as a site for septic tank absorption fields, and slope is a limitation for building sites. The moderately rapid permeability in the Leck Kill soils causes a hazard of ground-water pollution in areas used for landfills or sewage lagoons.

Capability subclass: IVe.

16D—Lily-Ramsey very stony sandy loams, 15 to 35 percent slopes. This unit consists of moderately steep and steep soils that do not have a seasonal high water table. Bedrock is at a depth of 20 to 40 inches in the Lily soils and 7 to 20 inches in the Ramsey soils. Stones at least 10 inches in diameter cover 3 to 10

percent of the surface area of the unit. The unit is on long, smooth mountain ridgetops and side slopes in long, narrow areas that range from 5 to 100 acres. It consists of about 50 percent Lily soils, 30 percent Ramsey soils, and 20 percent other soils. The Lily and Ramsey soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Lily soils is dark brown sandy loam about 3 inches thick. The subsoil is yellowish brown and dark yellowish brown gravelly loam 29 inches thick. Sandstone bedrock is at a depth of 32 inches.

Typically, the surface layer of the Ramsey soils is dark brown sandy loam about 2 inches thick. The subsoil is yellowish brown and is 10 inches thick. The upper 4 inches is gravelly sandy loam, and the lower 6 inches is loam. The substratum is yellowish brown loam 4 inches thick. Sandstone bedrock is at a depth of 16 inches.

Included with this soil in mapping are small areas of Nolichucky and Sherando soils. The Nolichucky soils are in concave areas and along drainageways. The Sherando soils are along narrow drainageways. Also included are small areas of soils that do not have stones on the surface.

Permeability is moderately rapid in these Lily soils and rapid in these Ramsey soils. Available water capacity is low in the Lily soils and very low in the Ramsey soils. Surface runoff is very rapid. The subsoil of both soils has a low shrink-swell potential and a moderate or low frost-action potential. These soils are low in natural fertility and moderately low to low in organic matter content. The reaction of the soils is strongly acid or very strongly acid.

The stones on the surface and slope and a very severe erosion hazard make this unit generally unsuitable for cultivated crops. The soils are moderately well suited to hay and pasture.

The potential productivity for trees on this unit is moderate. Nearly all of the acreage is wooded. Slope limits the use of logging equipment. The limited rooting depth for trees on the Ramsey soils causes a hazard of uprooting during windy periods. Controlling competing vegetation is a main woodland management practice.

Slope, the depth to rock, and the stones on the surface are the main limitations of this unit for community development. All limit the soils as a site for septic tank absorption fields, buildings, sanitary landfills, sewage lagoons, recreational areas, and roads and streets.

Capability subclass: VIs.

16F—Lily-Ramsey very stony sandy loams, 35 to 65 percent slopes. This unit consists of very steep soils that do not have a seasonal high water table. Bedrock is at a depth of 20 to 40 inches in the Lily soils and 7 to 20 inches in the Ramsey soils. Stones at least 10 inches in diameter cover 3 to 10 percent of the surface area of the unit. The unit is on long, smooth mountain side slopes in long, narrow areas that range from 5 to 100 acres. It is about 50 percent Lily soils, 30 percent Ramsey soils, and 20 percent other soils. The Lily and Ramsey soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Lily soils is dark brown sandy loam about 3 inches thick. The subsoil is yellowish brown and dark yellowish brown gravelly loam 29 inches thick. Sandstone bedrock is at a depth of 32 inches.

Typically, the surface layer of the Ramsey soils is dark brown sandy loam about 2 inches thick. The subsoil is yellowish brown and is 10 inches thick. The upper 4 inches is gravelly sandy loam, and the lower 6 inches is loam. The substratum is yellowish brown loam 4 inches thick. Sandstone bedrock is at a depth of 16 inches.

Included with this soil in mapping are small areas of Nolichucky and Sherando soils. The Nolichucky soils are in concave areas and along drainageways. The Sherando soils are along narrow drainageways. Also included are small areas of soils that do not have stones on the surface.

Permeability is moderately rapid in these Lily soils and rapid in these Ramsey soils. Available water capacity is low in the Lily soils and very low in the Ramsey soils. Surface runoff is very rapid. The subsoil of both soils has a low shrink-swell potential and a moderate or low frost-action potential. These soils are low in natural fertility and moderately low to low in organic matter content. The reaction of the soils is strongly acid or very strongly acid.

The stones on the surface and the slope and a very severe erosion hazard make this unit generally unsuitable for cultivated crops and poorly suited to hay and pasture.

The potential productivity for trees on this unit is moderate. Nearly all of the acreage is wooded. Slope limits the use of logging equipment. The limited rooting depth for trees on the Ramsey soils causes a hazard of uprooting during windy periods. Controlling competing vegetation is a main woodland management practice.

Slope, the depth to rock, and the stones on the surface are the main limitations of this unit for community development. All limit the soils as a site for septic tank absorption fields, buildings, sanitary landfills, sewage lagoons, recreational areas, and roads and streets.

Capability subclass: VIIs.

17—Lindside-Nolin silt loams. This unit consists of nearly level soils that are more than 60 inches deep to bedrock. The soils have a seasonal high water table and are subject to frequent flooding during the spring (fig. 3). The areas of this unit are long and narrow and range from 2 to 35 acres. Slopes range from 0 to 2 percent. The unit consists of about 55 percent Lindside soils, 35

Figure 3.—Flooding on Lindside-Nolin silt loams.

percent Nolin soils, and 10 percent other soils. The Lindside and Nolin soils are so intermingled that it was not practical to map them separately.

Typically, the Lindside soils have a surface layer of dark yellowish brown silt loam 10 inches thick. The subsoil is mottled and is 28 inches thick. The upper 5 inches is yellowish brown and pale brown silt loam, the middle 9 inches is yellowish brown and light gray silty clay loam, and the lower 14 inches is brown and grayish brown silt loam. The substratum is grayish brown silt loam to a depth of 60 inches or more.

Typically, the Nolin soils have a surface layer of brown silt loam 7 inches thick. The subsoil is brown and dark brown silt loam 31 inches thick. The substratum is dark yellowish brown silty clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of Dunning soils, small areas with a surface layer of gravelly silt loam or cherty silt loam, and a few areas of rock outcrop. Also included are small areas that are less silty throughout than the Lindside or Nolin soils. The Dunning soils and soils with a surface layer of cherty silt loam or gravelly silt loam are in depressions and channels. The rock outcrops are along points and side slopes.

The permeability of these Lindside and Nolin soils is moderate, and surface runoff is very slow. Natural fertility is high, and organic matter content is moderate. The subsoil has a low shrink-swell potential and a high frost-action potential. Available water capacity is high. The Lindside soils have a seasonal high water table at a depth of 18 to 36 inches, and the Nolin soils have a seasonal high water table at a depth of 36 to 72 inches.

Most areas of this unit are in pasture or hay. A few small areas are used for corn or truck crops.

Areas of this unit that are protected from flooding are prime farmland and are well suited to cultivated crops. Conservation tillage and the use of cover crops and grasses and legumes in the cropping system are

practices that increase organic matter content and maintain tilth. Applying lime and fertilizer and adding manure and other organic material help to maintain fertility and increase water infiltration. These soils are soft in the spring, making it difficult to use farm equipment.

These soils are well suited to pasture and hay. Alfalfa is usually short lived because of the seasonal high water table. Deferred and rotational grazing and using lime and fertilizer are the main pasture management practices. Overgrazing kills desirable grasses and legumes and reduces yields. Grazing during wet periods damages sod and compacts the surface layer.

The potential productivity for trees on these soils is very high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices. Harvesting and planting during wet periods causes soil compaction.

Seasonal wetness, low strength, the frost-action potential, and flooding are the main limitations of this unit for community development. Seasonal wetness and flooding limit the soils as a site for buildings, septic tanks, and recreational uses. Low strength limits the soils as a source of roadfill, and the frost-action potential is a hazard to roads and streets.

Capability subclass: IIw.

18B—Lodi loam, 2 to 7 percent slopes. This soil is gently sloping. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on convex ridgetops and side slopes in long, narrow areas that range from 3 to 50 acres.

Typically, the surface layer is yellowish brown loam 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish brown loam in the upper part, strong brown clay in the middle part, and yellow and brownish yellow clay loam in the lower part.

Included with this soil in mapping are small areas of Slabtown soils, small areas with a surface layer of cherty loam, and small areas of rock outcrops. The Slabtown soils and cherty loam areas are in small depressions, in drainageways, and on toe slopes. The areas of rock outcrops are on narrow spines and ridgetops. Included areas make up less than 5 percent of the unit.

The permeability of this Lodi soil is moderate, and available water capacity is moderate. Surface runoff is medium. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is moderately low in organic matter content and low in natural fertility. The surface layer and subsoil mainly are strongly acid or very strongly acid, but the surface layer is less acid in some limed areas.

Most areas of this soil are used for pasture and hay. A few small areas are cultivated or wooded.

This soil is prime farmland and is well suited to cultivated crops. The hazard of erosion is moderate and is a management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Lime and fertilizer help to offset the natural acidity and low fertility of this soil.

This soil is well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes and increases runoff and erosion. Deferred and rotational grazing and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

The permeability of this soil, the clayey texture and shrink-swell potential of the subsoil, and low strength are the main limitations for community development. The permeability limits the soil as a site for septic tank absorption fields, and the shrink-swell potential is a limitation for building sites. The clayey subsoil limits the soil as a site for trench sanitary landfills and for excavations. It is soft when wet, thus limiting vehicular traffic in unpaved areas. Low strength limits the soil as a source of roadfill and as a site for roads and streets.

Capability subclass: IIe.

18C—Lodi loam, 7 to 15 percent slopes. This soil is strongly sloping. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on convex ridgetops and side slopes in irregularly shaped areas that range from 3 to 50 acres.

Typically, the surface layer is yellowish brown loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish brown loam in the upper part, strong brown clay in the middle part, and yellow and brownish yellow clay loam in the lower part.

Included with this soil in mapping are small areas of Slabtown soils, soils with a surface layer of cherty loam, rock outcrop, and Groseclose and Poplimento soils. The Slabtown soils and cherty loam areas are in small depressions, in drainageways, and on toe slopes. The areas of rock outcrops are on narrow spines and ridgetops. Included areas make up less than 10 percent of the unit.

The permeability of this Lodi soil is moderate, and available water capacity is moderate. Surface runoff is medium. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is moderately low in organic matter content and low in natural fertility. The surface layer and subsoil mainly are strongly or very strongly acid, but the surface layer is less acid in some limed areas.

Most areas of this soil are used for pasture and hay. A few small areas are cultivated or wooded.

This soil is moderately well suited to cultivated crops. The hazard of erosion is severe and is a management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Lime and fertilizer help to offset the natural acidity and low fertility of this soil.

This soil is well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes and increases runoff and erosion. Deferred and rotational grazing and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices. The use of logging and planting equipment during wet seasons causes cuts in the surface layer of the soil and increases runoff and erosion.

Slope, low strength, the permeability of the soil, and the clayey texture and shrink-swell potential of the subsoil are the main limitations for community development. Slope limits the soil as a site for buildings, septic tanks, and sewage lagoons. The permeability is a further limitation for septic tank absorption fields, and the shrink-swell potential limits building sites. The clayey subsoil limits excavations and trench sanitary landfills, and it is soft when wet, thus limiting vehicular traffic in unpaved areas. Low strength limits the soil as a source of roadfill and as a site for roads and streets.

Capability subclass: IIIe.

18D—Lodi loam, 15 to 30 percent slopes. This soil is moderately steep and steep. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on convex side slopes in irregularly shaped areas that range from 3 to 50 acres.

Typically, the surface layer is yellowish brown loam 6 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish brown loam in the upper part, strong brown clay in the middle part, and yellow and brownish yellow clay loam in the lower part.

Included with this soil in mapping are small areas of soils with a surface layer of cherty loam, rock outcrop, Groseclose and Poplimento soils, and a soil with slopes of more than 30 percent. The cherty loam areas are on toe slopes, in depressions, and in drainageways. The areas of rock outcrop mainly are on spines and elevated areas. Included soils make up less than 5 percent of the unit.

The permeability of this Lodi soil is moderate, and available water capacity is moderate. Surface runoff is rapid. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is moderately low in organic matter content and low in natural fertility. The surface layer and subsoil mainly are strongly acid or very strongly acid, but the surface layer is less acid in some limed areas.

Most areas of this soil are used for pasture and hay. A few small areas are wooded.

Slope and a very severe erosion hazard make this soil poorly suited to cultivated crops. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Lime and fertilizer help to offset the natural acidity and low fertility of this soil.

This soil is moderately well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes and increases runoff and erosion. Deferred and rotational grazing and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices. The use of logging and planting equipment during wet seasons causes cuts in the surface layer of the soil and increases runoff and erosion.

Slope, low strength, the permeability of the soil, and the clayey texture and shrink-swell potential of the subsoil are the main limitations for community development. Slope limits the soil as a site for buildings, septic tanks, and sewage lagoons. The permeability is a further limitation for septic tank absorption fields, and the shrink-swell potential limits building sites. The clayey subsoil limits excavations and trench sanitary landfills, and it is soft when wet, thus limiting vehicular traffic in unpaved areas. Low strength limits the soil as a source of roadfill and as a site for roads and streets.

Capability subclass: IVe.

19C—Lodi coarse cherty loam, 7 to 15 percent slopes. This soil is strongly sloping. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on ridgetops and side slopes in irregularly shaped areas that range from 3 to 50 acres.

Typically, the surface layer is yellowish brown coarse cherty loam 8 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is yellowish brown loam, the middle part is strong brown clay, and the lower part is yellow highly weathered siltstone and strong brown clay loam.

Included with this soil in mapping are small areas of Slabtown soils, soils that have a surface layer of loam or silt loam, and rock outcrops. The Slabtown soils are in

small depressions, in drainageways, and on toe slopes. The areas of loam or silt loam are throughout the unit. The rock outcrops are on narrow spines and ridgetops. Included areas make up less than 10 percent of the unit.

The permeability of this Lodi soil is moderate, and available water capacity is moderate. Surface runoff is medium or rapid. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is moderately low in organic matter content and low in natural fertility. The surface layer and subsoil mainly are strongly acid or very strongly acid, but the surface layer is less acid in some limed areas.

Most areas of this soil are in woodland, mainly hardwoods. A few small areas are in pasture.

Stone fragments in the surface layer limit the types of farm machinery that can be used on these soils, making plowing and disking difficult and making this soil generally unsuited to cultivated crops. However, if the stone fragments are removed from the surface layer, the soil is moderately well suited to cultivated crops. The hazard of erosion is severe and is a management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Lime and fertilizer help to offset the natural acidity and low fertility of this soil.

This soil is moderately well suited to pasture and hay crops. The stone fragments in the surface layer make it difficult to establish and maintain pasture and hay fields. However, if the stone fragments are removed from the surface layer, this soil is well suited to pasture and hay. Using lime and fertilizer, use of proper stocking rates, and rotational and deferred grazing are the main pasture management practices. Overgrazing kills desirable grasses and legumes and increases runoff and erosion.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

Slope, low strength, the permeability of the soil, and the clayey texture and shrink-swell potential of the subsoil are the main limitations for community development. Slope limits the soil as a site for buildings, septic tanks, and sewage lagoons. The permeability is a further limitation for septic tank absorption fields, and the shrink-swell potential limits building sites. The clayey subsoil limits excavations and trench sanitary landfills, and it is soft when wet, thus limiting vehicular traffic in unpaved areas. Low strength limits the soil as a source of roadfill and as a site for roads and streets.

Capability subclass: IVs.

19D—Lodi coarse cherty loam, 15 to 30 percent slopes. This soil is moderately steep and steep. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on ridgetops and side slopes in irregularly shaped areas that range from 3 to 70 acres.

Typically, the surface layer is yellowish brown coarse cherty loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is yellowish brown loam, the middle part is strong brown clay, and the lower part is yellow highly weathered siltstone and strong brown clay loam.

Included with this soil in mapping are small areas of Slabtown soils, soils that have a surface layer of loam or silt loam, and rock outcrops. The Slabtown soils are in small depressions, in drainageways, and on toe slopes. The areas of loam or silt loam are throughout the unit. The rock outcrops are on narrow spines and ridgetops. Included areas make up less than 10 percent of the unit.

The permeability of this Lodi soil is moderate, and available water capacity is moderate. Surface runoff is rapid. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is moderately low in organic matter content and low in natural fertility. The surface layer and subsoil mainly are strongly acid or very strongly acid, but the surface layer is less acid in some limed areas.

Most areas of this soil are in woodland. A few small areas are in pasture.

Slope, a very severe erosion hazard, and stone fragments in the surface layer make this soil generally unsuitable for cultivated crops. The soil is moderately well suited to pasture and hay. The stone fragments in the surface layer make it difficult to establish and maintain pasture and hay fields. The use of lime and fertilizer, the use of proper stocking rates, and rotational and deferred grazing are the main pasture management practices. Overgrazing kills desirable grasses and legumes and increases runoff and erosion.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

Slope, low strength, the permeability of the soil, and the clayey texture and shrink-swell potential of the subsoil are the main limitations for community development. Slope limits the soil as a site for buildings, septic tanks, and sewage lagoons. The permeability is a further limitation for septic tank absorption fields, and the shrink-swell potential limits building sites. The clayey subsoil limits excavations and trench sanitary landfills, and it is soft when wet, thus limiting vehicular traffic in unpaved areas. Low strength limits the soil as a source of roadfill and as a site for roads and streets.

Capability subclass: VIs.

20B—Lowell silt loam, 2 to 7 percent slopes. This soil is gently sloping. It is more than 40 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on ridgetops in irregularly shaped areas that range from 2 to 30 acres.

Typically, the surface layer is dark yellowish brown silt loam 11 inches thick. The subsoil dominantly is strong brown and reddish yellow silty clay and clay 27 inches thick. The substratum is yellowish brown shaly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas, generally less than 1 acre each, of Slabtown and Carbo soils and limestone rock outcrops. Also included are areas that are generally less than 2 acres each of soils that are 20 to 40 inches deep to bedrock and that have a subsoil of brownish yellow silt loam or shaly loam. Included areas make up about 5 percent of the unit.

The permeability of this Lowell soil is moderately slow, and runoff is slow. Natural fertility is high, and organic matter content is moderately low. Reaction in the upper part of the soil ranges from very strongly acid through slightly acid. In the lower part it ranges from strongly acid through mildly alkaline. The available water capacity is moderate. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are cultivated. A few areas are in pasture or are wooded.

This soil is prime farmland and is well suited to cultivated crops. The hazard of erosion is moderate and is a major management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Applying lime and fertilizer and adding manure and other organic material help to improve fertility.

This soil is well suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main management practices.

The potential productivity for trees on this soil is high. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main management practices.

Low strength, the permeability and shrink-swell potential of the soil, and the clayey texture of the subsoil are the main limitations for community development. In some areas bedrock is at a depth of less than 60 inches, limiting the soil as a site for excavations and landfills. The clayey subsoil is a further limitation for trench landfills and excavations, and slope and the permeability limit sewage lagoons. Low strength is a limitation of the soil as a source of roadfill and as a site for roads and streets, and the shrink-swell potential limits the soil as a building site. The moderately slow permeability is a limitation of the soil as a site for septic tank absorption fields, and sinkholes and underground caverns cause a hazard of ground-water pollution in areas used as sites for septic tanks.

Capability subclass: IIe.

20C—Lowell silt loam, 7 to 15 percent slopes. This soil is strongly sloping. It is more than 40 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on narrow ridgetops and on side slopes. It is in irregularly shaped areas that range from 2 to 160 acres.

Typically, the surface layer is dark yellowish brown silt loam 11 inches thick. The subsoil dominantly is strong brown and reddish yellow silty clay and clay 27 inches thick. The substratum is yellowish brown shaly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Slabtown, Wurno, Newbern, Faywood, and Carbo soils and limestone rock outcrops. The Slabtown soils are at the heads of drainageways and on concave side slopes. The Wurno, Newbern, and Faywood soils are on ridgetops and convex side slopes. Also included are small areas of soils that are 20 to 40 inches deep to bedrock and that have a subsoil of brownish yellow silt loam or shaly loam. Included areas make up 5 to 10 percent of the unit.

The permeability of this Lowell soil is moderately slow, and runoff is medium or rapid. Natural fertility is high, and organic matter content is moderately low. Reaction in the upper part of the soil ranges from very strongly acid through slightly acid. In the lower part it ranges from strongly acid through mildly alkaline. The available water capacity is moderate. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are cultivated. A few areas are in pasture or are wooded.

This soil is moderately well suited to cultivated crops. The hazard of erosion is severe and is a major management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Using lime and fertilizer and adding manure and other organic material to the soil help to improve fertility and increase water infiltration.

This soil is well suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main management practices.

The potential productivity for trees on this soil is high. Fencing to keep livestock from damaging young trees

and controlling competing vegetation are the main management practices.

Low strength, the permeability and shrink-swell potential of the soil, and the clayey texture of the subsoil are the main limitations for community development. In some areas bedrock is at a depth of less than 60 inches, limiting the soil as a site for excavations and landfills. The clayey subsoil is a further limitation for trench landfills and excavations, and slope and the permeability limit sewage lagoons. Low strength is a limitation of the soil as a source of roadfill and as a site for roads and streets, and the shrink-swell potential limits the soil as a building site. The moderately slow permeability is a limitation of the soil as a site for septic tank absorption fields, and sinkholes and underground caverns cause a hazard of ground-water pollution in areas used as sites for septic tanks.

Capability subclass: IIIe.

20D—Lowell silt loam, 15 to 30 percent slopes. This soil is moderately steep and steep. It is more than 40 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on convex side slopes in irregularly shaped areas that range from 2 to 25 acres.

Typically, the surface layer is dark yellowish brown silt loam 11 inches thick. The subsoil dominantly is strong brown and reddish yellow silty clay and clay 27 inches thick. The substratum is yellowish brown shaly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Slabtown, Wurno, Newbern, Faywood, and Carbo soils and limestone rock outcrops. The Slabtown soils are at the heads of drainageways and on concave side slopes. The Wurno, Newbern, and Faywood soils are on ridgetops and convex side slopes. Also included are small areas of soils that are 20 to 40 inches deep to bedrock and that have a subsoil of brownish yellow silt loam or shaly loam. Included areas make up 10 to 15 percent of the unit.

The permeability of this Lowell soil is moderately slow, and runoff is rapid. Natural fertility is high, and organic matter content is moderately low. Reaction in the upper part of the soil ranges from very strongly acid through slightly acid. In the lower part it ranges from strongly acid through mildly alkaline. The available water capacity is moderate. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are in hay and pasture. A few small areas are in cultivated crops or are wooded.

Slope and a very severe erosion hazard make this soil poorly suited to cultivated crops. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Using lime and fertilizer and adding manure and other organic material to the soil help to improve fertility and increase water infiltration.

This soil is moderately well suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases erosion. Grazing during wet periods damages sod and compacts the surface layer. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main management practices.

The potential productivity for trees on this soil is high. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main management practices.

Slope, low strength, the permeability of the soil, and the clayey texture of the subsoil are the main limitations for community development. In some areas bedrock is at a depth of less than 60 inches, limiting the soil as a site for excavations and landfills. Slope limits the soil as a site for buildings, sewage lagoons, landfills, and septic tank absorption fields. The permeability further limits the soil as a site for septic tanks, and underground caverns cause a hazard of ground-water pollution in areas used as sites for septic tanks. The clayey subsoil is a limitation for trench landfills and excavations. Low strength limits the soil as a source of roadfill and as a site for local roads and streets.

Capability subclass: IVe.

21B—Lowell-Urban land complex, 2 to 7 percent slopes. This unit consists of gently sloping Lowell soils and areas that have been partly altered by grading or filling for housing developments, shopping centers, and other similar uses. The areas commonly are square or rectangular and range from 2 to 50 acres. They are about 50 percent Lowell soils, 40 percent Urban land, and 10 percent other soils. The Lowell soils and urbanized areas are so intermingled that it was not practical to map them separately.

Typically, the Lowell soils have a surface layer of dark yellowish brown silt loam 11 inches thick. The subsoil is mostly strong brown silty clay loam and clay 27 inches thick. The substratum is brownish yellow shaly silt loam to a depth of 60 inches or more.

Included with this unit in mapping are small areas of moderately well drained Slabtown soils and random areas of Carbo soils and limestone rock outcrops. The Slabtown soils are at the heads of drainageways and in small depressions. Also included are soils that are 20 to 40 inches deep to bedrock and that have subsoil of brownish yellow silt loam or shaly loam. Fill material, mostly from surrounding soils, has been added to some areas. The fill material is as much as 48 inches deep in some areas and more than 48 inches deep in others. As much as 50 percent of the soil has been removed from some other areas.

The areas of this unit that are undisturbed have moderately slow permeability. Permeability in the disturbed areas is highly variable. Runoff on this unit is slow, and available water capacity is moderate. The subsoil has a moderate shrink-swell potential. Reaction in the upper part of the Lowell soils ranges from very strongly acid to slightly acid and in the lower part from strongly acid to mildly alkaline. The soil has a moderate frost-action potential.

The areas of this unit that are not Urban land include yards, gardens, and open areas around buildings. These areas range from 300 square feet to 3 acres. The clayey texture of the subsoil, the permeability and shrink-swell potential of the soils, and low strength are the main limitations for community development. In some areas bedrock is at a depth of less than 60 inches, limiting the unit as a site for septic tanks, buildings, sewage lagoons, and excavations. Low strength and the shrink-swell potential are further limitations of the unit as a site for buildings, and the low strength limits the soils as a source of roadfill and as a site for local roads and streets. Slope and permeability also limit sewage lagoons, and the permeability is a limitation for septic tank absorption fields.

Onsite investigation is necessary to determine the limitations of the unit for any land use.

Capability subclass: not assigned.

21C—Lowell-Urban land complex, 7 to 15 percent slopes. This unit consists of strongly sloping Lowell soils and areas that have been partly altered by grading or filling for housing devlopements, shopping centers, and other similar uses. The areas commonly are square or rectangular and range from 3 to 60 acres. They are about 50 percent Lowell soils, 40 percent Urban land, and 10 percent other soils. The Lowell soils and urbanized areas are so intermingled that it was not practical to map them separately.

Typically, the Lowell soils have a surface layer of dark yellowish brown silt loam 6 inches thick. The subsoil is mostly strong brown silty clay loam and clay 27 inches thick. The substratum is brownish yellow shaly silt loam to a depth of 60 inches or more.

Included with this unit in mapping are small areas of Slabtown, Wurno, Newbern, and Faywood soils and areas of Carbo soils and limestone rock outcrops. The Slabtown soils are at the heads of drainageways and on concave side slopes. The Carbo soils and limestone rock outcrops are on convex side slopes and at the bottom of slopes near or in drainageways. The Wurno, Newbern, and Faywood soils are on ridgetops and convex side slopes. Also included are soils that are 20 to 40 inches deep to bedrock and that have a subsoil of brownish yellow silt loam or shaly loam. Fill material, mostly from surrounding soils, has been added to some areas. The fill material is as much as 48 inches deep in some areas and more than 48 inches deep in others. As much as 50 percent of the soil has been removed from some other areas.

The areas of this unit that are undisturbed have moderately slow permeability. Permeability in the disturbed areas is highly variable. Runoff on this unit is medium, and available water capacity is moderate. The subsoil has a moderate shrink-swell potential. Reaction in the upper part of the Lowell soils ranges from very strongly acid to slightly acid and in the lower part from strongly acid to mildly alkaline. The soil has a moderate frost-action potential.

The areas of this unit that are not Urban land include yards, gardens, and open areas around buildings. These areas range from 200 square feet to 3 acres. Slope, the clayey texture of the subsoil, the permeability and shrink-swell potential of the soils, and low strength are the main limitations for community development. In some areas bedrock is at a depth of less than 60 inches, limiting the unit as a site for septic tanks, buildings, sewage lagoons, and excavations. Slope, low strength, and the shrink-swell potential are further limitations of the unit as a site for buildings, and the low strength limits the soils as a source of roadfill and as a site for local roads and streets. Slope and the permeability also limit sewage lagoons and limit the unit as a site for septic tanks.

Onsite investigation is needed to determine the limitations of the unit for any land use.

Capability subclass: not assigned.

22C—Monongahela silt loam, 7 to 15 percent slopes. This soil is strongly sloping. It is more than 60 inches deep to bedrock and has a seasonal high water table at a depth of 1-1/2 to 3 feet. The soil is on concave side slopes and foot slopes and at the head of drainageways. The areas of this soil are irregular in shape and range from 3 to 25 acres.

Typically, the surface layer is brown silt loam 7 inches thick. The subsoil is yellowish brown silt loam and gravelly silt loam to a depth of 60 inches or more. The part of the subsoil between depths of 23 and 46 inches is dense and brittle.

Included with this soil in mapping are Berks, Gilpin, Klinesville, and Groseclose soils. Also included are small areas with slopes of less than 7 percent and areas that do not have a dense, brittle layer in the subsoil. The Berks, Gilpin, and Klinesville soils are on long, narrow ridgetops. The Groseclose soils are at the bottom of foot slopes extending from the ridges and are on convex side slopes. Included areas make up about 10 percent of the unit.

The permeability of this Monongahela soil is moderately slow or slow. Runoff is medium. Natural fertility is low, and organic matter content is moderate. Reaction in the lower part of the subsoil is strongly acid or very strongly acid; reaction varies in the surface layer and upper part of the subsoil due to liming practices. The available water capacity is moderate. The subsoil

has a low shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are in hay and pasture. Some areas are in woodland.

This soil is moderately well suited to cultivated crops. Slope and a severe erosion hazard are major limitations. The seasonal high water table in the spring causes the surface layer to remain wet for extended periods, delaying planting until late spring or midseason or making necessary the use of crops with a short growing season. The water table also makes the surface layer soft, thus limiting equipment use. Conservation tillage, contour stripcropping, using cover crops and grasses and legumes, and using crop residue on or in the soil are management practices that help to control erosion. Using lime and fertilizer and adding manure and other organic material to the soil help to improve fertility and increase water infiltration.

This soil is well suited to pasture and hay, but the water table limits some deep-rooted plants such as alfalfa. Using lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices. Overgrazing and grazing during wet periods, especially in spring, will cause soil compaction and kill desirable forage species.

The potential productivity for trees on this soil is moderately high. The seasonal high water table limits the use of timber-harvesting equipment. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

The seasonal high water table, slope, low strength, and the permeability of the soil are the main limitations for community development. The water table and slope limit the soil as a site for sewage lagoons, landfills, buildings, and roads and streets; the water table also limits the soil as a site for septic tanks and as a source of roadfill. The low strength is a further limitation for roadfill and roads and streets, and the permeability is a further limitation for septic tank absorption fields.

Capability subclass: IIIe.

22D—Monongahela silt loam, 15 to 25 percent slopes. This soil is moderately steep. It is more than 60 inches deep to bedrock and has a seasonal high water table at a depth of 1-1/2 to 3 feet. The soil is on concave side slopes and foot slopes in irregularly shaped areas that range from 3 to 10 acres.

Typically, the surface layer is brown silt loam 7 inches thick. The subsoil is yellowish brown silt loam and gravelly silt loam to a depth of 60 inches or more. The part of the subsoil between depths of 23 and 46 inches is dense and brittle.

Included with this soil in mapping are Berks, Gilpin, Klinesville, and Groseclose soils. Also included are small areas with slopes of less than 7 percent and areas that do not have a dense, brittle layer in the subsoil. The Berks, Gilpin, and Klinesville soils are on long, narrow ridgetops. The Groseclose soils are at the bottom of foot slopes extending from the ridges and are on convex side slopes. Included areas make up about 15 percent of the unit.

The permeability of this Monongahela soil is moderately slow or slow. Runoff is rapid. Natural fertility is low, and organic matter content is moderate. Reaction in the lower part of the subsoil is strongly acid or very strongly acid; reaction varies in the surface layer and upper part of the subsoil due to liming practices. The available water capacity is moderate. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

Most areas of this soil are in woodland, mainly hardwoods. Some areas are in hay and pasture.

Slope and a very severe erosion hazard make this soil poorly suited to cultivated crops. The seasonal high water table in the spring causes the surface layer to remain wet for extended periods, delaying planting and limiting the use of equipment. Conservation tillage, contour stripcropping, using cover crops and grasses and legumes, and using crop residue on or in the soil are practices that help to control erosion. Adding manure and other organic material and using lime and fertilizer help to improve fertility and infiltration.

This soil is moderately well suited to pasture and hay, but the water table limits some deep-rooted plants such as alfalfa. Using lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices. Overgrazing and grazing during wet periods, especially in spring, will cause soil compaction and kill desirable forage species.

The potential productivity for trees on this soil is moderately high. The seasonal high water table limits the use of timber-harvesting equipment. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

The seasonal high water table, slope, low strength, and the permeability of the soil are the main limitations for community development. The water table and slope limit the soil as a site for sewage lagoons, landfills, buildings, and roads and streets; the water table limits the soil as a site for septic tanks and as a source of roadfill. The low strength is a further limitation for roadfill and roads and streets, and the permeability is a further limitation for septic tank absorption fields.

Capability subclass: IVe.

23—Newark Variant silt loam. This soil is nearly level. It is more than 60 inches to bedrock and has a seasonal high water table at a depth of 6 to 18 inches from December through May. The soil is along drainageways in long, narrow areas that range from 3 to 55 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is silt loam 21 inches thick. The upper 10 inches is dark brown, the middle 5 inches is pale brown with light grayish brown mottles, and the lower 6 inches is light yellowish brown with pale brown and gray mottles. The subsoil is 28 inches thick. The upper part is yellowish brown silt loam 9 inches thick and has grayish brown mottles. The middle part is strong brown silty clay loam 12 inches thick and has grayish brown mottles. The lower part is yellowish brown very gravelly clay loam 7 inches thick and has light brownish gray mottles. The substratum is gray and extends to a depth of 60 inches or more. The upper part is very gravelly clay, and the lower part is clay.

Included with this soil in mapping are Dunning soils in concave areas adjacent to perennial streams. Included areas make up less than 10 percent of this unit.

The permeability of this Newark Variant soil is moderate, and runoff is very slow. Reaction is medium acid to mildly alkaline in the surface layer and subsoil. Natural fertility is high, and organic matter content is moderate. Available water capacity is moderate or high. The subsoil has a low shrink-swell potential and a high frost-action potential. This soil is subject to occasional, brief flooding in the spring.

Most areas of this soil are in pasture, and some areas are under cultivation.

Areas of this soil that are drained and protected from flooding are prime farmland and are well suited to cultivated crops. The erosion hazard is slight. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content and maintain tilth. Using lime and fertilizer and adding manure and other organic material help to maintain fertility and increase water infiltration. This soil is soft in the spring, making it difficult to operate farm equipment.

This soil is well suited to most pasture and hay crops. Alfalfa usually is short lived because of the seasonal high water table. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, and grazing during periods of seasonal wetness damages sod and compacts the surface layer. Use of proper stocking rates, deferred grazing, and use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices. Harvesting and planting during wet periods increase soil compaction.

Seasonal wetness and flooding limit this soil for most types of community development. Low strength is a further limitation of the soil as a source of roadfill and as a site for local roads and streets.

Capabilty subclass: IIw.

24C—Nolichucky gravelly sandy loam, 7 to 15 percent slopes. This soil is strongly sloping. It is at least 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. The soil is on foot slopes and toe slopes and on ridgetops. It is in irregularly shaped areas that range from 10 to 40 acres.

Typically, the surface layer of this soil is yellowish brown gravelly sandy loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown and strong brown sandy clay loam, and the lower part is yellowish red clay loam.

Included with this soil in mapping are a few small areas where up to 10 percent of the surface is covered with stones, small areas of Lodi soils, and small severely eroded areas. The areas with stones on the surface are on concave foot slopes, the Lodi soils are on knobs and toe slopes, and the severely eroded areas are on shoulders and ridgecrests. In some units there are small areas on toe slopes and in concave positions that have a seasonal high water table at a depth of 4 to 6 feet. Included areas make up less than 15 percent of this unit.

The permeability of this Nolichucky soil is moderate, and the available water capacity is moderate to high. Surface runoff is medium to rapid. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is low in natural fertility and moderately low in organic matter content. In unlimed areas it is strongly acid or very strongly acid throughout.

Most areas of this soil are wooded. Some areas are used for hay and pasture. A few areas are cultivated, and a few are used for community development.

This soil is moderately well suited to cultivated crops. The hazard of erosion is severe and is a major management concern. Conservation tillage and using cover crops and grasses and legumes in the cropping system are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. The gravel in the surface layer of this soil damages plowshares and causes rapid wear of equipment.

This soil is well suited to hay and pasture. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. Use of proper stocking rates, rotational grazing, and using lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high. Controlling competing vegetation and fencing to prevent livestock from damaging young trees are the main management practices.

Slope, the permeability and shrink-swell potential of the soil, low strength, and the clayey texture of the subsoil are the main limitations for community development. Slope limits the soil as a site for septic tank absorption fields, sewage lagoons, buildings, and landfills. The permeability is an additional limitation for

septic tank absorption fields, and the shrink-swell potential for building sites. Low strength limits the soil as a site for local roads and streets and as a source of roadfill. The clayey subsoil is a limitation of the soil as a site for trench sanitary landfills.

Capability subclass: IIIe.

24D—Nolichucky gravelly sandy loam, 15 to 30 percent slopes. This soil is moderately steep and steep. It is at least 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. This soil is on foot slopes and toe slopes in irregularly shaped areas that range from 10 to 40 acres.

Typically, the surface layer is yellowish brown gravelly sandy loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown gravelly fine sandy loam. The middle part is yellowish brown and strong brown sandy clay loam. The lower part is yellowish red clay loam.

Included with this soil in mapping are a few small areas where up to 10 percent of the surface is covered with stones, small severely eroded areas, and areas with slopes of more than 30 percent. The areas with stones on the surface are on concave foot slopes, and the severely eroded areas are on shoulders and side slopes. A few small areas of rock outcrop are along steep drainageways. Included areas make up less than 15 percent of this unit.

The permeability of this Nolichucky soil is moderate, and the available water capacity is moderate to high. Surface runoff is rapid. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is low in natural fertility and moderately low in organic matter content. In unlimed areas it is strongly acid or very strongly acid throughout.

Most areas of this soil are wooded. Some are used mainly for hay and pasture, and a few are cultivated or used for community development.

Slope and a very severe erosion hazard make this soil poorly suited to cultivated crops. Conservation tillage and using cover crops and grasses and legumes in the cropping system are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. The gravel in the surface layer damages plowshares and causes rapid wear of equipment.

This soil is moderately well suited to hay and pasture. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. Use of proper stocking rates, rotational grazing, and using lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high. Controlling competing vegetation and fencing to prevent livestock from damaging young trees are the main management practices.

Slope, the permeability and shrink-swell potential of the soil, low strength, and the clayey texture of the subsoil are the main limitations for community development. Slope limits the soil as a site for septic tank absorption fields, sewage lagoons, buildings, and landfills. The permeability is an additional limitation for septic tank absorption fields, and the shrink-swell potential for building sites. Low strength limits the soil as a site for local roads and streets and as a source of roadfill. The clayey subsoil is a limitation of the soil as a site for trench sanitary landfills.

Capability subclass: IVe.

25C—Nolichucky very stony sandy loam, 7 to 15 percent slopes. This soil is strongly sloping. It is at least 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. Sandstone fragments 10 inches or more in diameter cover 5 to 10 percent of the surface area of this soil. The soil is on foot slopes, toe slopes, and ridgetops. It is in irregularly shaped areas that range from 10 to 50 acres.

Typically, the surface layer of this soil is yellowish brown very gravelly sandy loam 7 inches thick, and the subsurface layer is yellowish brown sandy loam 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown and strong brown sandy clay loam, and the lower part is yellowish red clay loam.

Included with this soil in mapping are a few small areas that do not have stones on the surface, a few small areas of rock outcrop, and small areas on knobs that have shale bedrock at a depth of 3 to 4 feet. The areas without stones on the surface are on convex side slopes, and the areas of rock outcrop are adjacent to drainageways. Some units have small areas on toe slopes and in concave positions that have a seasonal high water table at a depth of 4 to 6 feet. Included areas make up less than 15 percent of this unit.

The permeability of this Nolichucky soil is moderate, and the available water capacity is moderate to high. Surface runoff is medium to rapid. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is low in natural fertility and moderately low in organic matter content. In unlimed areas it is strongly acid or very strongly acid throughout.

Most areas of this soil are wooded. A few small areas are used mainly for hay and pasture, and a few are used for homesites.

The stones on the surface make this soil generally unsuitable for cultivated crops. The stones make the soil difficult to cultivate and plow. If the stones are removed, however, the soil is moderately well suited to cultivated crops.

This soil is moderately well suited to hay and pasture. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable

grasses and legumes, reduce yields, and increases runoff and erosion. Using lime and fertilizer, using proper stocking rates, and rotational grazing are the main pasture management practices. Stones on the surface limit the use of heavy equipment for clipping, seeding, and spreading lime and fertilizer.

The potential productivity for trees on this soil is moderately high. Controlling competing vegetation and fencing to prevent livestock from damaging young trees are the main management practices.

Slope, the permeability and shrink-swell potential of the soil, low strength, and the clayey texture of the subsoil are the main limitations for community development. Slope limits the soil as a site for septic tank absorption fields, sewage lagoons, buildings, and landfills. The permeability is an additional limitation for septic tank absorption fields, and the shrink-swell potential for building sites. Low strength limits the soil as a site for local roads and streets and as a source of roadfill. The clayey subsoil is a limitation of the soil as a site for trench sanitary landfills.

Capability subclass: VIs.

25D—Nolichucky very stony sandy loam, 15 to 30 percent slopes. This soil is moderately steep and steep. It is at least 60 inches deep to bedrock and does not have a seasonal high water within 6 feet of the surface. Sandstone fragments 10 inches or more in diameter cover 5 to 10 percent of the surface area. The soil is on side slopes and ridgetops in irregularly shaped areas that range from 25 to 250 acres.

Typically the surface layer of this soil is yellowish brown very gravelly sandy loam 7 inches thick, and the subsurface layer is yellowish brown sandy loam 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown and strong brown sandy clay loam, and the lower part is yellowish red clay loam.

Included with this soil in mapping are a few small areas that do not have stones on the surface, a few small areas of rock outcrop, and small areas on knobs that have shale bedrock at a depth of 3 to 4 feet. The areas without stones on the surface are on convex side slopes, and the areas of rock outcrop are adjacent to drainageways. Some units have small areas on toe slopes and in concave positions that have a seasonal high water table at a depth of 4 to 6 feet. Included areas make up less than 15 percent of this unit.

The permeability of this Nolichucky soil is moderate, and the available water capacity is moderate to high. Surface runoff is rapid. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is low in natural fertility and moderately low in organic matter content. In unlimed areas it is strongly acid or very strongly acid throughout.

The stones on the surface make this soil generally unsuited to cultivated crops. The stones interfere with plowing and cultivation and make the establishment of a seedbed difficult. In areas where stones have been removed, slope makes the soil poorly suited to cultivated crops.

This soil is moderately well suited to hay and pasture. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. Using lime and fertilizer, using proper stocking rates, and rotational grazing are the main pasture management practices. The stones on the surface limit the use of heavy equipment for clipping, seeding, and spreading lime and fertilizer.

The potential productivity for trees on this soil is moderately high. Most areas are wooded. Controlling competing vegetation and fencing to prevent livestock from damaging young trees are the main management practices. Slope and the stones on the surface limit the type of woodland harvesting and planting equipment that can be used on this soil.

Slope, the permeability and shrink-swell potential of the soil, low strength, and the clayey texture of the subsoil are the main limitations for community development. Slope limits the soil as a site for septic tank absorption fields, sewage lagoons, buildings, and landfills. The permeability is an additional limitation for septic tank absorption fields, and the shrink-swell potential for building sites. Low strength limits the soil as a site for local roads and streets and as a source of roadfill. The clayey subsoil is a limitation of the soil as a site for trench sanitary landfills.

Capability subclass: VIs.

25F—Nolichucky very stony sandy loam, 30 to 65 percent slopes. This soil is steep and very steep. It is on side slopes in mountainous areas. It is at least 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the soil surface. Sandstone fragments more than 10 inches in diameter cover 5 to 10 percent of the surface area. The soil is in irregularly shaped areas that range from 50 to 250 acres.

Typically the surface layer of this soil is yellowish brown very gravelly sandy loam 7 inches thick, and the subsurface layer is yellowish brown sandy loam 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown and strong brown sandy clay loam, and the lower part is yellowish red clay loam.

Included with this soil in mapping are a few small areas that do not have stones on the surface, areas of bedrock outcrops, and escarpments and areas of soils that are less than 40 inches deep to bedrock. The areas of rock outcrop and soils that are less than 40 inches deep to bedrock are on ridgecrests and side slopes. Some units have small areas that have a seasonal high water table at a depth of 4 to 6 feet. Included areas make up less than 15 percent of this unit.

The permeability of this Nolichucky soil is moderate, and the available water capacity is moderate to high. Surface runoff is very rapid. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. This soil is low in natural fertility and moderately low in organic matter content. In unlimed areas it is strongly acid or very strongly acid throughout.

Almost all the areas of this soil are wooded. A few very small areas are used for homesites.

Slope and the stones on the surface make this soil generally unsuited to cultivated crops and poorly suited to hay and pasture. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. The slope and stones on the surface limit the use of heavy equipment for pasture maintenance. Applying lime and fertilizer, using proper stocking rates, and rotational grazing are the main pasture management practices.

The potential productivity for trees on this soil is moderately high. Controlling competing vegetation and fencing to prevent livestock from damaging young trees are the main management practices. Slope limits the use of some types of logging equipment.

Slope, the permeability and shrink-swell potential of the soil, low strength, and the clayey texture of the subsoil are the main limitations for community development. Slope limits the soil as a site for septic tank absorption fields, sewage lagoons, buildings, and landfills. The permeability is an additional limitation for septic tank absorption fields, and the shrink-swell potential for building sites. Low strength limits the soil as a site for local roads and streets and as a source of roadfill. The clayey subsoil is a limitation of the soil as a site for trench sanitary landfills.

Capability subclass: VIIs.

26F—Ramsey-Lily-Rock outcrop complex, 25 to 60 percent slopes. This unit consists of steep and very steep soils and rock outcrop. The unit is on long mountain ridgetops and side slopes. Sandstone rock fragments more than 10 inches in diameter cover 3 to 10 percent of the surface. Bedrock is at a depth of 7 to 20 inches in the Ramsey soils and 20 to 40 inches in the Lily soils. The soils do not have a seasonal high water table. The unit is about 50 percent Ramsey soils, 30 percent Lily soils, 15 percent rock outcrop, and 5 percent other soils. The soils and rock outcrop are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Ramsey soils is dark brown sandy loam about 2 inches thick. The subsoil is 10 inches thick. The upper 4 inches is yellowish brown gravelly sandy loam, and the lower 6 inches is yellowish brown loam. The substratum is yellowish brown loam 4 inches thick. Sandstone bedrock is at a depth of 16 inches.

Typically, the surface layer of the Lily soils is dark brown sandy loam about 3 inches thick. The subsoil is yellowish brown and dark yellowish brown gravelly loam 31 inches thick. Sandstone bedrock is at a depth of 34 inches.

Included with this unit in mapping are small areas of soils with a surface layer of loamy sand and a gravelly subsoil.

Permeability is rapid in these Ramsey soils and moderately rapid in these Lily soils. The available water capacity is very low in the Ramsey soils and moderately low in the Lily soils. Runoff is very rapid. The subsoil of both soils has a low shrink-swell potential, and both soils have a low frost-action potential. These soils are low in natural fertility and moderately low or low in organic matter content. The reaction of these soils is strongly acid or very strongly acid.

Slope and the stones and rock outcrop on the surface make this unit generally unsuitable for cultivated crops and poorly suited to hay and pasture.

The potential productivity for trees on this unit is low on the Ramsey soils and moderate on the Lily soils. All areas are wooded. Slope and the rock outcrop are major limitations for the use of heavy equipment. The bedrock in the Ramsey soils limits rooting, making trees susceptible to uprooting during windy periods. Controlling competing vegetation is the main management practice.

Slope, the depth to rock, and the rock outcrop and stones on the surface are the main limitations of this unit for most types of community development.

Capability subclass: VIIs.

27C—Rayne silt loam, 7 to 15 percent slopes. This soil is strongly sloping. It is more than 40 inches deep to bedrock and does not have a seasonal high water table. It is on ridgetops and side slopes in irregularly shaped areas that range from 2 to 50 acres.

Typically, the surface layer of this soil is brown silt loam about 7 inches thick. The subsoil is about 39 inches thick. It is strong brown loam and very shaly clay loam. The substratum is strong brown very shaly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Faywood, Lowell, Groseclose, Newbern, Poplimento, Monongahela, and Wurno soils. The Faywood, Newbern, and Wurno soils are on ridgetops and convex side slopes. The Lowell, Groseclose, and Poplimento soils are near drainageways and on more nearly level slopes. The Monongahela soils are on concave side slopes. Included areas make up about 15 percent of this unit. In some units there are small areas that have a seasonal high water table 3 to 5 feet below the surface.

The permeability of this Rayne soil is moderate, and available water capacity is moderate. Runoff is medium to rapid. Organic matter content is moderately low, and natural fertility is low. Reaction in the subsoil is strongly acid or very strongly acid but varies in the surface layer

because of liming practices. The depth to bedrock is more than 40 inches and in most areas is more than 60 inches. This soil has a low shrink-swell potential and moderate frost-action potential.

Most areas of this soil are in pasture. Some areas are in cultivated crops, and a few are wooded.

This soil is moderately well suited to cultivated crops. The hazard of erosion is severe and is a major management concern. Conservation tillage, contour stripcropping, using crop residue on or in the soil, and using cover crops are management practices that help to control erosion. Lime and fertilizer help to offset the natural acidity and low fertility of this soil. Using grasses and legumes in the cropping system and adding manure and other organic material to the soil help to improve fertility, reduce crusting, and increase water infiltration.

This soil is well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing causes soil compaction and kills desirable grasses and legumes, thus reducing yields and increasing runoff and erosion. Using lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

The slope, permeability, and frost-action potential of the soil are the main limitations for community development. In some areas the depth to bedrock is less than 60 inches, limiting the soil as a site for septic tank absorption fields and sanitary landfills. The slope and permeability are further limitations for septic tank absorption fields, and the slope also limits the soil as a site for landfills. Slope limits the soil as a building site and, along with the frost-action potential, is a limitation of the soil as a site for roads and streets.

Capability subclass: IIIe.

27D—Rayne silt loam, 15 to 30 percent slopes. This soil is moderately steep to steep. It is more than 40 inches deep to bedrock and does not have a seasonal high water table. It is on ridgetops and side slopes in irregularly shaped areas that range from 2 to 45 acres.

Typically, the surface layer of this soil is brown silt loam about 7 inches thick. The subsoil is about 39 inches thick. It is strong brown loam and very shaly clay loam. The substratum is strong brown very shaly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Faywood, Lowell, Groseclose, Newbern, Poplimento, Monongahela, and Wurno soils. The Faywood, Newbern, and Wurno soils are on ridgetops and convex side slopes. The Lowell, Groseclose, and Poplimento soils are near drainageways and on more nearly level slopes. The Monongahela soils are on concave side slopes. Included areas make up about 15 percent of this unit. In some units there are small areas that have a seasonal high water table 3 to 5 feet below the surface.

The permeability of this Rayne soil is moderate, and available water capacity is moderate. Runoff is rapid. Organic matter content is moderately low, and natural fertility is low. Reaction in the subsoil is strongly acid or very strongly acid but varies in the surface layer because of liming practices. The depth to bedrock is more than 40 inches and in most areas is more than 60 inches. This soil has a low shrink-swell potential and moderate frost-action potential.

Most areas of this soil are in pasture. A few areas are cultivated or in woodland.

This soil is poorly suited to cultivated crops. The hazard of erosion is very severe and is a major management concern. Conservation tillage, contour stripcropping, using crop residue on or in the soil, and using cover crops are management practices that help to control erosion. Lime and fertilizer help to offset the natural acidity and low fertility of this soil. Using grasses and legumes in the cropping system and adding manure and other organic material to the soil help to improve fertility, reduce crusting, and increase water infiltration.

This soil is moderately well suited to pasture and hay. The prevention of overgrazing is a major pasture management concern. Overgrazing causes soil compaction and kills desirable grasses and legumes, thus reducing yields and increasing runoff and erosion. Using lime and fertilizer, using proper stocking rates, and rotational and deferred grazing are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

The slope, permeability, and frost-action potential of the soil are the main limitations for community development. In some areas the depth to bedrock is less than 60 inches, limiting the soil as a site for septic tank absorption fields and sanitary landfills. The slope and permeability are further limitations for septic tank absorption fields, and the slope also limits the soil as a site for landfills. Slope limits the soil as a building site and, along with the frost-action potential, is a limitation of the soil as a site for roads and streets.

Capability subclass: IVe.

27E—Rayne silt loam, 30 to 45 percent slopes. This soil is steep and very steep. It is more than 40 inches deep to bedrock and does not have a seasonal high water table. It is on smooth side slopes in irregularly shaped areas that range from 3 to 40 acres.

Typically, the surface layer of this soil is brown silt loam about 7 inches thick. The subsoil is about 39 inches thick. It is strong brown loam and very shaly clay

loam. The substratum is strong brown very shaly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Faywood, Lowell, Groseclose, Newbern, Poplimento, Monongahela, and Wurno soils. The Faywood, Newbern, and Wurno soils are on ridgetops and convex side slopes. The Lowell, Groseclose, and Poplimento soils are near drainageways and on more nearly level slopes. The Monongahela soils are on concave side slopes. Included areas make up about 15 percent of this unit. In some units there are small areas that have a seasonal high water table 3 to 5 feet below the surface.

The permeability of this Rayne soil is moderate, and available water capacity is moderate. Runoff is rapid to very rapid. Organic matter content is moderately low, and natural fertility is low. Reaction in the subsoil is strongly acid or very strongly acid but varies in the surface layer because of liming practices. The depth to bedrock is more than 40 inches and in most areas is more than 60 inches. This soil has a low shrink-swell potential and moderate frost-action potential.

Most areas of this soil are in pasture. A few areas are wooded.

Slope and a very severe erosion hazard make this soil generally unsuitable for cultivated crops. The soil is suited to pasture, but the slope limits the use of equipment for liming, fertilizing, and pasture maintenance. Rotational and deferred grazing are the main pasture management practices. Overgrazing causes soil compaction and kills desirable pasture species, thus reducing yields and increasing runoff and erosion.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

Slope is the major limitation of this soil for community development. In some areas bedrock is at a depth of less than 60 inches, further limiting the soil for community development.

Capability subclass: VIIe.

28F—Rayne-Berks-Groseclose complex, 30 to 60 percent slopes. This unit consists of steep to very steep soils that do not have a seasonal high water table. The depth to bedrock is more than 40 inches in the Rayne soils, between 20 and 40 inches in the Berks soils, and more than 48 inches in the Groseclose soils. The unit is on short, convex side slopes in long, narrow areas that range from about 3 to 400 acres. The Rayne and Berks soils dominantly are on convex areas on the upper parts of the side slopes, and the Groseclose soils dominantly are on smooth areas on the middle and lower parts. The unit consists of 40 percent Rayne soils, 25 percent Berks soils, 20 percent Groseclose soils, and 15 percent other soils. The Rayne, Berks, and Groseclose soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Rayne soils is brown silt loam about 7 inches thick. The subsoil is about 39 inches thick. It is strong brown loam and very shaly clay loam. The substratum is strong brown very shaly clay loam to a depth of 60 inches or more.

Typically, the surface layer of the Berks soils is brown very shaly silt loam 7 inches thick. The subsoil is yellowish brown shaly silt loam 20 inches thick. Reddish yellow shale bedrock is at a depth of 27 inches.

Typically, the surface layer of the Groseclose soils is dark yellowish brown silt loam 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is strong brown silty clay in the upper part, yellowish red clay in the middle part, and yellow and brownish yellow silty clay loam in the lower part.

Included with this unit in mapping are small areas of rock outcrop and small areas of soils that are less than 20 inches deep to bedrock. These areas are on convex areas on the upper parts of side slopes and on shale spines on side slopes. Also included are small areas of Slabtown and Monongahela soils in saddles and in concave positions at the heads of drainageways and small areas with slopes of less than 30 percent.

The permeability of the Rayne soils is moderate, and available water capacity is moderate. Runoff is rapid to very rapid. The Rayne soils are low in natural fertility and moderately low in organic matter content. Reaction is strongly acid or very strongly acid. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

The permeability of the Berks soils is moderate. Available water capacity is very low. Surface runoff is very rapid. The Berks soils are low in natural fertility and moderately low in organic matter content. Reaction is slightly acid to extremely acid. The subsoil has a low shrink-swell potential.

The permeability of the Groseclose soils is slow, and available water capacity is moderate. Surface runoff is very rapid. The Groseclose soils are moderate in organic matter content and low in natural fertility. The subsoil has a high shrink-swell potential and a moderate frost-action potential. Reaction is strongly acid or very strongly acid.

Most areas of this unit are wooded. Some areas are in pasture.

Slope makes this unit generally unsuitable for cultivated crops and very poorly suited to pasture and hay. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing increases runoff and erosion. Grazing during wet periods damages sod and compacts the surface layer. The use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

Figure 4.—An area of Rock outcrop-Newbern-Carbo complex, 30 to 65 percent slopes.

The potential productivity for trees on this unit ranges from moderate to high. The slope limits the kinds of harvesting and planting equipment that can be used on these soils, and harvesting and planting during wet periods increase soil compaction, runoff, and erosion. Fencing to keep livestock from damaging young trees and controlling competing vegetation are the main management practices.

Slope is the major limitation of this unit for community development. In some areas, especially in the Berks soils, the depth to bedrock is a further limitation.

Capability subclass: VIIe.

29F—Rock outcrop-Newbern-Carbo complex, 30 to 65 percent slopes. This unit consists of steep and very steep soils and rock outcrop (fig. 4). The soils do not have a seasonal high water table. The depth to bedrock is between 10 and 20 inches in the Newbern soils and 20 and 40 inches in the Carbo soils. The unit is on narrow side slopes along drainageways and ravines. It is in irregularly shaped areas that range from 4 to 80 acres. The areas of the unit are about 50 percent rock outcrop, 25 percent Newbern soils, 20 percent Carbo soils, and 5 percent other soils. The rock outcrop and the Newbern and Carbo soils are so intermingled that it was not practical to map them separately.

Typically, the Newbern soils have a surface layer of yellowish brown silt loam 7 inches thick. The subsoil is brownish yellow shaly silty clay loam 8 inches thick. Unconsolidated shale is at a depth of 15 inches, and hard shale is at a depth of 19 inches.

Typically, the Carbo soils have a surface layer of dark yellowish brown silty clay loam 5 inches thick. The

subsoil is strong brown clay 26 inches thick. Limestone bedrock is at a depth of 31 inches.

Included with these soils in mapping are narrow areas of Fluvaquents at the base of slopes along streams and escarpments in the steepest areas.

Permeability is moderate in the Newbern soils and slow in the Carbo soils. Runoff is rapid or very rapid. Available water capacity is very low in the Newbern soils and low in the Carbo soils. Organic matter content in both soils is moderately low, and natural fertility is high. In both soils the surface layer and upper part of the subsoil are slightly acid or neutral. The lower part of the subsoil is neutral or moderately alkaline. The Newbern soils have a low shrink-swell potential, and the Carbo soils have a high shrink-swell potential. Both have a moderate frost-action potential.

Slope, the areas of rock outcrop, and the depth to bedrock make these soils generally unsuited to farming and are the main limitations for community development. The potential productivity for trees is moderately high, and most areas are wooded, but slope limits the use of planting and harvesting equipment.

Capability subclass: VIIIs.

30C—Sherando gravelly sandy loam, 0 to 15 percent slopes. This soil is nearly level to strongly sloping. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 60 inches of the surface. Stones cover up to 10 percent of the surface area. This soil is on colluvial fans and along drainageways at the bottom of V-shaped valleys in the Blue Ridge Mountains. The areas of this soil are irregular in shape and range from 5 to 40 acres.

Typically, the surface layer of this soil is very dark grayish brown gravelly sandy loam 4 inches thick. The subsoil is 33 inches thick. The upper 7 inches is yellowish brown very gravelly sandy loam, and the lower 26 inches is strong brown very cobbly sandy loam. The substratum is strong brown very cobbly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas where stones cover 10 to 50 percent of the surface and small areas of Berks and Gilpin soils. These areas are near the outer edges of the unit. Also included near streambanks are areas that have a seasonal high water table. Included areas make up about 15 percent of this unit.

The permeability of this Sherando soil is moderately rapid, and available water capacity is low. Surface runoff is moderate. The subsoil has a low shrink-swell potential and a low frost-action potential. The soil is low in natural fertility and moderately low in organic matter content. It is strongly acid or very strongly acid in the surface layer and subsoil.

Most areas of this soil are wooded. Some areas are used for homesites and campgrounds.

The stones on the surface and the slope in some areas make this soil generally unsuited to cultivated crops and hay. The soil is moderately well suited to pasture.

The potential productivity for trees on this soil is high. Controlling competing vegetation is the main management concern.

The stones on the surface and the slope in some areas are the main limitations of this soil for community development. The permeability limits the soil as a site for septic tank absorption fields and landfills. The stones on the surface limit the soil as a site for sewage lagoons, landfills, buildings, or roads and streets and are a limitation of the soil as a source of roadfill.

Capability subclass: VIs.

31F—Sherando rubbly sandy loam, 30 to 65 percent slopes. This soil is steep to very steep. It is more than 60 inches deep to bedrock and does not have a seasonal high water table within 60 inches of the surface. Sandstone rock fragments more than 10 inches in diameter cover at least 50 percent of the surface area of the soil. The soil is on side slopes and along narrow drainageways in mountainous areas. It is in long, narrow areas that range from 10 to 100 acres.

Typically, the surface layer of this soil is very dark grayish brown sandy loam 4 inches thick. The subsoil is 33 inches thick. The upper 7 inches is yellowish brown very gravelly sandy loam, and the lower 26 inches is strong brown very cobbly sandy loam. The substratum is strong brown very cobbly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Lily and Ramsey soils on the higher parts of the landscape near the heads of drainageways. These soils make up 10 percent of the unit.

The permeability of this Sherando soil is moderately rapid, and available water capacity is low. Surface runoff is moderate. The subsoil has a low shrink-swell potential and a low frost-action potential. The soil is low in natural fertility and moderately low in organic matter content. It is strongly acid or very strongly acid in the surface layer and subsoil.

Slope and the stones on the surface make this soil generally unsuited to farming.

The potential productivity for trees on this soil is high on north-facing slopes and moderately high on south-facing slopes. All areas are wooded. Slope and the stones on the surface limit the use of timber equipment. Controlling competing vegetation is the main woodland management practice.

Slope and the stones on the surface are major limitations of this soil for most types of community development.

Capability subclass: VIIs.

Figure 5.—The seasonal high water table in an excavation in Slabtown silt loam, 2 to 7 percent slopes.

32B—Slabtown silt loam, 2 to 7 percent slopes. This soil is gently sloping. It is more than 60 inches deep to bedrock and has a seasonal high water table at a depth of 18 to 36 inches (fig. 5). The soil is on concave toe slopes and foot slopes and at the heads of drainageways. The areas of this soil mainly are irregularly shaped and range from 3 to 10 acres.

Typically, the surface layer is brown silt loam 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown silt loam and gravelly silty clay loam, and the lower part is yellowish brown clay.

Included with this soil in mapping are small areas of Lowell, Faywood, and Wurno soils on upper side slopes. Also included are small areas of Monongahela soils. Included areas make up about 10 percent of the unit.

The permeability of this Slabtown soil is moderately slow. Surface runoff is medium. Reaction is medium acid to mildly alkaline in the upper part and slightly acid to mildly alkaline in the lower part. Natural fertility is low, and organic matter content is moderately low. Available water capacity is high. The lower part of the subsoil has a high shrink-swell potential and a high frost-action potential.

Most areas of this soil are used for hay or pasture. A few small areas are cultivated.

This soil is prime farmland and is well suited to cultivated crops. The hazard of erosion is moderate and is a major management concern. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Adding lime and fertilizer and manure and other organic material to the soil helps to maintain fertility and increase water infiltration.

This soil is well suited to pasture and hay. Alfalfa is short lived on this soil because of the seasonal high water table. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. Grazing during periods of seasonal wetness damages the sod and compacts the surface layer. Use of proper stocking rates, deferred grazing, and using lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices. Harvesting and planting during wet periods increase soil compaction, runoff, and erosion.

The seasonal high water table, shrink-swell potential, permeability, and low strength of the soil are the main limitations for community development. The water table limits the soil as a site for buildings, landfills, septic tanks, and sewage lagoons and as a source of roadfill. The permeability is a further limitation of the soil as a site for septic tanks, the low strength for roadfill, and the shrink-swell potential for building sites. The shrink-swell potential and low strength are limitations of the soil as a site for roads and streets.

Capability subclass: IIe.

32C—Slabtown silt loam, 7 to 15 percent slopes. This soil is strongly sloping. It is more than 60 inches deep to bedrock and has a seasonal high water table at a depth of 18 to 36 inches. The soil is on concave back slopes and foot slopes and at the heads of drainageways. The areas of this soil are irregular in shape and range from 3 to 40 acres.

Typically, the surface layer is brown silt loam 8 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown silt loam and gravelly silty clay loam, and the lower part is yellowish brown clay.

Included with this soil in mapping are small areas of Lowell, Faywood, Newbern, and Wurno soils. Also included are a few small areas with slopes of as much as 25 percent, small areas of Carbo soils on knobs and rises, and a few areas with a surface layer of cherty silt loam. The Lowell, Faywood, Newbern, and Wurno soils are at the crest of slopes and on convex side slopes. The areas with a cherty surface layer are in low positions at the base of slopes and in depressions and along drainageways. Included areas make up 5 to 10 percent of this unit.

The permeability of this Slabtown soil is moderately slow. Surface runoff is medium or rapid. Reaction is medium acid to mildly alkaline in the upper part and slightly acid to mildly alkaline in the lower part. Natural fertility is low, and organic matter content is moderately low. Available water capacity is high. The lower part of the subsoil has a high shrink-swell potential and a high frost-action potential.

Most areas of this soil are used for hay and pasture. A few small areas are cultivated.

This soil is moderately well suited to cultivated crops. The hazard of erosion is severe and is a major management concern if this soil is cultivated. The seasonal high water table sometimes delays seedbed preparation and planting and causes the soil to warm slowly in the spring. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue on or in the soil are practices that increase organic matter content, maintain tilth, and reduce runoff and erosion. Using lime and fertilizer and adding manure and other organic material to the soil help to increase fertility and water infiltration.

This soil is well suited to pasture and hay. Alfalfa is short lived on this soil because of the seasonal high water table. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. Overgrazing kills desirable grasses and legumes, reduces yields, and increases runoff and erosion. Grazing during periods of seasonal wetness damages the sod and compacts the surface layer. Use of proper stocking rates, deferred grazing, and using lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices. Harvesting and planting during wet periods increase soil compaction, runoff, and erosion.

The seasonal high water table, slope, shrink-swell potential, permeability, and low strength are the main limitations of the soil for community development. The water table limits the soil as a site for buildings, landfills, sewage lagoons, and septic tanks and as a source of roadfill. The permeability is a further limitation of the soil as a site for septic tanks, the low strength for roadfill, the shrink-swell potential for building sites, and the slope for sewage lagoons and landfills. The shrink-swell potential and low strength are limitations of the soil as a site for roads and streets.

Capability subclass: IIIe.

33—Urban land. This unit consists of areas where at least 80 percent of the surface area is covered by buildings, roads, sidewalks, parking lots, and other structures. These areas range from 2 to 40 acres.

Included with this unit in mapping are areas that are excavated and filled and that consist of highly disturbed soil material. Also included are small areas of generally undisturbed soil material and areas of miscellaneous fill material such as cinders, stumps, gravel, and boulders.

Onsite investigation is needed to determine the suitability of this unit for any use.

Capability subclass: not assigned.

34—Wheeling sandy loam. This soil is level to nearly level. It is at least 60 inches deep to bedrock and does not have a seasonal high water table within 6 feet of the surface. This soil is on long, oval terraces dominantly along the New River. The areas of this soil range from 5 to 40 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is dark brown sandy loam 10 inches thick. The subsoil is 42 inches thick. The upper 23 inches is dark brown sandy clay loam, and the lower 19 inches is dark brown sandy loam. The substratum is dark brown gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of soils with a sandy subsoil and small areas of Cotaco soils. The sandy soils are on point bars and natural levees. The Cotaco soils are in depressions, old channels, and swamps. In some units there are small areas that have a seasonal high water table at a depth of 3 to 5 feet. Included areas make up less than 10 percent of this unit.

The permeability of this Wheeling soil is moderate, and available water capacity is moderate. Surface runoff is slow. This soil has a low shrink-swell potential and a moderate frost-action potential. The soil is medium in natural fertility and moderately low in organic matter content. It is strongly acid or medium acid throughout.

Many areas of this soil are cultivated or are in hay or pasture. Some areas are wooded.

This soil is prime farmland and is very well suited to cultivated crops. The hazard of erosion is slight. Conservation tillage, using cover crops and grasses and legumes in the cropping system, and using crop residue in or on the soil are practices that increase organic matter content, maintain tilth, and increase water infiltration. Applying lime and fertilizer and adding manure and other organic material to the soil help to increase the water-holding capacity.

This soil is well suited to hay and pasture. The prevention of overgrazing is a major pasture management concern. Overgrazing kills desirable grasses and legumes and reduces yields. Use of proper stocking rates, rotational and deferred grazing, and use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. Controlling competing vegetation and fencing to keep livestock from damaging young trees are the main management practices.

The permeability and low strength of this soil are the limitations for community development. The permeability is a limitation of the soil as a site for septic tanks, sewage lagoons, and landfills. The low strength limits the soil as a source of roadfill.

Capability class: I.

35C—Wurno-Newbern-Faywood silt loams, 7 to 15 percent slopes. This unit consists of strongly sloping soils that do not have a seasonal high water table. Bedrock is at a depth of 20 to 40 inches in the Wurno and Faywood soils and 10 to 20 inches in the Newbern soils. The unit is on long, narrow ridgetops in irregularly shaped areas that range from 3 to 35 acres. The unit is about 35 percent Wurno soils, 30 percent Newbern soils, 25 percent Faywood soils, and 10 percent other soils. The Wurno, Newbern, and Faywood soils are so intermingled that it was not practical to map them separately.

Typically, the Wurno soils have a surface layer of yellowish brown silt loam 8 inches thick. The subsoil is brownish yellow very shaly silty clay loam 6 inches thick. The substratum is partially weathered shale 13 inches thick. Bedrock is at a depth of 27 inches.

Typically, the Newbern soils have a surface layer of yellowish brown silt loam 5 inches thick. The subsoil is brownish yellow shaly silt loam 8 inches thick. The substratum is 5 inches thick. It is brownish yellow shale and silt loam. Bedrock is at a depth of 18 inches.

Typically, the Faywood soils have a surface layer of yellowish brown silt loam 10 inches thick. The subsoil is 18 inches thick. The upper part is yellowish brown silty clay loam, and the lower part is yellowish brown silty clay. Bedrock is at a depth of 28 inches.

Included with these soils in mapping are small areas of rock outcrop. Also included are small areas of Lowell and Slabtown soils and soils with a surface layer of shaly silt loam. The areas of rock outcrop are on convex side slopes along drainageways. The Lowell soils are on broad, nearly level areas of ridgetops. The Slabtown soils are in saddles and in concave positions at the heads of drainageways. The soils with a surface layer of shaly silt loam are on small convex areas throughout the unit.

The permeability of these Wurno soils is moderate. Runoff is medium to rapid. Natural fertility is medium, and organic matter content is moderately low. Available water capacity is very low. Reaction in the upper part of the soil ranges from slightly acid to mildly alkaline. In the lower part it is mildly alkaline or neutral. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

The permeability of these Newbern soils is moderate. Runoff is medium to rapid. Natural fertility is high, and organic matter content is moderately low. Available water capacity is very low. Reaction in the surface layer and subsoil ranges from neutral to slightly acid. The substratum is neutral or mildly alkaline. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

The permeability of these Faywood soils is moderately slow. Runoff is medium to rapid. Available water capacity is low. Natural fertility is high, and organic matter content is moderate. Reaction of the soil ranges from neutral to strongly acid throughout. The shrink-swell potential of the subsoil is moderate.

The depth to bedrock, a severe erosion hazard, and droughtiness in late summer and early fall make the soils in this unit poorly suited to most of the cultivated crops grown in the area. The depth to bedrock, especially in the Newbern soils, is a hazard to plowing equipment. Conservation tillage and use of cover crops are practices in cultivated areas that help prevent erosion. Using crop residue in and on the soil and adding manure and other organic material to the soil help to improve fertility and increase water infiltration.

These soils are moderately well suited to pasture and hay. Most areas are in pasture. Some stands of alfalfa are short lived because of the restricted rooting depth. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. If the pasture is overgrazed, runoff and erosion increase. Grazing during wet periods causes soil compaction and damages the sod. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this unit is moderately high. Trees on the Newbern soils have a high rate of seedling mortality and are susceptible to uprooting during windy periods. Fencing to protect trees from livestock is a main management practice.

The depth to bedrock and slope are the main limitations of this unit for community development. Both limit the unit as a site for buildings or septic tank absorption fields. The subsoil of the Faywood soils is sticky when wet, limiting vehicular traffic in unpaved areas.

Capability subclass: IVe.

35D—Wurno-Newbern-Faywood silt loams, 15 to 30 percent slopes. This unit consists of moderately steep and steep soils that do not have a seasonal high water table. Bedrock is at a depth of 20 to 40 inches in

the Wurno and Faywood soils and 10 to 20 inches in the Newbern soils. The unit is on convex side slopes along drainageways in irregularly shaped areas that range from 3 to 30 acres. The unit is about 35 percent Wurno soils, 30 percent Newbern soils, 25 percent Faywood soils, and 10 percent other soils. The Wurno, Newbern, and Faywood soils are so intermingled that it was not practical to map them separately.

Typically, the Wurno soils have a surface layer of yellowish brown silt loam 7 inches thick. The subsoil is brownish yellow very shaly silty clay loam 6 inches thick. The substratum is partially weathered shale 13 inches thick. Bedrock is at a depth of 26 inches.

Typically, the Newbern soils have a surface layer of yellowish brown silt loam 6 inches thick. The subsoil is brownish yellow shaly silt loam 9 inches thick. The substratum is brownish yellow shale and silt loam 3 inches thick. Bedrock is at a depth of 18 inches.

Typically, the Faywood soils have a surface layer of yellowish brown silt loam 10 inches thick. The subsoil is 18 inches thick. The upper part is yellowish brown silty clay loam, and the lower part is yellowish brown silty clay. Bedrock is at a depth of 28 inches.

Included with these soils in mapping are small areas of rock outcrop. Also included are small areas of Lowell and Slabtown soils and soils with a surface layer of shaly silt loam. The areas of rock outcrop are on convex side slopes along drainageways. The Lowell soils are on broad, nearly level areas of ridgetops. The Slabtown soils are in saddles and in concave positions at the heads of drainageways. The soils with a surface layer of shaly silt loam are on small convex areas throughout the unit.

The permeability of these Wurno soils is moderate. Runoff is rapid. Natural fertility is medium, and organic matter content is moderately low. Available water capacity is very low. Reaction in the upper part of the soil ranges from slightly acid to mildly alkaline. In the lower part it is mildly alkaline or neutral. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

The permeability of these Newbern soils is moderate. Runoff is rapid. Natural fertility is high, and organic matter content is moderately low. Available water capacity is very low. Reaction in the surface layer and subsoil ranges from neutral to slightly acid. The substratum is neutral or mildly alkaline. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

The permeability of these Faywood soils is moderately slow. Runoff is rapid. Available water capacity is low. Natural fertility is high, and organic matter content is moderate. Reaction of the soil ranges from neutral to strongly acid throughout. The shrink-swell potential of the subsoil is moderate.

A very severe erosion hazard makes this unit generally unsuited to cultivated crops. These soils are moderately well suited to pasture and hay. Most areas are in pasture. Some stands of alfalfa are short lived because of the restricted rooting depth. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. If the pasture is overgrazed, runoff and erosion increase. Grazing during wet periods causes soil compaction and damages the sod. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this unit is moderately high. Trees on the Newbern soils have a high rate of seedling mortality and are susceptible to uprooting during windy periods. Fencing to protect trees from livestock is a main management practice.

The depth to bedrock and slope are the main limitations of this unit for community development. Both limit the unit as a site for buildings or septic tank absorption fields. The subsoil of the Faywood soils is sticky when wet, limiting vehicular traffic in unpaved areas.

Capability subclass: VIe.

35E—Wurno-Newbern-Faywood silt loams, 30 to 45 percent slopes. This unit consists of steep and very steep soils that do not have a seasonal high water table. Bedrock is at a depth of 20 to 40 inches in the Wurno and Faywood soils and 10 to 20 inches in the Newbern soils. The unit is on long, convex side slopes along drainageways in irregularly shaped areas that range from 3 to 25 acres. The unit is about 35 percent Wurno soils, 30 percent Newbern soils, 25 percent Faywood soils, and 10 percent other soils. The Wurno, Newbern, and Faywood soils are so intermingled that it was not practical to map them separately.

Typically, the Wurno soils have a surface layer of yellowish brown silt loam 6 inches thick. The subsoil is brownish yellow very shaly silty clay loam 6 inches thick. The substratum is partially weathered shale 13 inches thick. Bedrock is at a depth of 25 inches.

Typically, the Newbern soils have a surface layer of yellowish brown silt loam 5 inches thick. The subsoil is brownish yellow shaly silt loam 9 inches thick. The substratum is brownish yellow shale and silt loam 3 inches thick. Bedrock is at a depth of 17 inches.

Typically, the Faywood soils have a surface layer of yellowish brown silt loam 8 inches thick. The subsoil is 18 inches thick. The upper part is yellowish brown silty clay loam, and the lower part is yellowish brown silty clay. Bedrock is at a depth of 26 inches.

Included with these soils in mapping are small areas of rock outcrop. Also included are small areas of Lowell and Slabtown soils and soils with a surface layer of shaly silt loam. The areas of rock outcrop are on convex side slopes along drainageways. The Lowell soils are on broad, nearly level areas of ridgetops. The Slabtown soils are in saddles and in concave positions at the

heads of drainageways. The soils with a surface layer of shaly silt loam are on small convex areas throughout the unit.

The permeability of these Wurno soils is moderate. Runoff is very rapid. Natural fertility is medium, and organic matter content is moderately low. Available water capacity is very low. Reaction in the upper part of the soil ranges from slightly acid to mildly alkaline. In the lower part it is mildly alkaline or neutral. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

The permeability of these Newbern soils is moderate. Runoff is very rapid. Natural fertility is high, and organic matter content is moderately low. Available water capacity is very low. Reaction in the surface layer and subsoil ranges from neutral to slightly acid. The substratum is neutral or mildly alkaline. The subsoil has a low shrink-swell potential and a moderate frost-action potential.

The permeability of these Faywood soils is moderately slow. Runoff is very rapid. Available water capacity is low. Natural fertility is high, and organic matter content is moderate. Reaction of the soil ranges from neutral to strongly acid throughout. The shrink-swell potential of the subsoil is moderate.

A very severe erosion hazard makes this unit generally unsuited to cultivated crops. These soils are moderately well suited to pasture and hay. Most areas are in pasture. Some stands of alfalfa are short lived because of the restricted rooting depth. The prevention of overgrazing and grazing when the soil is wet is a major pasture management concern. If the pasture is overgrazed, runoff and erosion increase. Grazing during wet periods causes soil compaction and damages the sod. Use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture mangement practices.

The potential productivity for trees on this unit is moderate or moderately high. Trees on the Newbern soils have a high rate of seedling mortality and are susceptible to uprooting during windy periods. Harvesting and planting during wet periods increase soil compaction, runoff, and erosion. Slope limits the kinds of harvesting and planting equipment that can be used on these soils.

The depth to bedrock and slope are the main limitations of this unit for community development. Both limit the unit as a site for buildings or septic tank absorption fields. The subsoil of the Faywood soils is sticky when wet, limiting vehicular traffic in unpaved areas.

Capability subclass: VIIe.

36—Zoar loam. This soil is nearly level. It is more than 60 inches deep to bedrock and has a seasonal high water table at a depth of 18 to 30 inches. The soil in back swamps and depressional areas on stream terraces in irregularly shaped areas that range from 3 to 30 acres.

Typically, the surface layer is dark grayish brown loam 3 inches thick. The subsurface layer is light yellowish brown loam 7 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is yellowish brown loam. The middle part is mottled, yellowish brown clay loam. The lower part is light gray, yellowish brown, and pale brown clay that is mottled.

Included with this soil in mapping are small areas of Cotaco soils and soils in depressional areas that have water on the surface. The Cotaco soils are at the high areas of the unit, and the areas with water on the surface are in the low areas. Included areas make up less than 15 percent of this unit.

The permeability of this Zoar soil is slow, and available water capacity is moderate. Surface runoff is slow or very slow. The subsoil has a moderate shrink-swell potential and a moderate frost-action potential. The soil is moderate in organic matter content and low in natural fertility. It generally is strongly acid or very strongly acid throughout, but the reaction of the surface layer is variable because of local liming practices.

Most areas of this soil are in woodland or pasture. A few areas are in small grains.

This soil is prime farmland and is well suited to cultivated crops. The main limitation is wetness caused by the seasonal high water table. It makes alfalfa short lived and often keeps the soil wet and cold in the spring, delaying tillage, planting, and grazing. The installation of a drainage system in this soil generally is impractical because of the high clay content of the subsoil. The use of cover crops and grasses and legumes in the cropping system, using crop residue on and in the soil, and deferred plowing and planting until the soil temperature and moisture content are suitable are practices that help to maintain organic matter content and tilth, reduce crusting and clodding, and increase water infiltration.

This soil is well suited to pasture and hay. The use of proper stocking rates, rotational and deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Overgrazing and grazing when the soil is wet sometimes cause damage to grasses and legumes and reduce yields.

The potential productivity for trees on this soil is moderately high. Seedlings survive and grow well if competing vegetation is controlled. This soil is soft when wet, limiting the use of heavy timber equipment.

The seasonal high water table, low strength, and the permeability and shrink-swell potential of the soil are the main limitations for community development. The water table and permeability limit the soil as a site for septic tank absorption fields, sewage lagoons, and sanitary landfills. The water table and the shrink-swell potential are limitations of the soil as a building site, and low

strength limits the soil as a site for roads and streets and as a source of roadfill.

Capability subclass: IIw.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the Nation's short and long term needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops when it is treated and managed using up-to-date farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources. Farming it also results in the least damage to the environment.

Prime farmland may now be in crops, pasture, woodland, or other land, but not urban or built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has favorable temperature and growing season and acidity or alkalinity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope range is mainly from 0 to 7 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

About 20,000 acres, or nearly 10 percent of Pulaski County, meets the requirements for prime farmland. The prime farmland soils are scattered throughout the county, but most are in the central and east-central parts. Most of the prime farmland is used for crops that support dairy and beef farming, including corn, alfalfa, clovers, grasses, and small grains.

The trend towards urban development in the county has caused a loss of prime farmland to other uses and has put increased pressure on marginal land. The marginal land is generally more erodible, difficult to cultivate, and less productive.

Soil map units that make up prime farmland in Pulaski County are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is given in table 4. The location of the map units is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed soil map units."

Soils that have limitations, such as a high water table or flooding, may qualify for prime farmland if those limitations are overcome by such measures as drainage or flood control. In the following list the measures are shown in parentheses after the map unit name. Onsite evaluation is necessary to see if the limitations have been overcome by corrective measures.

The map units that meet the soil requirements for prime farmland are:

2B Braddock loam, 2 to 7 percent slopes
7A Cotaco loam, 0 to 2 percent slopes
7B Cotaco loam, 2 to 7 percent slopes
8 Dunning silty clay loam (if drained and protected from flooding)
10B Frederick loam, 2 to 7 percent slopes
13B Groseclose and Poplimento silt loams, 2 to 7 percent slopes
17 Lindside-Nolin silt loams (if protected from flooding)
18B Lodi loam, 2 to 7 percent slopes
20B Lowell silt loam, 2 to 7 percent slopes
23 Newark Variant silt loam (if drained and protected from flooding)
32B Slabtown silt loam, 2 to 7 percent slopes
34 Wheeling sandy loam
36 Zoar loam

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

L. Willis Miller, conservation agronomist, helped to prepare this section.

General management needed for crops and pasture is suggested in this section. The system of land capability classification used by the Soil Conservation Service is explained, and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

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

Most soils in the county have low or medium natural fertility, and most require lime and fertilizer. The effectiveness of applying lime and fertilizer depends on the type of soil. For example, the productivity for some fertilized crops is higher on some of the deep soils, such as Lodi or Poplimento soils, than it is on moderately deep soils, such as Berks or Gilpin soils.

Lodi, Poplimento, and Frederick soils, which are silty and clayey, retain more plant nutrients, especially nitrogen, than do sandy soils, such as Sherando or Ramsey soils. Fertilizers leach downward into the ground water more rapidly in the sandy soils; thus, it is better to apply nutrients to sandy soils in small amounts several times rather than in a large amount all at once.

Most soils in the county have a moderate to low organic matter content. Organic matter helps the soil retain plant nutrients and water and helps prevent soil crusting and compaction. Though it is difficult to significantly increase organic matter content, the level of organic matter can be maintained by applying manure, using cover crops, and incorporating crop residue into the surface layer of the soil.

Good tilth in the topsoil is important for seed germination and growth. Soils with a surface layer of loam, sandy loam, or silt loam can be tilled throughout a wide range of moisture conditions. Soils with a surface layer of silty clay loam have a narrow range of moisture content for good workability. Farming on a soil that has a high moisture level increases soil compaction and runoff and restricts root penetration.

Erosion is the major hazard on all but the nearly level soils in the county. Conservation tillage, the use of cover crops, contour farming, no-tillage, stripcropping, crop rotations, and grassed waterways help to control erosion in cultivated areas. Using lime and fertilizer to encourage plant growth and root development, controlling grazing, and reseeding poor plant stands are practices that help control erosion on pasture and hayland.

Poor natural drainage is a limitation for crops on some soils, for example, Dunning and Newark Variant soils. A seasonal high water table can limit the choice of crops

or make the growing of a desirable crop impractical. Alfalfa, for instance, is best suited to soils that do not have a seasonal high water table; clovers and tall fescue are more tolerant of wet soils.

Subsurface drainage and open-ditch drainage are two methods used to lower a high water table. However, for either method to be successful a suitable outlet for the water must be available. Subsurface drainage is more difficult to install than an open-ditch system but is easier to maintain over an extended period. Certain soils, such as those having a firm layer or a clay subsoil, are difficult or impractical to drain by subsurface means.

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 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

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

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures 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 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

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 grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

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, IIe-4 or IIIe-6.

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

Woodland Management and Productivity

Norman O. Wilson, forester, Soil Conservation Service, helped with this section.

A forest of second-growth hardwoods, eastern white pine, and Virginia pine covers about 47 percent of the land area in Pulaski County. The forested areas are mainly in remote sections of the county that are too steep or too rocky, or both, for farming.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that few trees may be blown down by strong winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

The county boundaries encompass parts of the Thomas Jefferson National Forest and the New River, all of Claytor Lake State Park, and two small reservoirs, Gatewood and Hogan. These facilities provide opportunities for boating, fishing, swimming, hunting, hiking, and camping.

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning,

design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

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

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

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

L. H. Robinson, biologist, Soil Conservation Service, helped prepare this section.

Pulaski County has many species of wildlife within its boundaries. White-tailed deer, black bear, wild turkey, ruffed grouse, and gray squirrel are common in the wooded mountain areas, especially on Ramsey, Lily, Berks, and Gilpin soils. Cottontail rabbit, quail, mourning dove, and woodcock are on upland pastures and open fields throughout the county. Mallard, wood duck, black duck, and blue-winged teal inhabit the wetland areas of Dunning soils and Fluvaquents during the migration periods.

The New River is noted for its walleye, smallmouth bass, chain pickerel, and catfish. Crappie are plentiful in Claytor Lake. Bluegill, rock bass, and yellow perch inhabit all the major streams, and native brook trout are in some of the remote mountain streams.

Numerous song and garden birds, most of which are migratory, inhabit the county. Birds of prey, such as hawks and owls, are common, and a few American eagle and osprey have been sighted.

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

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer,

available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, bluegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

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

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

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are hawthorne, mountain laurel, rhododendron, and azalea. The potential of habitat elements for shrubs was not rated.

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

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

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

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

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

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

Engineering

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

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

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to

bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that

special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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

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

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

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

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

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

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

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

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

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil

properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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

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

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

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

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in

construction costs, and possibly increased maintenance are required.

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

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

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

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

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

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

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

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

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

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

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

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

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

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

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

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

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

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

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Some soils in table 15 that are less than 20 inches deep to bedrock are assigned to two hydrologic soil groups. The first letter applies to areas where the bedrock is cracked and pervious and the second letter to areas where the bedrock is impervious or where exposed bedrock makes up more than 25 percent of the surface of the soil.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

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 absence of distinctive horizons that form in soils that are not subject to flooding.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. Only saturated zones within a depth of about 6 feet are indicated. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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

or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

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

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*5*). 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 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

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

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

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

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*4*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*5*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

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

Berks Series

The soils in the Berks series are 20 to 40 inches deep to bedrock and do not have a seasonal high water table. They formed in the weathered products of shale and siltstone. Berks soils are on the tops and side slopes of ridges. Slopes range from 7 to 65 percent.

Berks soils are mapped with Gilpin, Klinesville, Monongahela, and Rayne soils. The Berks soils are deeper to bedrock than the Klinesville soils, are not as deep to bedrock as the Monongahela or Rayne soils, and contain more coarse fragments than the Gilpin soils.

Typical pedon of Berks shaly silt loam, in an area of Berks-Gilpin complex, 35 to 65 percent slopes, 1/2 mile southwest of the intersection of VA 672 and VA 670, elevation 2,140 feet:

Ap—0 to 7 inches; brown (10YR 4/3) shaly silt loam; moderate fine and medium granular structure; friable, nonsticky, nonplastic; many fine and medium roots; many very fine pores; 20 percent shale fragments less than 1 inch in diameter; strongly acid; clear wavy boundary.

B1—7 to 15 inches; yellowish brown (10YR 5/6) very shaly silt loam; common fine faint very pale brown (10YR 7/3) mottles; moderate fine subangular blocky structure; friable, slightly sticky, nonplastic; common fine roots; common very fine pores; 45 percent shale fragments less than 3 inch in diameter; very strongly acid; clear wavy boundary.

B2—15 to 27 inches; yellowish brown (10YR 5/6) very shaly silt loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common very fine pores; thin patchy dark brown (7.5YR 4/4) ped coatings; 45 percent shale fragments less than 3 inches in diameter; very strongly acid; clear wavy boundary.

R—27 inches; reddish yellow (7.5YR 6/8) shale.

The solum thickness and depth to bedrock are 20 to 40 inches. Angular shale fragments make up as much as 65 percent of the solum and as much as 85 percent of the substratum. Reaction mainly is extremely acid through slightly acid but is less acid in some limed areas.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is dominantly silt loam but includes shaly silt loam.

The B horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 6. It is silt loam, loam, or silty clay loam and their shaly and very shaly analogs. The hue of 5YR is restricted to the lower part.

Some pedons have a C horizon that has hue of 5YR to 10YR, value of 5 or 6, and chroma of 3 to 8. It is silt loam and its shaly and very shaly analogs.

Braddock Series

The soils in the Braddock series are more than 60 inches deep to bedrock and do not have a seasonal high water table at a depth of less than 6 feet. Braddock soils formed in alluvium from sedimentary, metamorphic, and igneous materials. Braddock soils are on high terraces in the New River Valley. Slopes range from 0 to 30 percent.

Braddock soils are commonly near Cotaco, Frederick, Groseclose, and Poplimento soils. The Braddock soils contain more clay in the subsoil than the Cotaco soils, and they have more mica in the subsoil than the Frederick, Groseclose, or Poplimento soils.

Typical pedon of Braddock loam, 2 to 7 percent slopes, 1/2 mile northeast of the end of State Route 679, about 1/2 mile west of the New River, elevation 1,950 feet:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) loam; moderate fine granular structure; friable, nonsticky, nonplastic; common very fine mica flakes; neutral; clear wavy boundary.

B1t—7 to 14 inches; yellowish red (5YR 4/6) clay; moderate very fine and fine subangular blocky structure; friable, sticky, plastic; common very fine roots; common very fine pores; thick continuous yellowish red (5YR 5/6) clay films; common very fine mica flakes; slightly acid; clear wavy boundary.

B21t—14 to 23 inches; yellowish red (5YR 5/6) clay; few fine prominent yellowish brown (10YR 5/8) mottles; moderate very fine and fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; thick continuous yellowish red (5YR 4/6) clay films; common very fine mica flakes; strongly acid; clear wavy boundary.

B22t—23 to 30 inches; red (2.5YR 4/6) clay; few fine prominent yellowish brown (10YR 5/4) mottles; moderate very fine and fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; few very fine pores; thick continuous red (2.5YR 4/6) and reddish brown (5YR 4/4) clay films; common very fine mica flecks; 5 percent quartzite gravel; very strongly acid; clear wavy boundary.

B23t—30 to 60 inches; red (2.5YR 4/6) clay; few fine prominent yellowish brown (10YR 5/8) mottles; moderate medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; thick continuous dark red (2.5YR 3/6) clay films; common very fine mica flecks; 5 percent quartzite gravel; very strongly acid.

The solum thickness and depth to bedrock are more than 60 inches. Reaction in unlimed areas is very strongly acid or strongly acid throughout the profile. The content of rounded quartzite gravel and cobbles ranges from 0 to 35 percent in the surface layer and from 5 to 15 percent in the lower horizons.

A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is dominantly loam but ranges to include sandy loam or fine sandy loam or their gravelly and cobbly analogs.

B1 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is clay loam or clay.

B2 horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay loam or clay.

Carbo Series

The soils in the Carbo series are 20 to 40 inches deep to bedrock and do not have a seasonal high water table. They formed in the weathered products of limestone and a few shale seams. The soils are on upland side slopes and ridgetops. Slopes range from 7 to 35 percent.

Carbo soils are commonly near Slabtown, Faywood, Groseclose, Lowell, Lodi, Newbern, Poplimento, and Wurno soils. The Carbo soils have more clay in the subsoil and are shallower to bedrock than the Groseclose, Slabtown, Lowell, or Poplimento soils. The Carbo soils contain more clay in the subsoil than the Faywood, Newbern, or Wurno soils.

Typical pedon of Carbo silty clay loam, in an area of Carbo silty clay loam, very rocky, 15 to 30 percent slopes, south of old U.S. Route 11, 1 mile northeast of Dublin, 100 yards southeast of the railroad, across from Highland Park, elevation 2,020 feet:

Ap—0 to 5 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and very fine granular structure; friable, slightly sticky, slightly plastic; many fine roots; common very fine pores; neutral; clear smooth boundary.

B21t—5 to 15 inches; strong brown (7.5YR 5/6) clay; moderate fine and medium subangular blocky structure; firm, sticky, plastic; common fine roots; common very fine pores; thin continuous strong brown (7.5YR 4/6) clay films; few oxide stains on ped faces; neutral; abrupt smooth boundary.

B22t—15 to 31 inches; strong brown (7.5YR 5/6) clay; moderate fine and medium angular blocky structure; firm, very sticky, very plastic; few fine roots; common very fine pores; thin continuous brown (7.5YR 4/4) clay films; two 1/4 inch thick seams of dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) siltstone material in bedding planes of the limestone parent material; neutral; abrupt wavy boundary.

R—31 inches; limestone bedrock.

The solum thickness and depth to bedrock are 20 and 40 inches. The reaction of the upper horizons is slightly acid or neutral. The reaction of the lower horizons is neutral or mildly alkline.

Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

Some pedons have a B1 horizon. It has hue of 7.5YR and 10YR, value of 3 to 6, and chroma of 4 to 8. It is clay loam, silt loam, or silty clay loam.

The B2 horizon has hue of 5YR to 10YR, value of 5, and chroma of 6 to 8.

Some pedons have a B3 horizon. It has hue of 7.5YR, value of 5, and chroma of 6. It is clay.

Some pedons have a C horizon. It is a mixture of strong brown, brownish yellow, and yellow. It is silty clay.

Cotaco Series

The soils of the Cotaco series are more than 60 inches deep to bedrock and have a seasonal high water table at a depth of 18 to 30 inches from November through May. The soils formed in alluvium from sandstone, limestone, shale, and mixed igneous and metamorphic materials. The Cotaco soils are on terraces along major streams and rivers. Slopes range from 0 to 15 percent.

Cotaco soils are commonly near Braddock, Dunning, Wheeling, and Zoar soils. The Cotaco soils are more poorly drained than the Wheeling soils, contain less clay in the subsoil than the Braddock or Zoar soils, and are better drained than the Dunning soils.

Typical pedon of Cotaco loam, 2 to 7 percent slopes, 150 yards west of the end of VA 628, 1/6 mile north of Race Path Branch, 1/3 mile west of Back Creek, elevation 1,970 feet:

Ap—0 to 9 inches; brown (10YR 4/3) loam; moderate very fine granular structure; very friable, slightly sticky, nonplastic; many fine roots; many very fine pores; 2 percent rounded sandstone and quartzite fragments less than 1 inch in diameter; neutral; abrupt smooth boundary.

B1t—9 to 15 inches; yellowish brown (10YR 5/6) loam; moderate fine and very fine subangular blocky structure; friable, slightly sticky, nonplastic; common fine roots; common fine pores; thin patchy brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6) clay films; few fine manganese concretions and stains; common fine Ap bodies; 2 percent rounded sandstone and quartzite fragments less than 1 inch in diameter; neutral; clear smooth boundary.

B21t—15 to 25 inches; brownish yellow (10YR 6/6) loam; common fine faint light gray (10YR 7/2) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; common fine and many very fine pores; thin patchy brownish yellow (10YR 6/8) clay films; common fine manganese concretions and stains; 5 percent rounded sandstone and quartzite fragments less than 1 inch in diameter; strongly acid; clear wavy boundary.

B22t—25 to 38 inches; brownish yellow (10YR 6/6) clay loam; many medium faint light gray (10YR 7/2) mottles; moderate fine subangular blocky structure; firm, slightly sticky, slightly plastic; few fine roots; common fine and very fine pores; thin patchy clay films same color as matrix; common fine manganese concretions and stains; 5 percent rounded sandstone and quartzite fragments less than 1 inch in diameter; 10 percent brittleness; strongly acid; clear wavy boundary.

B23t—38 to 49 inches; brownish yellow (10YR 6/6) clay loam; many medium faint light gray (10YR 7/2)

mottles; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; few very fine roots; common very fine pores; thin patchy reddish yellow (7.5YR 6/6) clay films; common fine manganese concretions and stains; 10 percent rounded sandstone and quartzite fragments less than 2 inches in diameter; 10 percent brittleness; strongly acid; clear irregular boundary.

IIB3t—49 to 60 inches; brownish yellow (10YR 6/6) sandy clay loam; many coarse faint light gray (10YR 7/1) mottles; weak coarse subangular blocky structure; firm, slightly sticky, slightly plastic; few fine pores; thin patchy very pale brown (10YR 7/4) clay films; 5 percent rounded sandstone and quartzite fragments less than 1 inch in diameter; 40 percent brittleness; strongly acid.

The solum is more than 40 inches thick, and the depth to bedrock is more than 60 inches. Reaction in unlimed areas is strongly acid or very strongly acid throughout the solum. Semirounded and rounded sandstone fragments make up 0 to 15 percent of individual subhorizons.

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

The B1 horizon has hue of 10YR, value of 5, and chroma of 4 or 6. The B2 and B3 horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 6 or 8. The B horizon is loam, sandy clay loam, or clay loam.

The Cotaco soils in this survey area are taxadjuncts to the Cotaco series because they have slightly higher silt content and fewer weatherable minerals in the control section than is defined in the range for the series. These differences do not significantly affect the use and management of the soils.

Dunning Series

The soils of the Dunning series are more than 60 inches deep to bedrock and have a seasonal high water table at or near the surface from January through April. The soils formed in alluvial deposits weathered from limestone, shale, and sandstone. The soils are on flood plains along small streams. Slopes range from 0 to 2 percent.

Dunning soils are commonly near Newark, Carbo, Cotaco, Groseclose, Lowell, and Poplimento soils but are more poorly drained than those soils.

Typical pedon of Dunning silty clay loam, along Back Creek, 1.6 miles northwest of the intersection of VA 105 and VA 628, 100 feet southwest of the VA 628 bridge over Back Creek, 30 feet from the creek, elevation 1,930 feet:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam; dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; friable, slightly sticky, nonplastic; slightly acid; abrupt smooth boundary.

A1—8 to 17 inches; very dark gray (10YR 3/1) silty clay loam; dark brown (10YR 4/3) dry; few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine granular structure; friable, slightly sticky, nonplastic; slightly acid; gradual wavy boundary.

B21g—17 to 30 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate very fine subangular blocky structure; friable, sticky, slightly plastic; slightly acid; gradual wavy boundary.

B22g—30 to 47 inches; very dark gray (10YR 3/1) silty clay loam; many coarse prominent yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; friable, sticky, slightly plastic; neutral; gradual wavy boundary.

Cg—47 to 60 inches; very dark gray (10YR 3/1) and dark gray (10YR 4/1) sandy clay loam; many coarse prominent yellowish brown (10YR 5/8) mottles; massive; friable, slightly sticky, nonplastic; neutral.

The solum thickness ranges from 30 to 50 inches. The depth to bedrock is more than 60 inches. The soil is mildly alkaline to medium acid throughout. The content of coarse fragments ranges from 0 to 35 percent in the individual horizons below the surface layer. In some areas, gravel strata are in the lower horizons. The content of coarse fragments in the control section averages less than 35 percent.

The A horizon has hue of 10YR, value of 3, and chroma of 1 or 2. It is silty clay loam or silt loam.

The B2 horizon has hue of 10YR, value of 4 or 5, and chroma of 1. It is silty clay loam or silty clay.

Some pedons have a B3 horizon. It has hue of 10YR, value of 3 to 6, and chroma of 1. It is clay loam or clay.

The C horizon has hue of 10YR, value of 3 to 8, and chroma of 1. It ranges from sandy loam to clay.

Faywood Series

The soils of the Faywood series are 20 to 40 inches deep to bedrock and do not have a seasonal high water table. The soils formed in the weathered products of calcareous shale interbedded with thin layers of limestone. Faywood soils are on smooth ridgetops and side slopes of upland areas. Slopes range from 7 to 45 percent.

The Faywood soils in this survey area are mapped only with Newbern and Wurno soils and are commonly near Carbo, Lowell, and Slabtown soils. The Faywood soils have more clay in the subsoil than Newbern or Wurno soils, contain less clay in the subsoil than the Carbo soils, and have a thinner solum than the Lowell or Slabtown soils.

Typical pedon of Faywood silt loam, in an area of Wurno-Newbern-Faywood silt loams, 7 to 15 percent

slopes, 3/4 mile south of Newbern on VA 643, 250 feet east of road, elevation 2,100 feet:

Ap—0 to 10 inches; yellowish brown (10YR 5/4) silt loam; moderate fine granular structure; friable, slightly sticky, nonplastic; common fine and very fine roots; common very fine pores; 5 percent chert and sandstone fragments less than 3/4 inch in diameter; neutral; abrupt smooth boundary.

B2t—10 to 20 inches; yellowish brown (10YR 5/8) silty clay loam; moderate very fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and very fine roots; many very fine pores; thin patchy yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) clay films; 2 percent shale fragments less than 1/2 inch in diameter; neutral; clear wavy boundary.

B3t—20 to 28 inches; yellowish brown (10YR 5/8) silty clay; moderate very fine subangular blocky structure; friable, sticky, slightly plastic; few fine and very fine roots; common very fine pores; thick patchy strong brown (7.5YR 5/6) clay films; 40 percent highly weathered dark yellowish brown (10YR 4/6) shale fragments; neutral; clear smooth boundary.

R—28 inches; hard shale interbedded with thin layers of limestone.

The solum is 20 to 30 inches thick. The depth to hard bedrock is 20 to 40 inches. In some pedons, angular and rounded chert, sandstone, and shale fragments 1/4 inch to 2 inches in diameter make up 0 to 15 percent of the A horizon. Angular shale fragments 1/2 inch to 3 inches in diameter make up 0 to 15 percent of the B horizon. Reaction of the soil ranges from neutral to strongly acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6.

Some pedons have a B1 horizon that has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam or silty clay loam.

The B2t horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay, silty clay, or silty clay loam.

The B3t horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay or silty clay.

Some pedons have a C horizon that has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is clay, silty clay, or silty clay loam or their shaly analogs.

Fluvaquents

Fluvaquents are more than 60 inches deep to bedrock and have a seasonal high water table at or near the surface. Fluvaquents are in long, narrow areas along streams. The soils formed in loamy, clayey, and gravelly alluvium. Slopes range from 0 to 2 percent.

Fluvaquents are commonly near Wheeling soils but are more poorly drained.

Because of the variability of Fluvaquents, a typical pedon is not described. Fluvaquents generally are stratified. Reaction ranges from mildly alkaline to medium acid. Rounded sandstone and quartzite pebbles and cobbles make up as much as 75 percent of some pedons.

The A horizon has a hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 or 2. It ranges from silty clay loam to loamy sand or their gravelly, cobbly, or stony analogs. It ranges from 2 to 8 inches in thickness.

The C horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 or 2. It ranges from sandy loam to silty clay loam and their gravelly or cobbly analogs. Some pedons have layers of loamy sand. In most areas, the C horizon is mottled gray, yellow, and brown.

Frederick Series

The soils of the Frederick series are more than 60 inches deep to bedrock and do not have a seasonal high water table within 6 feet of the surface. The soils formed in weathered products of shale, dolomite, and limestone and are on side slopes and ridgetops in upland areas. Slopes range from 2 to 30 percent.

Frederick soils commonly are near Carbo, Lodi, Lowell, and Poplimento soils. The Frederick soils have more clay and less sand in the lower part of the profile than the Lodi soils, are deeper to bedrock than the Carbo soils, and have more clay and less silt in the lower part of the profile than the Lowell or Poplimento soils.

Typical pedon of Frederick loam, 7 to 15 percent slopes, about 1/2 mile east of the FAA Airway Beacon and about 1/2 mile northeast of the intersection of VA 643 and the Norfolk and Western Railroad, elevation 2,130 feet:

Ap—0 to 7 inches; yellowish brown (10YR 5/4) loam; moderate fine granular structure; friable, slightly sticky, nonplastic; common fine roots; many very fine pores; 3 percent semirounded sandstone and chert fragments 1/4 to 1 inch in diameter; slightly acid; clear smooth boundary.

B21t—7 to 17 inches; strong brown (7.5YR 5/6) clay; moderate fine and very fine subangular blocky structure; firm, sticky, plastic; common fine roots; many very fine pores; thin continuous yellowish red (5YR 5/6) clay films; few channels less than 5 millimeters in diameter filled with material from the Ap horizon; strongly acid; gradual smooth boundary.

B22t—17 to 28 inches; strong brown (7.5YR 5/8) clay; common fine distinct reddish yellow (5YR 6/8) mottles; moderate fine and very fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; many very fine pores; thin continuous yellowish red (5YR 5/6) clay films on horizontal faces; thin continuous strong brown (7.5YR 5/6) clay films on vertical faces; strongly acid; gradual smooth boundary.

IIB23t—28 to 43 inches; strong brown (7.5YR 5/8) silty clay; many medium prominent brownish yellow

(10YR 6/6) mottles and few fine distinct red (2.5YR 5/6) mottles; moderate fine and very fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common very fine pores; thin continuous yellowish red (5YR 5/6) clay films; strongly acid; gradual smooth boundary.

IIB24t—43 to 60 inches; yellowish red (5YR 5/6) clay; many medium distinct reddish yellow (7.5YR 6/6) and red (2.5YR 4/8) mottles; moderate very fine subangular blocky structure; firm, slightly sticky, slightly plastic; few fine roots; common very fine pores; thin continuous yellowish red (5YR 5/6) clay films; strongly acid.

The solum thickness and depth to bedrock are more than 60 inches. The reaction of the upper horizons ranges from medium acid to neutral. The reaction of the lower horizons mainly is very strongly acid or strongly acid but varies widely in the surface layer due to liming practices. Chert fragments less than 1 inch in diameter comprise 0 to 15 percent of the upper horizons.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is loam, silt loam, or clay loam.

The B1 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. It is clay loam or silty clay loam or their cherty analogs.

The B2 horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. It is clay or silty clay loam. Mottles are few to common.

Some pedons have a B3 horizon that has hue of 5YR to 10YR, value of 5 and 6, and chroma of 6 to 8. In some pedons it is mixed red, yellow, and brown and does not have a dominant matrix color. It is clay or silty clay.

Gilpin Series

The soils of the Gilpin series are 20 to 40 inches deep to bedrock and do not have a seasonal high water table. They formed in the weathered products of shale and siltstone. The soils are on convex side slopes and ridgetops. Slopes range from 7 to 65 percent.

Gilpin soils are mapped with Berks and Lily soils but contain fewer coarse fragments than the Berks soils and less sand than the Lily soils.

Typical pedon of Gilpin silt loam, in an area of Gilpin-Lily complex, 35 to 65 percent slopes, 2-1/2 miles east of Route 643 on the top of Little Walker Mountain, elevation 2,820 feet:

O1&O2—2 inches to 0; partially decomposed and undecomposed oak leaves, twigs, mosses, and pine needles.

A1—0 to 4 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; many fine and medium roots; common fine pores; 5 percent angular shale fragments less than 1 inch in diameter; very strongly acid; clear wavy boundary.

B1—4 to 9 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many fine and medium roots; common fine pores; 5 percent angular shale fragments less than 1 inch in diameter; very strongly acid; clear wavy boundary.

B2—9 to 17 inches; reddish yellow (7.5YR 6/6) silty clay loam; moderate fine subangular blocky structure; friable, sticky, slightly plastic; common fine roots; common fine pores; thin patchy strong brown (7.5YR 5/6) clay films; 5 percent angular shale fragments less than 1 inch in diameter; very strongly acid; clear wavy boundary.

B3t—17 to 23 inches; reddish yellow (7.5YR 6/6) shaly silty clay loam; weak fine subangular blocky structure; friable, sticky, slightly plastic; few fine roots; common fine pores; thin patchy strong brown (7.5YR 5/6) clay films; 20 percent angular shale fragments less than 1 inch in diameter; very strongly acid; abrupt smooth boundary.

R—23 inches; shale.

The solum thickness and depth to bedrock range from 20 to 40 inches. Reaction ranges from extremely acid through strongly acid throughout the profile. Shale fragments make up 5 to 25 percent of the solum.

A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or loam.

B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, silt loam, or silty clay loam or their shaly analogs.

Some pedons have a C horizon that has colors and textures similar to those of the B horizon. The shale fragment content ranges from 5 to 50 percent.

Groseclose Series

The soils of the Groseclose series are more than 48 inches deep to bedrock and do not have a seasonal high water table within 6 feet of the surface. They formed in the weathered products of shale interbedded with thin layers of limestone. Groseclose soils are on upland side slopes and ridgetops. Slopes range from 2 to 30 percent.

Groseclose soils are commonly near Carbo, Frederick, Lowell, and Poplimento soils. The Groseclose soils have less clay in the control section than the Carbo soils, have more silt and less clay in the lower part of the profile than the Frederick soils, have a thicker solum than the Lowell soils, and have a lower base saturation than the Poplimento soils.

Typical pedon of Groseclose silt loam, in an area of Groseclose and Popliminto silt loams, 7 to 15 percent slopes, 1/2 mile south of Pulaski County High School,

400 yards east of the FAA Airway Beacon and 150 yards north of the railroad tracks, elevation 2,070 feet:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine and very fine roots; common very fine pores; 2 percent angular chert fragments less than 1 inch in diameter; slightly acid; abrupt smooth boundary.

B21t—8 to 18 inches; strong brown (7.5YR 5/8) silty clay; 15 percent yellowish brown (10YR 4/4) A horizon material; moderate fine subangular blocky structure; friable, sticky, plastic; few fine and common very fine roots; common very fine pores; thin continuous yellowish red (5YR 5/6) clay films; common patchy oxide stains; medium acid; clear wavy boundary.

B22t—18 to 24 inches; yellowish red (5YR 5/8) clay; few fine prominent brownish yellow (10YR 6/8) mottles; moderate very fine subangular blocky structure; friable, sticky, plastic; common very fine roots; common very fine pores; thin continuous yellowish red (5YR 5/6) clay films; strongly acid; clear wavy boundary.

B23t—24 to 34 inches; strong brown (7.5YR 5/8) clay; common medium distinct yellowish brown (10YR 5/8) mottles; strong fine angular blocky structure; friable, sticky, plastic; many very fine pores; thin continuous yellowish red (5YR 5/6) clay films; very strongly acid; abrupt wavy boundary.

B31t—34 to 48 inches; brownish yellow (10YR 6/8), yellowish red (5YR 5/8), and red (2.5YR 5/8) silty clay loam; weak medium platy structure parting to moderate very fine subangular blocky; friable, sticky, slightly plastic; common fine pores; thin patchy yellowish red (5YR 5/6) clay films; 10 percent reddish yellow (7.5YR 6/8) highly weathered shale that crushes to a silty clay loam; strongly acid; gradual smooth boundary.

B32t—48 to 62 inches; 30 percent yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), and yellowish red (5YR 5/8) silty clay loam; weak thin platy structure; friable, sticky, slightly plastic; few fine and common very fine pores; thin patchy yellowish red (5YR 5/8) clay films; 30 percent highly weathered olive yellow (2.5Y 6/6) shale that crushes to a silty clay loam; strongly acid; abrupt smooth boundary.

C—62 to 67 inches; brownish yellow (10YR 6/8) silty clay loam; massive; friable, sticky, slightly plastic; few fine and common very fine pores; thin patchy yellowish red (5YR 5/8) clay films along old bedding planes and shale seams; strongly acid; abrupt smooth boundary.

R—67 inches; hard gray argillaceous limestone.

The solum thickness is 40 to 60 inches. The depth to bedrock is more than 48 inches. Individual horizons contain from 0 to 30 percent semirounded and angular chert, shale, sandstone, or dolomite fragments. Reaction of the upper horizons mainly ranges from strongly acid to neutral. Reaction of the lower horizons ranges from very strongly acid or strongly acid. Reaction varies in the surface layer and upper part of the subsoil because of liming practices. Some pedons have lithologic discontinuities below a depth of 17 inches.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or loam.

The B1 horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 6 to 8. It ranges from silt loam to clay loam.

The B2 horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 6 to 8. It is clay, clay loam, or silty clay.

The B3 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. It is clay, silty clay, or silty clay loam. Mottles are few to common.

The C horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 6 to 8. It ranges from clay to silt loam.

Klinesville Series

The soils of the Klinesville series are 10 to 20 inches deep to bedrock and do not have a seasonal high water table. The soils formed in the weathered products of shale and siltstone. Klinesville soils are on tops and sideslopes of ridges. Slopes range from 7 to 65 percent.

Klinesville soils in this survey area are mapped with Berks soils but are redder than and not as deep to bedrock as Berks soils.

Typical pedon of Klinesville shaly silt loam, in an area of Klinesville-Berks shaly silt loams, 7 to 15 percent slopes, 1/4 mile northeast of McAdam and 500 yards southeast of Possum Hollow, elevation 2,120 feet:

O1&O2—2 inches to 0; fresh leaf litter; partially decomposed oak and maple leaves and twigs; abrupt smooth boundary.

A1—0 to 2 inches; dark reddish brown (5YR 3/2) shaly silt loam; weak fine granular structure; very friable, nonsticky, nonplastic; many very fine pores; many fine and medium roots; 35 percent shale fragments less than 1 inch in diameter; very strongly acid; abrupt smooth boundary.

B2—2 to 7 inches; reddish brown (5YR 4/4) shaly silt loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; many very fine pores; common fine and medium roots; 35 percent shale fragments less than 1 inch in diameter; very strongly acid; clear smooth boundary.

B3—7 to 14 inches; reddish brown (5YR 5/4) very shaly silt loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; common very fine pores; few fine and medium roots; 60 percent shale fragments less than 3 inches in diameter; very strongly acid; clear smooth boundary.

R—14 inches; reddish brown (2.5YR 4/4) shale.

The solum thickness and depth to bedrock are 10 to 18 inches. Angular shale fragments 1/2 inch to 2 inches in diameter make up 20 to 40 percent of the A horizon, 35 to 70 percent of the B horizon, and 45 to 80 percent of the C horizon. Reaction is very strongly acid to medium acid.

A horizon has hue of 5YR, value of 3 or 4, and chroma of 2 or 3. It is shaly silt loam or very shaly silt loam.

The B horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 3 or 4. It is shaly silt loam or very shaly silt loam.

Some pedons have a C horizon that has hue of 5YR or 2.5YR, value of 3 or 4, and chroma of 3 or 4. It is very shaly silt loam or shaly silt loam.

Leck Kill Series

The soils of the Leck Kill series are more than 40 inches deep to bedrock and do not have a seasonal high water within 6 feet of the surface. The soils formed in the weathered products of interbedded shale, sandstone, and siltstone. Leck Kill soils are on upland ridgetops and side slopes. Slopes range from 7 to 30 percent.

Leck Kill soils in this survey area are mapped with Rayne soils but are redder throughout than Rayne soils.

Typical pedon of Leck Kill silt loam, in an area of Leck Kill-Rayne silt loams, 15 to 30 percent slopes, 4/5 mile north of the end of VA 637, 1-1/4 mile north of Back Creek, elevation 2,170 feet:

A1—0 to 4 inches; dark reddish gray (5YR 4/2) silt loam; moderate fine granular structure; friable, slightly sticky, nonplastic; many fine and very fine roots; many very fine pores; 5 percent angular shale fragments less than 2 inches in diameter; very strongly acid; clear smooth boundary.

B1t—4 to 8 inches; reddish brown (5YR 4/4) silt loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and very fine roots; common very fine pores; 5 percent angular shale fragments less than 2 inches in diameter; very strongly acid; clear wavy boundary.

B2t—8 to 14 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm, sticky, slightly plastic; few very fine roots; common very fine pores; thick patchy reddish brown (5YR 5/4) clay films; 5 percent angular shale fragments less than 3 inches in diameter; very strongly acid; clear wavy boundary.

B3t—14 to 31 inches; red (2.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable, sticky, slightly plastic; few very fine roots; common fine pores; thick patchy reddish brown (5YR 5/4) clay films; 10 percent angular shale fragments less than 3 inches in diameter; very strongly acid; clear wavy boundary.

C—31 to 60 inches; red (2.5YR 4/6) shaly silty clay loam; massive; friable, slightly sticky, slightly plastic; few fine pores; 25 percent weathered shale fragments less than 3 inches in diameter; very strongly acid.

The solum thickness is 24 to 48 inches. The depth to bedrock is more than 40 inches. Angular shale fragments make up as much as 20 percent of the solum and 60 percent of the substratum. Reaction of the solum mainly is strongly or very strongly acid but is less acid in some limed areas.

The A horizon has hue of 5YR, value of 4, and chroma of 2 to 4. It is silt loam or shaly silt loam.

The B1 horizon has hue of 5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or shaly silt loam.

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

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

Lily Series

The soils of the Lily series are 20 to 40 inches deep to bedrock and do not have a seasonal high water table. The soils formed in the weathered products of sandstone on mountain side slopes and ridgetops. Slopes range from 7 to 65 percent.

Lily soils in this survey area are mapped only with Gilpin or Ramsey soils. The Lily soils contain more sand than the Gilpin soils and are deeper to bedrock than the Ramsey soils.

Typical pedon of Lily sandy loam, in an area of Lily-Ramsey very stony sandy loams, 35 to 65 percent slopes, 1/3 mile east of the intersection of Big Mack and Little Mack Creeks, 300 yards north of Route 655, elevation 2,300 feet:

O1&O2—3 inches to 0; fresh leaf litter; partially decomposed needles, leaves, and twigs; abrupt smooth boundary.

A1—0 to 3 inches; dark brown (10YR 4/3) sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine and medium roots; 10 percent sandstone fragments less than 2 inches in diameter; 5 percent sandstone fragments more than 10 inches in diameter; very strongly acid; abrupt wavy boundary.

B1t—3 to 8 inches; yellowish brown (10YR 5/4) gravelly loam; weak fine subangular blocky structure; friable, nonsticky, nonplastic; common fine and medium roots; thin patchy yellowish brown (10YR 5/6) clay films; 20 percent sandstone fragments less than 2

inches in diameter; very strongly acid; clear wavy boundary.
B2t—8 to 22 inches; yellowish brown (10YR 5/6) gravelly loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; thin patchy yellowish brown (10YR 5/6) clay films; 20 percent sandstone fragments less than 2 inches diameter; very strongly acid; clear wavy boundary.
B3t—22 to 34 inches; dark yellowish brown (10YR 4/6) gravelly loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; thin patchy dark yellowish brown (10YR 4/6) clay films; 35 percent sandstone fragments less than 3 inches in diameter; very strongly acid; abrupt wavy boundary.
R—34 inches; sandstone bedrock.

The solum thickness and depth to bedrock range from 20 to 40 inches. Angular sandstone fragments make up 0 to 15 percent of the A and B1 horizons, 0 to 25 percent of the B2 horizon, and 20 to 35 percent of the B3 and C horizons. Reaction is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam or loam.

The B1 horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam or sandy loam or their gravelly analogs.

The B2 horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam or their gravelly analogs.

The B3 horizon has hue of 10YR, value of 4 or 5, and chroma of 6. It is gravelly loam or gravelly sandy clay loam.

Some pedons have a C horizon that has the same hue, value, chroma, and texture as the B3 horizon.

Lindside Series

The soils of the Lindside series are at least 60 inches deep to bedrock and have a seasonal high water table at a depth of 18 to 36 inches from December through April. The soils formed in alluvium from limestone, sandstone, and shale. The soils are on flood plains and in drainageways in the limestone valley. Slopes range from 0 to 2 percent.

Lindside soils are commonly near Carbo, Frederick, Lowell, Nolin, and Poplimento soils but are more poorly drained than any of those soils.

Typical pedon of Lindside silt loam, in an area of Lindside-Nolin silt loams, 2/3 mile northwest of the intersection of Routes 11 and 747, 1/2 mile west of race track, elevation of 1,900 feet:

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine granular structure; friable, slightly sticky, slightly plastic; many very fine roots; neutral abrupt smooth boundary.
B1—10 to 15 inches; 60 percent yellowish brown (10YR 5/4), 30 percent pale brown (10YR 6/3), and 10 percent very pale brown (10YR 7/3) silt loam; weak medium platy structure parting to weak very fine subangular blocky; friable, slightly sticky, slightly plastic; common very fine roots; few stains; few lenses of sandy material; neutral; abrupt smooth boundary.
B21—15 to 24 inches; 50 percent yellowish brown (10YR 5/4), 30 percent pale brown (10YR 6/3), and 20 percent light gray (10YR 7/2) silty clay loam; moderate very fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common stains on ped faces; neutral; clear smooth boundary.
B22—24 to 38 inches; 80 percent brown (10YR 5/3) and 20 percent grayish brown (10YR 5/2) silt loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many stains on ped faces; slightly acid; clear smooth boundary.
C—38 to 60 inches; grayish brown (10YR 5/2) silt loam; few fine distinct yellowish brown (10YR 5/4) mottles; massive; friable, slightly sticky, slightly plastic; few thin lenses of loam material; few stains; neutral.

The solum thickness is 30 to 50 inches. The depth to bedrock is more than 60 inches. Rounded and semirounded chert and sandstone fragments 1/4 inch to 2 inches in diameter make up 0 to 15 percent of the solum and 0 to 25 percent of the C horizon. Reaction is medium acid to mildly alkaline.

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

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma mainly of 3 to 6; chroma of 2 is in some pedons. The B horizon is dominantly silt loam, but some subhorizons are silty clay loam or clay loam.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 6. It is silt loam, loam, or silty clay loam.

Lodi Series

The soils in the Lodi series are more than 60 inches deep to bedrock and do not have a seasonal high water table within 6 feet of the surface. The soils formed in the weathered products of interbedded dolomite, sandstone, and shale. The Lodi soils are on upland side slopes and ridgetops. Slopes range from 2 to 30 percent.

Lodi soils are commonly near Carbo, Frederick, Groseclose, and Poplimento soils. The Lodi soils are deeper to bedrock than the Carbo soils, have less clay in the lower part of the profile than the Frederick soils, and contain more sand and less silt than the Poplimento or Groseclose soils.

Typical pedon of Lodi loam, 7 to 15 percent slopes, between the east end of the New River Valley airport and VA 617, east-southeast from the end of the runway, elevation 2,080 feet:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) loam; weak very fine granular structure; very friable, slightly sticky, nonplastic; common very fine roots; common very fine pores; 10 percent angular chert and sandstone fragments less than 2 inches in diameter; slightly acid; abrupt smooth boundary.

B1t—8 to 12 inches; yellowish brown (10YR 5/6) loam; few fine distinct strong brown (7.5YR 5/8) mottles; weak fine angular blocky structure; friable, slightly sticky, and nonplastic; common very fine roots; common very fine pores; patchy brownish yellow (10YR 6/6) clay films; 3 percent angular weathered sandstone fragments 1/4 inch in diameter; neutral; clear wavy boundary.

B21t—12 to 27 inches; strong brown (7.5YR 5/8) clay; few fine distinct yellowish red (5YR 5/8) mottles; moderate fine and very fine subangular blocky structure; firm, sticky, plastic; few very fine roots; common very fine pores; continuous light red (2.5YR 6/8) clay films; medium acid; abrupt wavy boundary.

B22t—27 to 40 inches; strong brown (7.5YR 5/8) clay; few fine distinct reddish yellow (7.5YR 6/8) mottles; strong fine subangular blocky structure; firm, sticky, plastic; few very fine roots; few very fine pores; thick continuous yellowish red (5YR 5/8) clay films; thin bands of weathered chert; strongly acid; clear wavy boundary.

B31t—40 to 55 inches; strong brown (7.5YR 5/8) clay loam; moderate fine subangular blocky structure; firm, sticky, slightly plastic; few very fine roots; few very fine pores; thick continuous strong brown (7.5YR 5/6) clay films; 40 percent yellow (10YR 7/8) highly weathered siltstone; strongly acid; gradual smooth boundary.

B32t—55 to 65 inches; strong brown (7.5YR 5/8) clay loam; moderate fine subangular blocky structure; firm, sticky, slightly plastic; common fine pores; thick continuous yellowish red (5YR 5/6) clay films; 35 percent brownish yellow (10YR 6/8) highly weathered siltstone; 1/2 inch thick weathered sandstone seam in upper part of horizon; strongly acid.

The solum is 40 inches thick or more, and the depth to bedrock is more than 60 inches. Angular chert and sandstone fragments up to 6 inches in diameter are throughout the solum. The fragments make up as much as 60 percent of the volume of A horizon and as much as 25 percent of B horizon. The fragment content decreases with depth. Reaction of the solum in unlimed areas is strongly acid or very strongly acid.

The Ap horizon has hue of 10YR and value and chroma of 4 or 5. Some pedons have A1 and A2 horizons. The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 4. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 4. The A horizon is loam, silt loam, or fine sandy loam.

The B1 horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, silt loam, clay loam, or sandy clay loam.

The B2 horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 6 to 8. It is clay or clay loam.

The B3 horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 6 to 8. It is clay, clay loam, or sandy clay loam.

Some pedons have a C horizon that has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 to 8. It ranges from clay loam and sandy clay loam to fine sandy loam.

Lowell Series

The soils in the Lowell series are more than 40 inches deep to bedrock and do not have a seasonal high water table. The soils formed in the weathered products of interbedded limestone and shale. They are on upland side slopes and ridgetops. Slopes range from 2 to 30 percent.

Lowell soils commonly are near Carbo, Wurno, Newbern, Faywood, and Groseclose, and Poplimento soils. The Lowell soils are deeper to bedrock than the Carbo, Wurno, Newbern, or Faywood soils and have a thinner solum than the Groseclose or Poplimento soils.

Typical pedon of Lowell silt loam, 7 to 15 percent slopes, 0.8 mile south of U.S. 11 on Route 807, 200 yards west, elevation 2,110 feet:

Ap—0 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine roots; common very fine pores; few dark reddish brown (2.5YR 5/4) weathered bodies; 2 percent semirounded sandstone and shale fragments less than 1/2 inch in diameter; medium acid; abrupt smooth boundary.

B21t—11 to 18 inches; strong brown (7.5YR 5/8) silty clay loam; common fine distinct brownish yellow (10YR 6/6) mottles; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; many very fine pores; thin patchy strong brown (7.5YR 5/6) clay films; few fine light yellowish brown (10YR 6/4) skeletans; few patchy oxide stains; slightly acid; clear wavy boundary.

B22t—18 to 28 inches; strong brown (7.5YR 5/8) clay; strong fine subangular blocky structure; firm, sticky, plastic; common fine roots; many very fine pores; thick continuous strong brown (7.5YR 5/6) clay films; common patchy oxide stains; slightly acid; clear wavy boundary.

B3—28 to 38 inches; reddish yellow (7.5YR 6/8) silty clay; weak medium subangular blocky structure; friable, sticky, slightly plastic; few fine roots; many very fine pores; thick continuous strong brown (7.5YR 5/6) clay films; common patchy oxide stains; two 1 inch thick shale seams crushing to silty clay loam; slightly acid; abrupt wavy boundary.

C—38 to 60 inches; weathered brownish yellow (10YR 6/8) shale crushing to silty clay loam; massive rock-controlled structure; very firm, slightly sticky, slightly plastic when crushed; two 1 inch thick seams of silty clay; slightly acid; clear smooth boundary.

The solum thickness is 30 to 50 inches. Limestone and shale bedrock are at a depth of 40 inches or more. The upper part of the profile ranges from very strongly acid through slightly acid. The lower part of the profile ranges from strongly acid through mildly alkaline. Coarse fragments make up as much as 15 percent of the control section.

The Ap horizon has a hue of 10YR, value of 4, and chroma of 2 to 4.

Some pedons have a B1 horizon. It has hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. It is silt loam, silty clay loam, or clay loam.

The B2 horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 to 8. It is silty clay loam or clay. The clay content is 45 to 60 percent in the control section.

The B3 horizon has hue of 7.5YR and 10YR, value of 5 or 6, and chroma of 6 to 8. It is silty clay or silty clay loam.

The C horizon has hue of 7.5YR and 10YR, value of 5 or 6, and chroma of 6 or 8. It ranges from silty clay loam and clay loam to silty clay.

Monongahela Series

The soils in the Monongahela series are at least 60 inches deep to bedrock and have a seasonal high water table 18 to 36 inches below the surface. The soils formed in weathered colluvium from shale, siltstone, and sandstone. They are on concave side slopes, at the heads of drainageways, and on foot slopes. Slopes range from 7 to 25 percent.

Monongahela soils commonly are near Berks, Gilpin, and Klinesville soils but are deeper to bedrock than those soils.

Typical pedon of Monongahela silt loam, 7 to 15 percent slopes, 150 yards east of State Route 100 and 150 yards south of Route 654, elevation 2,080 feet:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable, slightly sticky, nonplastic; many very fine roots; common very fine pores; 10 percent rounded shale fragments less than 1/2 inch in diameter; slightly acid; clear wavy boundary.

B1t—7 to 16 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and very fine subangular blocky structure; friable, slightly sticky, nonplastic; common very fine roots; many very fine pores; thin patchy coatings; 12 percent rounded shale fragments less than 1/2 inch in diameter; medium acid; clear irregular boundary.

B21t—16 to 23 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many very fine pores; thin patchy dark yellowish brown (10YR 4/4) clay films; 12 percent rounded shale fragments less than 1/2 inch in diameter; strongly acid; clear irregular boundary.

Bx—23 to 46 inches; yellowish brown (10YR 5/4) gravelly silt loam; common fine faint brown (10YR 5/3) mottles; moderate fine and very fine subangular blocky structure; firm, slightly sticky, slightly plastic; many very fine and fine pores; thin continuous brown (7.5YR 4/4) clay films; 20 percent rounded shale fragments less than 1/2 inch in diameter; 70 percent brittleness by volume; very strongly acid; clear wavy boundary.

B23t—46 to 60 inches; yellowish brown (10YR 5/4) silt loam; common fine faint brown (10YR 5/3) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; many fine and very fine pores; thin continuous brown (7.5YR 4/4) clay films; 10 percent rounded shale fragments less than 1/2 inch in diameter; very strongly acid.

The solum thickness and depth to bedrock are more than 60 inches. Reaction in the solum of unlimed areas is strongly acid or very strongly acid. Semirounded and rounded shale and sandstone fragments make up 5 to 15 percent of the A and Bt horizons and 10 to 25 percent of the Bx horizon.

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

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is silt loam or silty clay loam.

The hue, value, chroma, and texture of the Bx horizon are similar to those of the Bt horizon, but the chroma of the Bx horizon is 2 to 8.

The Monongahela soils in this survey area are taxadjuncts to the Monongahela series because they have an argillic horizon beneath the fragipan. This difference does not significantly affect the use and management of the soils.

Newark Variant

Newark Variant soils are at least 60 inches deep to bedrock and have a seasonal high water table at a depth of 12 to 20 inches. The soils formed in alluvium and colluvium from siltstone, shale, and limestone and are on

low terraces along drainageways. Slopes range from 0 to 2 percent.

Newark Variant soils commonly are near Dunning, Frederick, Lowell, and Poplimento soils. The Newark Variant soils are better drained than the Dunning soils and are more poorly drained than the Frederick, Lowell, or Poplimento soils.

Typical pedon of Newark Variant silt loam, about 3/5 mile northwest of the intersection of VA 643 and VA 639, about 1/3 mile northwest of Thorne Springs Church, 70 feet south of Thorne Springs, elevation 2,050 feet:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; light gray (10YR 7/2) dry; common fine distinct dark yellowish brown (10YR 4/6) mottles; moderate very fine subangular blocky structure; friable, slightly sticky, nonplastic; common very fine roots; common very fine pores; 2 percent semirounded sandstone and chert fragments less than 1/2 inch in diameter; slightly acid; clear smooth boundary.

A12—10 to 15 inches; pale brown (10YR 6/3) silt loam; common fine faint light grayish brown (10YR 6/2) mottles and few fine distinct strong brown (7.5YR 5/6) mottles; moderate very fine subangular blocky structure; friable, slightly sticky, nonplastic; common very fine roots; common fine and many very fine pores; many fine prominent dark yellowish brown (10YR 4/6) coatings on ped faces; 2 percent semirounded sandstone and chert fragments less than 1/2 inch in diameter; slightly acid; abrupt smooth boundary.

A3—15 to 21 inches; light yellowish brown (10YR 6/4) silt loam; many fine prominent pale brown (10YR 6/3) mottles and many fine prominant gray (10YR 6/1) mottles; moderate very fine subangular blocky structure; friable, slightly sticky, nonplastic; few very fine roots; common fine and many very fine pores; 2 percent semirounded sandstone and chert fragments less than 1/2 inch in diameter; slightly acid; clear wavy boundary.

B21t—21 to 30 inches; 60 percent yellowish brown (10YR 5/8) and 40 percent light yellowish brown (10YR 6/4) silt loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; 40 percent brittle; few very fine roots; many very fine pores; thin patchy yellowish brown (10YR 5/6) clay films; 5 percent rounded sandstone fragments less than 1 inch in diameter; slightly acid; clear wavy boundary.

B22t—30 to 42 inches; 60 percent strong brown (7.5YR 5/8) and 40 percent light yellowish brown (10YR 6/4) silty clay loam; moderate fine subangular blocky structure; friable, sticky, slightly plastic; 40 percent brittle; few very fine roots; common very fine pores; thin patchy strong brown (7.5YR 5/6) clay films; 15 percent rounded sandstone and quartzite fragments less than 1 inch in diameter; common grayish brown (10YR 5/2) pockets; neutral; clear irregular boundary.

IIB3—42 to 49 inches; yellowish brown (10YR 5/8) very gravelly clay loam; few fine prominent light brownish gray (2.5Y 6/2) mottles; weak fine subangular blocky structure; friable, sticky, slightly plastic; few very fine roots; few dark oxide stains; 50 percent rounded sandstone and quartzite fragments less than 2 inches in diameter; mildly alkaline; clear broken boundary.

IICg—49 to 56 inches; gray (10YR 6/1) very gravelly clay; common fine distinct very pale brown (10YR 7/3) mottles; massive; firm, very sticky, plastic; 60 percent semirounded chert and quartzite fragments of which 60 percent are less than 3 inches in diameter and 40 percent are 3 to 6 inches in diameter; mildly alkaline; abrupt smooth boundary.

IIICg—56 to 63 inches; gray (10YR 6/1) clay; massive; firm, very sticky, plastic; 5 percent semirounded chert fragments less than 1 inch in diameter; mildly alkaline.

The solum thickness is at least 40 inches. The depth to bedrock is more than 5 feet. Angular and semirounded chert and sandstone fragments 1/4 inch to 3 inches in diameter make up 0 to 15 percent of the A horizon and 5 to 60 percent of the Bt and C horizons. Cobblestones make up 0 to 10 percent of the IIB and IIC horizons. The solum ranges from mildly alkaline to medium acid.

The A horizon has hue mainly of 10YR or 7.5YR or 2.5Y in some pedons, value of 3 to 6, and chroma of 3 to 6.

The B horizon has hue mainly of 10YR or 7.5YR or 2.5YR in some pedons, value of 3 to 6, and chroma of 1 to 8. It is silt loam, silty clay loam, gravelly clay loam, or very gravelly clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 to 8. It is silty clay loam, clay loam, gravelly clay loam, clay, or very gravelly clay.

Newbern Series

The soils of the Newbern series are 10 to 20 inches deep to bedrock and do not have a seasonal high water table. They formed in the weathered products of shale interbedded with thin beds of limestone. Newbern soils are on uplands on smooth ridgetops and side slopes. Slopes range from 7 to 45 percent.

Newbern soils commonly are near Lowell soils and in this survey area are mapped only with Carbo, Faywood, and Wurno soils. The Newbern soils have less clay in the subsoil than the Carbo, Faywood, or Lowell soils and are not as deep to bedrock as the Wurno soils.

Typical pedon of Newbern silt loam, in an area of Wurno-Newbern-Faywood silt loams, 7 to 15 percent

slopes, 3/8 mile west of the intersection of U.S. 11 and VA 645, 4/5 mile northeast of Jordans Chapel; elevation 2,080 feet:

Ap—0 to 5 inches; yellowish brown (10YR 5/4) silt loam; moderate fine granular structure; very friable, nonsticky, nonplastic; common fine roots; few fine pores; semirounded sandstone and angular shale fragments less than 1 inch in diameter; neutral; clear smooth boundary.

B—5 to 13 inches; brownish yellow (10YR 6/6) shaly silt loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; few fine pores; 25 percent angular shale fragments less than 1 inch in diameter; neutral; abrupt wavy boundary.

Cr—13 to 18 inches; brownish yellow (10YR 6/8) partially weathered shale and some brownish yellow (10YR 6/8) silt loam in fractured cracks and crevices; neutral; abrupt smooth boundary.

R—18 inches; shale.

The solum is 10 to 17 inches thick. The depth to bedrock is 10 to 20 inches. The volume of shale fragments is variable in individual horizons but averages less than 35 percent in the control section. The shale fragment content generally increases with depth. The solum ranges from neutral to slightly acid. The substratum is neutral or mildly alkaline.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam or silt loam or their shaly analogs. Yellow or brown mottles are in some pedons.

The Cr horizon has hue of 10YR, value of 5 or 6, and chroma of 6 to 8. It is mostly weathered shale and silt loam in the interstices.

Nolichucky Series

The soils of the Nolichucky series are more than 60 inches deep to bedrock and do not have a seasonal high water table within 6 feet of the surface. They formed in colluvium from sandstone on side slopes, toe slopes, and foot slopes. Slopes are 7 to 65 percent.

Nolichucky soils commonly are near Berks, Gilpin, and Lily soils but are deeper to bedrock than those soils.

Typical pedon of Nolichucky very gravelly sandy loam, in an area of Nolichucky very stony sandy loam, 30 to 65 percent slopes, on the east end of Draper Mountain, 1/2 mile east of Peaks Knob lookout tower and 1 mile southwest of the intersection of Rts. 672 and 100, elevation 2,500 feet:

A1—0 to 7 inches; brown (10YR 4/3) very gravelly sandy loam; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; many fine and common medium roots; many fine pores; 60 percent hematitic sandstone and chert fragments less than 3 inches in diameter; 20 percent sandstone fragments more than 10 inches in diameter; very strongly acid; clear smooth boundary.

A2—7 to 16 inches; yellowish brown (10YR 5/4) sandy loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; common fine and medium and few coarse roots; many very fine and few medium pores; 10 percent hematitic sandstone and chert fragments less than 3 inches in diameter; very strongly acid; clear wavy boundary.

B1—16 to 29 inches; yellowish brown (10YR 5/4) gravelly loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine and few medium roots; common medium and common fine pores; few very pale brown (10YR 7/3) skeletans; 25 percent hematitic sandstone and chert fragments less than 3 inches in diameter; very strongly acid; gradual wavy boundary.

B21t—29 to 43 inches; yellowish brown (10YR 5/6) loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy yellowish brown (10YR 5/6) clay films; very strongly acid; gradual wavy boundary.

IIB22t—43 to 52 inches; strong brown (7.5YR 5/8) clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy strong brown (7.5YR 5/8) clay films; very strongly acid; clear wavy boundary.

IIB23t—52 to 60 inches; yellowish red (5YR 5/8) clay loam; moderate fine subangular blocky structure; friable, sticky, slightly plastic; thin continuous strong brown (7.5YR 5/6) clay films; very strongly acid.

The solum thickness and depth to bedrock are more than 60 inches. Angular and semirounded chert and sandstone fragments less than 3 inches in diameter make up as much as 70 percent of individual horizons above the discontinuity and up to 15 percent below the discontinuity. The solum in unlimed areas is strongly or very strongly acid.

The A1 horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. The A2 horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 8. Some pedons have an Ap horizon that has the same color range as the A2 horizon. The A horizon ranges from sandy loam to loam.

The B horizon has hue of 10YR to 5YR; hue of 5YR is restricted to the lower part. Value is 5 or 6, and chroma is 4 to 8. The B horizon is loam, sandy clay loam, or clay loam. Gravelly and sandy phases are in the upper part, and sand and gravel content decreases with depth.

The Nolichucky soils in this survey area are taxadjuncts to the Nolichucky series because they have hue of 10YR in the upper part of the B horizon above a

discontinuity at a depth of 43 inches. This difference does not significantly affect the use and management of the soils.

Nolin Series

The soils in the Nolin series are more than 60 inches deep to bedrock. They have a seasonal high water table at a depth of 48 to 72 inches during February and March. They formed in alluvium from limestone, sandstone, and shale. The soils are in the limestone valley on flood plains and in drainageways. Slopes range from 0 to 2 percent.

Nolin soils commonly are near Carbo, Frederick, Groseclose, Lowell, and Poplimento soils and are mapped only with Lindside soils. The Nolin soils have less clay in the subsoil than any of those soils and are better drained than the Lindside soils.

Typical pedon of Nolin silt loam, in an area of Lindside-Nolin silt loams, 150 feet west of Route 628 and 100 yards east of Casper Branch, elevation 1,990 feet:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable, slightly sticky, slightly plastic; many very fine and fine roots; few fine and very fine pores; neutral; clear wavy boundary.

B1—7 to 12 inches; brown (10YR 4/3) silt loam; moderate very fine subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine and fine roots; few fine and very fine pores; thick patchy very dark grayish brown (10YR 3/2) silt coatings; neutral; abrupt wavy boundary.

B21—12 to 20 inches; dark brown (10YR 3/3) silt loam; moderate very fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine pores; thick continuous very dark grayish brown (10YR 3/2) silt coatings; neutral; clear wavy boundary.

B22—20 to 30 inches; dark brown (10YR 4/3) silt loam; moderate very fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine and fine roots; few very fine pores; thick continuous very dark grayish brown (10YR 3/2) silt coatings; slightly acid; clear wavy boundary.

B23—30 to 38 inches; dark brown (10YR 3/3) silt loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many very fine and fine pores; thin continuous very dark grayish brown (10YR 3/2) silt coatings; slightly acid; clear wavy boundary.

C—38 to 60 inches; dark yellowish brown (10YR 4/4) silty clay loam; massive; firm, slightly sticky, slightly plastic; common very fine pores; thin patchy very dark grayish brown (10YR 3/2) silt coatings; few dark oxide stains; slightly acid.

The solum thickness is 28 to 56 inches. The depth to bedrock is more than 60 inches. The soil ranges from medium acid to mildly alkaline. Some pedons have a buried A horizon at a depth of 12 to 30 inches, and some pedons have gray mottles at a depth of more than 24 inches.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 3.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, silty clay loam, or loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is clay loam, silty clay loam, sandy clay loam, or their gravelly or very gravelly analogs.

The Nolin soils in this survey area are taxadjuncts to the Nolin series because they have a thinner solum than is defined for the series. This difference does not significantly affect the use and management of the soils.

Poplimento Series

The soils of the Poplimento series are more than 48 inches deep to bedrock and do not have a seasonal high water table within 6 feet of the surface. They formed in the weathered products of shale and limestone. Poplimento soils are on upland side slopes and ridgetops. Slopes range from 2 to 30 percent.

Poplimento soils commonly are near Carbo, Frederick, and Lowell soils and are mapped only with Groseclose soils. The Poplimento soils have less clay in the control section than the Carbo soils, have more silt and less clay in the lower part of the profile than the Frederick soils, have a thicker solum than the Lowell soils, and have a higher base saturation than the Groseclose soils.

Typical pedon of Poplimento silt loam, in an area of Groseclose and Poplimento silt loams, 7 to 15 percent slopes, 1/4 mile southeast of U.S. 11 on VA 807, 500 feet northeast of VA 807, in a hayfield, elevation 2,040 feet:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine roots; 5 percent semirounded chert and sandstone fragments less than 1/2 inch in diameter; neutral; clear smooth boundary.

B1—7 to 14 inches; strong brown (7.5YR 5/8) silt loam; moderate fine subangular blocky structure; friable, nonsticky, nonplastic; common fine roots; many fine very pale brown (10YR 7/4) skeletans; 5 percent semirounded chert and sandstone fragments less than 2 inches in diameter; slightly acid; clear wavy boundary.

B21—14 to 20 inches; yellowish brown (10YR 5/6) clay; moderate fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; common fine very pale brown (10YR 7/4) skeletans; thin

patchy strong brown (7.5YR 5/8) clay films; common streaks and stains; common weathered sandstone bodies; slightly acid; clear wavy boundary.

B22t—20 to 27 inches; strong brown (7.5YR 5/8) clay; moderate fine and medium subangular blocky structure; firm, sticky, plastic; few fine roots; very pale brown (10YR 7/4) skeletans; thin continuous strong brown (7.5YR 5/6) clay films; common streaks and stains; slightly acid; clear smooth boundary.

B23t—27 to 44 inches; reddish yellow (7.5YR 6/8) clay; moderate medium and coarse subangular blocky structure; firm, sticky, plastic; few fine roots; thin continuous strong brown (7.5YR 5/6) clay films; common streaks and stains; medium acid; abrupt smooth boundary.

C—44 to 70 inches; 60 percent reddish yellow (7.5YR 6/8), 30 percent strong brown (7.5YR 5/8), and 10 percent brownish yellow (10YR 6/8) silty clay loam; massive; friable, slightly sticky, nonplastic; few fine roots; 12 percent chert fragments; few very fine mica flakes; medium acid.

The solum thickness is 40 to 60 inches. The depth to bedrock is more than 48 inches. The Ap horizon is less than 10 percent fragments; the B1 and B2 horizons are 0 to 20 percent semirounded and angular fragments of shale, sandstone, dolomite, or chert; and the B3 and C horizons are 10 to 50 percent fragments. In unlimed areas the soil ranges from very strongly acid to medium acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or loam.

The B1 horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. It ranges from silty clay loam to silt loam.

The B2 horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 to 8. It ranges from clay to silty clay loam.

Some pedons have a B3 horizon with hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 or 8. It ranges from clay to shaly silty clay loam.

The C horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 to 8. In some pedons it has mottles of light olive brown and yellowish brown. The C horizon is silt loam or silty clay loam.

Some pedons have a Cr horizon at a depth or more than 50 inches.

Ramsey Series

The soils of the Ramsey series are 10 to 20 inches deep to bedrock and do not have a seasonal high water table. They formed in the weathered products of sandstone and quartzite. Ramsey soils are on mountain side slopes and ridgetops. Slopes ranges from 25 to 60 inches.

Ramsey soils commonly are near Lily and Nolichucky soils but are not as deep to bedrock.

Typical pedon of Ramsey gravelly sandy loam, in an area of Ramsey-Lily-Rock outcrop complex, 25 to 60 percent slopes, 1/2 mile west of Big Tan Trough Branch, 300 yards north of the Floyd-Pulaski County line, and 1/4 mile east of Big Laurel Creek, elevation 2,980 feet:

O1&O2—1 inch to 0; partially decomposed oak leaves and twigs.

A1—0 to 2 inches; dark brown (10YR 3/3) gravelly sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine and very fine roots; 35 percent angular sandstone fragments less than 3 inches in diameter; 3 to 5 percent fragments more than 10 inches in diameter; very strongly acid; abrupt wavy boundary.

B1—2 to 6 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; many fine and medium roots; 20 percent angular sandstone fragments less than 3 inches in diameter; very strongly acid; clear wavy boundary.

B2—6 to 12 inches; yellowish brown (10YR 5/8) loam; weak medium subangular blocky structure; very friable, slightly sticky, nonplastic; common fine and medium roots; 5 percent sandstone fragments less than 3 inches in diameter; very strongly acid; clear wavy boundary.

C—12 to 16 inches; yellowish brown (10YR 5/4) loam; massive; very friable, slightly sticky, nonplastic; 10 percent angular sandstone fragments less than 3 inches in diameter; very strongly acid; abrupt smooth boundary.

R—16 inches; sandstone.

The solum thickness and depth to bedrock are 10 to 20 inches. Angular sandstone and quartzite fragments less than 3 inches in diameter make up 15 to 35 percent of the A horizon, 5 to 20 percent of the B horizon, and 5 to 30 percent of the C horizon. Reaction is strongly or very strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 3. It is gravelly sandy loam or gravelly loam.

The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4, 6, or 8. It is loam, sandy loam, or their gravelly analogs.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8.

Rayne Series

The soils of the Rayne series are more than 40 inches deep to bedrock and do not have a seasonal high water table. They formed in the weathered residuum of brecciated interbedded shale on side slopes and

ridgetops in upland areas. Slopes range from 7 to 60 percent.

Rayne soils commonly are near Berks, Leck Kill, Lowell, Groseclose, Poplimento, and Monongahela soils. The Rayne soils have a thicker solum and contain more coarse fragments in the subsoil than the Lowell soils, contain less clay in the subsoil than the Poplimento or Groseclose soils, and are browner throughout than the Leck Kill soils. The Rayne soils do not have the fragipan typical of the Monongahela soils and are deeper to bedrock than the Berks soils.

Typical pedon of Rayne silt loam, 30 to 45 percent slopes, about 1.3 miles west of the intersection of VA Routes 100 and 654 and about 1/4 mile south of Route 654, and 500 feet west of stream, elevation 2,080 feet:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable, slightly sticky, slightly plastic; slightly acid; abrupt smooth boundary.

B1—7 to 18 inches; strong brown (7.5YR 5/6) loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; 10 percent green shale fragments less than 1 inch in diameter that crush easily to silt loam; few fine oxide stains; strongly acid; clear wavy boundary.

B21t—18 to 33 inches; strong brown (7.5YR 5/8) loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy strong brown (7.5YR 5/8) clay films; 15 percent shale fragments less than 1 inch in diameter that crush easily to silt loam; few fine oxide stains; strongly acid; gradual wavy boundary.

B3—33 to 46 inches; 40 percent strong brown (7.5YR 5/8), 30 percent strong brown (7.5YR 5/6), and 30 percent olive yellow (2.5Y 6/6) very shaly clay loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; 40 percent shale fragments less than 1 inch in diameter that crush easily to silt loam; few fine oxide stains; strongly acid; gradual wavy boundary.

C—46 to 60 inches; 40 percent strong brown (7.5YR 5/8) and 60 percent olive yellow (2.5Y 6/6) very shaly clay loam; massive; friable, slightly sticky, nonplastic; 45 percent shale fragments less than 1 inch in diameter that crush easily to silt loam; few fine oxide stains; strongly acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 40 inches. The soil in unlimed areas is strongly acid or very strongly acid. Highly weathered shale fragments less than 1 inch in diameter comprise 0 to 40 percent of the A and B2 horizons and 15 to 80 percent of B3 and C horizons; 0 to 20 percent of the coarse fragments throughout the profile are hard.

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

The B1 horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is silt loam or clay loam.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is clay loam, loam, or silty clay loam.

The B3 horizon has hue of 7.5YR and 10YR, value of 4 to 6, and chroma of 6 to 8. It is clay loam or silty clay loam.

The C horizon has hue of 7.5YR to 2.5YR, value of 5 or 6, and chroma of 4 to 8. It is clay loam or loam.

Sherando Series

The soils of the Sherando series are more than 60 inches to bedrock and do not have a seasonal high water table within 6 feet of the surface. These soils formed in the alluvial and colluvial materials washed from soils underlain by sandstone, shale, and quartzite. The Sherando soils are on concave side slopes and along drainageways in V-shaped valleys. Slopes range from 0 to 15 percent and from 30 to 65 percent.

Sherando soils commonly are near Berks, Gilpin, Lily, and Ramsey soils but are deeper to bedrock than those soils.

Typical pedon of Sherando gravelly sandy loam, 0 to 15 percent slopes, 1/2 mile northeast of the intersection of Bark Camp Branch and Big Macks Creek, between Locust Thicket and Dead Pine Mountains, elevation 2,180 feet:

O1&O2—4 inches to 0; partially decomposed leaves, twigs, and needles.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine and medium roots; 15 percent sandstone fragments less than 2 inches in diameter, 3 percent sandstone fragments more than 10 inches in diameter; very strongly acid; abrupt smooth boundary.

B1—4 to 11 inches; yellowish brown (10YR 5/6) very gravelly sandy loam; weak fine subangular blocky structure; friable, nonsticky, nonplastic; many fine and medium roots; 40 percent sandstone pebbles and cobblestones; very strongly acid; clear wavy boundary.

B2—11 to 37 inches; strong brown (7.5YR 5/8) very cobbly sandy loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; common fine and medium roots; 40 percent sandstone pebbles and cobblestones; very strongly acid; clear wavy boudary.

C—37 to 60 inches; strong brown (7.5YR 5/6) very cobbly sandy loam; massive; friable, slightly sticky, nonplastic; few fine roots; 45 percent sandstone cobblestones; very strongly acid.

The solum thickness ranges from 30 to 60 inches, and the depth to bedrock is more than 60 inches. The solum is strongly acid or very strongly acid. Angular shale fragments or rounded sandstone and quartzite fragments make up 10 to 20 percent of the A horizon, 35 to 60 percent of the B horizon, and 40 to 60 percent of the C horizon. Stones cover from 0 to at least 50 percent of the surface area.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4. It dominantly is gravelly sandy loam and is sandy loam or their stony and rubbly analogs.

The B horizon has hue of 10YR and 7.5YR, value of 5 or 6, and chroma of 6 or 8. It dominantly is very gravelly, very cobbly, or very flaggy sandy loam.

The C horizon has hue of 7.5YR, value of 5, and chroma of 4 to 8. It is very gravelly, very cobbly, or very flaggy sandy loam.

Slabtown Series

The soils of the Slabtown series are more than 60 inches deep to bedrock and have a seasonal high water table at a depth of 18 to 36 inches. The soils formed in the weathered products of mixed colluvium over limestone residuum. Slabtown soils are on concave toe slopes and concave foot slopes and at the heads of drainageways. Slopes range from 2 to 15 percent.

Slabtown soils commonly are near Faywood, Groseclose, Lowell, Newbern, Poplimento, and Wurno soils. Slabtown soils are deeper to bedrock than the Faywood, Newbern, or Wurno soils and have less clay in the control section than the Groseclose, Lowell, or Poplimento soils.

Typical pedon of Slabtown silt loam, 7 to 15 percent slopes, 2 miles northeast of Pulaski on U.S. 11 and 500 feet northwest of the intersection of U.S. 11 and VA 645, elevation 2,030 feet:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable, slightly sticky, nonplastic; common fine and very fine pores; 10 percent semirounded chert and sandstone fragments less than 2 inches in diameter; neutral; clear wavy boundary.

A2—9 to 18 inches; yellowish brown (10YR 5/4) silt loam; few fine faint brown (10YR 6/3) mottles; weak fine and very fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine and very fine roots; common very fine pores; 5 percent semirounded chert and sandstone fragments less than 1 inch in diameter; few reddish brown (2.5YR 5/4) weathered bodies; mildly alkaline; clear smooth boundary.

B1—18 to 26 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and very fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots on peds; many very fine pores; few pale brown (10YR 6/3) skeletans; few dark yellowish brown (10YR 4/6) ped coatings; 12 percent semirounded chert and sandstone fragments less than 2 inches in diameter; many reddish brown (2.5YR 5/4) weathered bodies; few dark oxide stains on peds; mildly alkaline; clear smooth boundary.

B21t—26 to 35 inches; yellowish brown (10YR 5/6) silt loam; many fine distinct light gray (10YR 7/2) mottles; moderate coarse prismatic structure parting to moderate very thick platy; friable, slightly sticky, slightly plastic; 40 percent brittle; few very fine roots on prism faces; many fine pores; thin patchy dark brown (7.5YR 4/4) clay films; 2 percent semirounded chert and sandstone fragments less than 1/2 inch in diameter; common reddish brown (2.5YR 5/4) weathered bodies; common dark oxide stains on peds; mildly alkaline; gradual smooth boundary.

B22t—35 to 46 inches; 50 percent strong brown (7.5YR 5/6) and 50 percent light yellowish brown (10YR 6/4) gravelly silty clay loam; many fine distinct light gray (10YR 7/2) mottles; moderate coarse prismatic structure parting to moderate very thick platy; friable, slightly sticky, slightly plastic; 40 percent brittle; few very fine roots on prism faces; common very fine pores; thin patchy dark brown (7.5YR 4/4) clay films; 20 percent chert fragments less than 2 inches in diameter; common reddish brown (2.5YR 5/4) weathered bodies; many dark oxide stains on peds; mildly alkaline; clear smooth boundary.

IIB23t—46 to 76 inches; yellowish brown (10YR 5/8 and 5/6) and yellowish red (5YR 5/8) clay; moderate very fine subangular blocky structure; friable, slightly sticky, plastic; common very fine pores; thin continuous strong brown (7.5YR 5/6) clay films; mildly alkaline.

The solum is more than 60 inches thick. The depth to bedrock is more than 6 feet. Coarse fragments of chert and sandstone 1/4 inch to 3 inches in diameter make up 2 to 35 percent of the solum above the lithologic discontinuity and 0 to 5 percent below the discontinuity. The depth to the lithologic discontinuity ranges mainly from 20 to 50 inches. Reaction is medium acid to mildly alkaline in the upper part of the profile and slightly acid to mildly alkaline in the lower part.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 8. It is silt loam or loam.

The part of the B horizon above the discontinuity has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. It is loam, silt loam, clay loam, or silty clay loam or their gravelly analogs.

The part of the B horizon below the discontinuity has hue of 10YR to 5YR, value of 5 or 6, and chroma of 5 to 8. It is silty clay loam, silty clay, or clay.

Wheeling Series

The soils in the Wheeling series are at least 60 inches deep to bedrock and do not have a seasonal high water within 6 feet of the surface. They formed in mixed alluvium from sedimentary, igneous, and metamorphic materials. Slopes range from 0 to 2 percent.

Wheeling soils are near Braddock and Cotaco soils and Fluvaquents. Wheeling soils are better drained than the Cotaco soils or Fluvaquents and have less clay in the control section than the Braddock soils.

Typical pedon of Wheeling sandy loam, about 1.1 miles east of the junction of VA routes 114 and 679, 0.6 mile northeast of the end of VA 679, 500 feet south of the New River, and 1,000 feet north of the escarpment, elevation 1,720 feet:

Ap—0 to 10 inches; dark brown (10YR 3/3) sandy loam; dark yellowish brown (10YR 3/4) dry; moderate fine subangular blocky structure parting to moderate very fine granular; very friable, slightly sticky, nonplastic; many very fine roots; common very fine pores; common medium mica flakes; slightly acid; abrupt wavy boundary.

B21t—10 to 21 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate fine to very fine subangular blocky structure; very friable, slightly sticky, slightly plastic; many very fine pores; common very fine roots; thin patchy dark brown (7.5YR 4/3) clay films; common medium mica flakes; common 2 to 5 millimeter worm channels; slightly acid; gradual wavy boundary.

B22t—21 to 33 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; many very fine pores; thin patchy dark brown (7.5YR 4/3) clay films; common medium mica flakes; roots in worm channels; medium acid; clear wavy boundary.

B3t—33 to 52 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; few very fine roots; common fine pores; many medium mica flakes; thin patchy dark brown (7.5YR 4/3) clay films; medium acid; clear wavy boundary.

IIC—52 to 60 inches; dark brown (7.5YR 4/4) gravelly sandy loam; massive; friable, slightly sticky, nonplastic; common fine pores; 30 percent quartzite fragments 1/4 inch to 3 inches in diameter; medium acid.

The solum thickness ranges from 50 to 60 inches, and the depth to bedrock is more than 60 inches. Reaction in unlimed areas is strongly acid or medium acid throughout the profile. In some pedons, strata of cobblestones or gravel are below a depth of 50 inches.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or 3. It is loam or sandy loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy clay loam, or sandy loam.

The C horizon has the same hue, value, and chroma as the B horizon. The C horizon is loam or sandy loam or their gravelly analogs.

The Wheeling soils in this survey area are taxadjuncts to the Wheeling series because the surface layer has a lower color value than defined for the series. This difference does not significantly affect the use and management of the soils.

Wurno Series

The soils of the Wurno series are 20 to 40 inches deep to bedrock and do not have a seasonal high water table. They formed in the weathered products of shale interbedded with thin layers of limestone. Wurno soils are on smooth ridgetops and side slopes on uplands. Slopes range from 5 to 45 percent.

Wurno soils commonly are near Carbo and Lowell soils and are mapped with Faywood and Newbern soils. The Wurno soils have less clay in the subsoil than the Carbo, Faywood, or Lowell soils and are deeper to bedrock than the Newbern soils.

Typical pedon of Wurno silt loam, in an area of Wurno-Newbern-Faywood silt loams, 7 to 15 percent slopes, about 3/4 mile south of Newbern on VA 643, 100 yards north-northeast of VA 643, elevation 2,100 feet:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silt loam; moderate fine granular structure; friable, slightly sticky, slightly plastic; common fine and very fine roots; common very fine pores; 5 percent shale and sandstone fragment less than 1-1/2 inches across; mildly alkaline; abrupt smooth boundary.

B2—8 to 14 inches; brownish yellow (10YR 6/6) very shaly silty clay loam; moderate fine and very fine subangular blocky structure; friable, slightly sticky, slightly plastic; few very fine roots; common very fine pores; many yellowish brown (10YR 5/6) ped coatings; 40 percent olive yellow (2.5Y 6/8) angular shale fragments less than 3 inches across; mildly alkaline; abrupt broken boundary.

C—14 to 21 inches; brownish yellow (10YR 6/6) extremely shaly silt loam in cracks and crevices between bedding planes; rock-controlled structure; few very fine roots in rock crevices; 75 percent olive yellow (2.5Y 6/8) shale fragments; mildly alkaline; abrupt smooth boundary.

Cr—21 to 27 inches; light yellowish brown (2.5Y 6/4) shale that can be excavated with pick and shovel; few very fine roots in rock crevices; abrupt smooth boundary.

R—27 inches; rippable shale.

The solum is 10 to 20 inches thick. The depth to hard bedrock is 20 to 40 inches. The content of angular shale fragments, by volume, ranges from 5 to 80 percent in individual horizons and averages over 35 percent in the control section. The shale fragment content increases with depth. Reaction ranges from slightly acid to mildly alkaline in the upper part of the solum and from neutral to mildly alkaline in the lower part.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or loam or their shaly analogs.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8. It is silt loam or silty clay loam or their shaly or very shaly analogs.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 6 or 8. It is shaly silt loam or very shaly silt loam.

The Cr horizon has the same hue, value, and chroma as the C horizon. The Cr horizon consists of highly weathered shale or siltstone.

Zoar Series

The soils in the Zoar series are more than 60 inches deep to bedrock and have a seasonal high water table at a depth of 18 to 30 inches from December through April. The soils formed in old alluvial deposits weathered from a mixture of crystalline and sedimentary rocks. The Zoar soils are on high stream terraces in back swamps and depressional areas. Slopes range from 0 to 4 percent.

Zoar soils commonly are near Braddock and Cotaco soils. The Zoar soils are not as well drained as the Braddock soils and have more clay in the subsoil than the Cotaco soils.

Typical pedon of Zoar loam, 75 yards northwest of the intersection of routes 663 and 668, in Claytor Lake State Park, elevation 1,880 feet:

A1—0 to 3 inches; dark grayish brown (10YR 4/2) partially decomposed leaf litter and loam; many very fine to coarse roots; very strongly acid; abrupt wavy boundary.

A2—3 to 10 inches; light yellowish brown (10YR 6/4) loam; weak fine and very fine subangular blocky structure; friable, slightly sticky, nonplastic; many very fine pores; many fine light gray (10YR 7/2) skeletans; common medium mica flakes; strongly acid; clear wavy boundary.

B1t—10 to 18 inches; yellowish brown (10YR 5/4) loam; weak fine and very fine subangular blocky structure; friable, sticky, slightly plastic; common fine to coarse roots; many very fine pores; common medium very pale brown (10YR 7/3) skeletans; thin patchy yellowish brown (10YR 5/6) clay films; common medium mica flakes; very strongly acid; clear wavy boundary.

B21t—18 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct light gray (10YR 6/1) mottles; moderate fine and very fine subangular blocky structure; firm, sticky, plastic; common fine to coarse roots; many fine to very fine pores; thin continuous yellowish brown (10YR 5/4) clay films; common medium mica flakes; very strongly acid; clear smooth boundary.

B22t—26 to 34 inches; pale brown (10YR 6/3), yellowish brown (10YR 5/8), and yellow (10YR 7/8) clay; many medium distinct light gray mottles; strong very fine and fine angular blocky structure; firm, very sticky, plastic; common very fine to medium roots; few very fine pores; thin continuous yellowish brown (10YR 5/4) clay films; common medium mica flakes; very strongly acid; abrupt wavy boundary.

B23tg—34 to 51 inches; light gray (10YR 7/1), brownish yellow (10YR 6/8), gray (10YR 5/1), and olive brown (2.5Y 4/4) clay; moderate fine angular blocky structure; common very fine pores; thick continuous brown (10YR 5/3) clay films; many medium mica flakes; very strongly acid; gradual irregular boundary.

B3gt—51 to 60 inches; light gray (10YR 7/1), gray (10YR 6/1), brownish yellow (10YR 6/6), and olive brown (2.5Y 4/4); clay; weak medium prismatic structure parting to moderate medium and coarse angular blocky; firm, slightly sticky, slightly plastic; few fine roots; many very fine pores; thick patchy yellowish brown (10YR 5/4) clay films; many medium mica flakes; very strongly acid.

The solum is more than 60 inches thick, and the depth to bedrock is more than 60 inches. Reaction of the solum in unlimed areas is strongly acid or very strongly acid.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 4.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 1 to 6. It is clay or silty clay.

The Zoar soils in this survey area are taxadjuncts to the Zoar series because they have a thicker solum than is defined for the series. This difference does not significantly affect the use and management of the soils.

Formation of the Soils

This section describes soil horizon nomenclature and gives the processes of horizon development and soil formation.

Major Soil Horizons

The influence of the soil-forming factors can be shown by the different layers, or horizons, in a soil profile. The profile extends from the soil surface down to materials that are only slightly altered by the soil-forming processes.

Most soils contain three major layers, called the A, B, and C horizons. Some soils, especially those in forests, also have an O (organic) horizon at the surface. The major horizons may be subdivided by using numbers and letters to indicate differences within the horizon. In the B2t horizon, for example, the letter B designates the horizon as the subsoil, the number 2 indicates that it is the most developed part of the B horizon, and the letter t indicates an accumulation of clay from overlying horizons.

The A horizon, or surface layer, is a mineral layer at or adjacent to the soil surface. An A1 horizon is darkened by organic matter. An Ap horizon is a layer that has been stirred by plowing, cattle, or other disrupting forces and that is commonly darkened by an accumulation of organic matter. The A horizon is the layer in which maximum leaching, or eluviation, of clay and iron has occurred. If considerable leaching has taken place and the material is not darkened by organic matter, the horizon is called an A2 horizon. The A2 horizon is normally the lightest colored of all horizons in the profile.

The B horizon commonly underlies the A horizon and is called the subsoil. It is the horizon in which the maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer has taken place. The B horizon generally has blocky, prismatic, or platy structure. It is generally firmer and is lighter in color than the A1 or Ap horizon and is normally darker colored than the C horizon or A2 horizon.

In some soils, for example, Wurno soils, the B horizon is formed mainly by alteration of the original material instead of by illuviation. The alteration sometimes results from the weathering of the parent material, the oxidation and reduction of iron, the weathering of clay minerals, or the development of soil structure in place of the original rock or sediment structure.

The C horizon is normally below the B horizon. It consists of materials that are less altered by the soil-forming processes than the A and B horizons, but in some areas it is modified by weathering.

Processes of Horizon Development

The main processes of soil horizon development in Pulaski County are the accumulation of organic matter, the leaching of soluble soils, the chemical reduction and movement of iron, the formation of soil structure, and the translocation and loss of clay minerals. Those processes constantly take place, and most usually occur at the same time throughout the profile.

Organic matter accumulates as plant and animal residue is deposited and then decomposed. This process darkens the surface layer and aids in forming the A1 horizon. Organic matter content develops very slowly and, if lost, takes a long time to replace.

Many soils in Pulaski County have a distinct subsoil. It is thought that some lime and other soluble salts are leached prior to the translocation of iron and clay. Leaching is affected by factors such as the kinds of salts originally present, the percolation depth of the soil solution, and the soil texture. Once leaching has occurred, clay is more easily dispersed and allowed to enter the soil solution. The Groseclose, Poplimento, and Braddock soils, for example, have a Bt horizon in which clay has accumulated. This accumulation is believed to occur as the soil solution carries dispersed clay down through the profile and then deposits it as the solution dries. Clay from dissolved silica and aluminum also accumulates in the Bt horizon. The A horizon loses much of its clay to the translocation process and contains mostly inert materials such as silt and sand-size quartz.

Soils in Pulaski County that have a seasonal high water table at a depth of more than about 1-1/2 feet generally have a red to yellowish brown subsoil. Those colors are largely the results of iron oxide coatings, but in some soils the color is inherited from the materials from which the soils developed. The reddish brown in the Leck Kill soils, for example, is largely inherited from the underlying red shale. Weak to medium development of subangular blocky structure has occurred in most of the soils, and many soils in the county contain more clay in the subsoil than in the overlying surface layer.

The reduction and transfer of iron is mainly associated with the wetter, more poorly drained soils. This process is known as gleying. Soils with a seasonal high water table at a depth of less than 1-1/2 feet, such as Dunning soils, have a subsoil and underlying material that are grayish, which indicates reduction and transfer of iron. Slabtown, Newark, and Cotaco soils have yellowish brown to gray mottles caused by the segregation of iron.

A firm layer, called a fragipan, has developed in the subsoil of the Monongahela soils. This horizon is very firm and brittle when moist and hard when dry. Soil particles are tightly packed, causing a high bulk density and a low pore space. Genesis of this horizon is uncertain, but studies show that swelling and shrinking occur during alternating wet and dry periods. This may contribute to the tight packing of soil particles in the fragipan. Clay, silica, and oxides of aluminum are the most probable cementing agents which cause brittleness and hardness.

Factors of Soil Formation

Soil formation consists of the action of climate and organisms on parent material and is influenced by relief over a period of time. The degree to which each factor influences soil formation varies from place to place. In some areas soil properties are dependent almost entirely on one factor, but generally all the soil-forming factors contribute to some degree. Local variations of soils in Pulaski County are attributable mainly to parent material, relief, and time.

Parent Material

The unconsolidated mass from which a soil is formed is parent material. Parent material is largely responsible for the physical, chemical, and mineralogical properties of the soil and the rate at which soil-forming factors take place. Three kinds of parent materials are in Pulaski County: residual, alluvial, and colluvial.

Some of the residual parent materials are sandstone, shale, limestone, and phyllite. Soils formed in residuum from limestone and shale are most extensive in the Dublin Plateau area. They dominantly are silty in the surface layer and clayey in the subsoil. Examples are the Frederick, Groseclose, and Poplimento soils. Residuum weathered from acid shale, phyllite, and siltstone in mountainous areas formed the Berks, Gilpin, and Klinesville soils. Sandstone and quartzite, also in mountainous areas, are the parent materials for the Lily and Ramsey soils.

Alluvial parent materials are those transported by water. They may be of local origin, as material along small streams that originate within the county. They may have been transported long distances, as is the material of the New River Terraces. Soils formed in the local alluvium generally are variable in texture and have little development. Examples are Nolin, Lindside, and Dunning soils. Soils formed in widely transported alluvium generally have some development. Examples are Cotaco, Braddock, and Zoar soils.

Colluvial parent materials are those that have been transported by gravity. They generally are at the lower positions of the landscape, such as foot slopes, toe slopes, and concave back slopes. Some are at higher positions, such as the heads of drainageways and saddles. Soils formed in colluvial materials vary widely in characteristics. Examples of colluvial soils in the survey area are Nolichucky, Slabtown, and Monongahela soils.

Climate

Pulaski County has a humid, temperate climate characterized by seasonal temperature changes. Although there are some slight climatic differences at different elevations, those differences are too small to be reflected in soil properties.

The humid climate and abundant rainfall in the county have resulted in strong weathering and leaching of the soils. In most areas the soils have weathered to a considerable depth because of exposure to climatic factors for a long period. The only materials that are not strongly weathered are those that are resistant (sandstone and quartzite) or those that have been exposed for only a short time (on steep slopes).

In many of the soils, for example, Lodi and Leck Kill soils, the carbonates and other nutrients have been leached by percolating rainwater. Those soils have a low base saturation and low natural fertility. The downward movement of water also moves clay from upper layers to lower layers. Most of the soils in the county have a higher clay content in the subsoil than in the surface layer.

Climate influences the formation of soil structure, particularly in a clay subsoil. The alternate wetting and drying and freezing and thawing form structural units in the soil, called peds. These peds show their strongest development in the shapes of blocks or prisms.

Living Organisms

Man, animals, micro-organisms, and plants are significant in the formation of soils. Plant life is mainly responsible for determining the amount of organic matter that decomposes and gives a dark color to the surface layer. The micro-organisms are responsible for decomposing the organic matter and releasing nutrients for recycling. Man and other animals are responsible for mixing the soil layers and determining the porosity and structure of the soils.

Relief

The relief of an area is largely determined by the geologic material present and its resistance to weathering. Relief is less pronounced in areas dominated by materials that weather uniformly than in

areas containing materials that weather at different rates. Relief, to a large degree, influences soil drainage and soil depth and dictates the shape of drainage patterns.

Relief in Pulaski County is greatest in the northern and southern areas that are underlain by sandstone and quartzite and shale. The sandstone and quartzite are on the highest part of the landscape; the shale underlies the middle and lower parts. Those areas of the county have local relief of 1,000 feet or more and are characterized by fast-flowing streams that dissect the area. Because those areas are steep, most of the soils are shallow or moderately deep and do not have a seasonal high water table. Examples of such soils are the Berks, Gilpin, Ramsey, and Lily soils.

The central part of the county is underlain by shale and limestone, and the relief is much less pronounced than in the northern and southern parts. Limestone is dominantly in the lower areas, and shale is dominant in the higher areas. Local relief is mainly less than 400 feet. The soils in the central part of the county are more highly developed and generally deeper than the soils in the northern and southern parts. This is because of a more stable landform resulting from gentler slopes and more gradual runoff.

Many of the soils in the low-lying, nearly level areas have a seasonal high water table because they receive runoff and seepage from nearby, steeper soils. Examples of soils in the limestone-shale area are deep Lodi, Frederick, Groseclose, and Poplimento soils on high areas and deep Dunning, Lindside, and Newark soils in low areas.

Time

Time determines the degree of soil development and the expression of individual horizons.

The oldest soils in the county are those formed in residuum from carbonate rocks or New River alluvium. Those soils are on gently sloping, stable landforms. Examples are Frederick and Braddock soils. They show strong horizon development and significant downward movement of clay.

The younger soils, for example, Berks and Klinesville soils, are on the steeper areas of the county. Runoff and erosion have kept the soils from being in equilibrium long enough to show strong development, and the soils show only a moderate to slight degree of downward clay movement.

Soils formed in recent alluvium along the streams are the youngest of all. They have been in place only long enough to show slight horizon development and little or no downward movement of clay. Examples are Nolin and Lindside soils.

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Glossary

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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A system that retains protective amounts of residue mulch on the surface of the soil throughout the year using no-tillage, strip tillage, stubble mulching, and other types of noninversion tillage.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

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. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally,

material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

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.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

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.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

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.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the

surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

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.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower

in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data were recorded in the period 1960-78 at Pulaski, Virginia]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	43.1	22.4	32.8	67	-8	69	2.54	1.33	3.59	6	1.3
February---	45.8	23.9	34.9	70	1	59	2.72	1.28	3.96	6	2.3
March------	56.3	32.2	44.3	78	10	189	3.57	2.05	4.92	8	.3
April------	66.1	39.3	52.7	82	20	381	2.93	1.66	4.05	6	.2
May--------	74.0	48.1	61.1	87	28	654	3.39	1.91	4.69	8	.0
June-------	80.0	55.5	67.8	91	37	834	3.75	1.78	5.44	7	.0
July-------	83.5	59.4	71.5	93	44	977	3.53	2.15	4.77	7	.0
August-----	82.6	58.9	70.7	92	44	952	3.73	1.74	5.44	7	.0
September--	77.0	52.7	64.9	89	33	747	2.49	1.14	3.63	5	.0
October----	67.3	40.9	54.1	82	20	437	2.95	.82	4.66	5	.1
November---	55.8	33.1	44.5	76	11	165	2.37	1.31	3.31	5	.5
December---	46.4	25.9	36.1	68	3	73	2.86	1.61	4.01	6	3.0
Yearly:											
Average--	64.8	41.0	53.0	---	---	---	---	---	---	---	---
Extreme--	---	---	---	95	-8	---	---	---	---	---	---
Total----	---	---	---	---	---	5,537	36.83	31.40	41.64	76	7.7

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1960-78 at Pulaski, Virginia]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 25	May 3	May 23
2 years in 10 later than--	April 18	April 28	May 17
5 years in 10 later than--	April 4	April 20	May 5
First freezing temperature in fall:			
1 year in 10 earlier than--	October 12	October 7	September 25
2 years in 10 earlier than--	October 18	October 12	September 29
5 years in 10 earlier than--	October 30	October 21	October 7

TABLE 3.--GROWING SEASON

[Data were recorded in the period 1960-78 at Pulaski, Virginia]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	180	159	132
8 years in 10	190	167	140
5 years in 10	209	184	155
2 years in 10	228	200	170
1 year in 10	238	209	178

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1C	Berks-Gilpin complex, 7 to 15 percent slopes	1,179	.6
1D	Berks-Gilpin complex, 15 to 35 percent slopes	2,294	1.2
1F	Berks-Gilpin complex, 35 to 65 percent slopes	16,656	8.7
2B	Braddock loam, 2 to 7 percent slopes	2,650	1.4
2C	Braddock loam, 7 to 15 percent slopes	3,823	2.0
2D	Braddock loam, 15 to 30 percent slopes	2,366	1.2
3B	Braddock-Urbanland complex, 0 to 7 percent slopes	346	.2
4C	Carbo silty clay loam, 7 to 15 percent slopes	856	.4
4D	Carbo silty clay loam, 15 to 35 percent slopes	718	.3
5C	Carbo silty clay loam, very rocky, 7 to 15 percent slopes	2,681	1.4
5D	Carbo silty clay loam, very rocky, 15 to 30 percent slopes	4,360	2.3
6E	Carbo-Rock outcrop complex, 10 to 45 percent slopes	5,219	3.9
7A	Cotaco loam, 0 to 2 percent slopes	659	.3
7B	Cotaco loam, 2 to 7 percent slopes	1,361	.7
7C	Cotaco loam, 7 to 15 percent slopes	823	.4
8	Dunning silty clay loam	1,092	.5
9	Fluvaquents, nearly level	342	.2
10B	Frederick loam, 2 to 7 percent slopes	1,493	.8
10C	Frederick loam, 7 to 15 percent slopes	2,949	1.5
10D	Frederick loam, 15 to 30 percent slopes	1,719	.9
11C	Gilpin-Lily complex, 7 to 15 percent slopes	1,389	.7
11D	Gilpin-Lily complex, 15 to 35 percent slopes	1,072	.6
11F	Gilpin-Lily complex, 35 to 65 percent slopes	4,151	2.2
12B	Groseclose-Urban land complex, 2 to 7 percent slopes	957	.5
12C	Groseclose-Urbanland complex, 7 to 15 percent slopes	1,695	.9
13B	Groseclose and Poplimento silt loams, 2 to 7 percent slopes	4,874	2.5
13C	Groseclose and Poplimento silt loams, 7 to 15 percent slopes	9,486	4.9
13D	Groseclose and Poplimento silt loams, 15 to 30 percent slopes	6,513	3.4
14C	Klinesville-Berks shaly silt loams, 7 to 15 percent slopes	6,915	3.5
14F	Klinesville-Berks shaly silt loams, 30 to 65 percent slopes	5,148	2.7
15C	Leck Kill-Rayne silt loams, 7 to 15 percent slopes	1,985	1.0
15D	Leck Kill-Rayne silt loams, 15 to 30 percent slopes	2,443	1.3
16D	Lily-Ramsey very stony sandy loams, 15 to 35 percent slopes	2,396	1.2
16F	Lily-Ramsey very stony sandy loams, 35 to 65 percent slopes	3,549	1.8
17	Lindside-Nolin silt loams	2,384	1.2
18B	Lodi loam, 2 to 7 percent slopes	331	.2
18C	Lodi loam, 7 to 15 percent slopes	850	.4
18D	Lodi loam, 15 to 30 percent slopes	553	.3
19C	Lodi coarse cherty loam, 7 to 15 percent slopes	689	.3
19D	Lodi coarse cherty loam, 15 to 30 percent slopes	848	.4
20B	Lowell silt loam, 2 to 7 percent slopes	1,872	1.0
20C	Lowell silt loam, 7 to 15 percent slopes	4,687	2.5
20D	Lowell silt loam, 15 to 30 percent slopes	2,596	1.4
21B	Lowell-Urban land complex, 2 to 7 percent slopes	325	.2
21C	Lowell-Urban land complex, 7 to 15 percent slopes	809	.4
22C	Monongahela silt loam, 7 to 15 percent slopes	1,740	1.9
22D	Monongahela silt loam, 15 to 25 percent slopes	772	.4
23	Newark Variant, silt loam	771	.4
24C	Nolichucky gravelly sandy loam, 7 to 15 percent slopes	1,083	.5
24D	Nolichucky gravelly sandy loam, 15 to 30 percent slopes	797	.4
25C	Nolichucky very stony sandy loam, 7 to 15 percent slopes	605	.3
25D	Nolichucky very stony sandy loam, 15 to 30 percent slopes	2,167	1.1
25F	Nolichucky very stony sandy loam, 30 to 65 percent slopes	4,544	2.4
26F	Ramsey-Lily-Rock outcrop complex, 25 to 60 percent slopes	9,164	4.8
27C	Rayne silt loam, 7 to 15 percent slopes	1,865	1.0
27D	Rayne silt loam, 15 to 30 percent slopes	2,201	1.1
27E	Rayne silt loam, 30 to 45 percent slopes	1,178	.6
28F	Rayne-Berks-Groseclose complex, 30 to 60 percent slopes	15,102	7.9
29F	Rock outcrop-Newbern-Carbo complex, 30 to 65 percent slopes	3,317	1.8
30C	Sherando gravelly sandy loam, 0 to 15 percent slopes	911	.5
31F	Sherando rubbly sandy loam, 30 to 65 percent slopes	662	.4
32B	Slabtown silt loam, 2 to 7 percent slopes	957	.5
32C	Slabtown silt loam, 7 to 15 percent slopes	1,706	.9
33	Urban land	983	.6
34	Wheeling sandy loam	1,634	.8
35C	Wurno-Newbern-Faywood silt loams, 7 to 15 percent slopes	4,292	2.5
35D	Wurno-Newbern-Faywood silt loams, 15 to 30 percent slopes	3,478	1.9
35E	Wurno-Newbern-Faywood silt loams, 30 to 45 percent slopes	1,181	.6
36	Zoar loam	260	.1
	Water	6,207	3.2
	Total	190,080	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Corn silage	Wheat	Alfalfa hay	Grass-legume hay	Kentucky bluegrass	Tall fescue
	Bu	Ton	Bu	Ton	Ton	AUM*	AUM*
1C---- Berks-Gilpin	80	16	35	3.5	3.0	5.0	6.0
1D---- Berks-Gilpin	---	15	30	3.5	2.5	4.5	5.5
1F---- Berks-Gilpin	---	---	---	---	---	---	---
2B---- Braddock	130	26	55	5.0	4.5	7.5	9.0
2C---- Braddock	125	25	50	4.5	4.0	7.0	8.5
2D---- Braddock	110	22	45	4.0	3.5	6.5	8.0
3B---- Braddock-Urban land	---	---	---	---	---	---	---
4C---- Carbo	80	17	45	4.0	3.5	5.0	7.0
4D---- Carbo	---	---	40	3.5	3.0	4.5	6.5
5C---- Carbo	---	---	---	4.0	3.5	5.0	7.0
5D---- Carbo	---	---	---	3.5	3.0	4.5	6.5
6E---- Carbo-Rock outcrop	---	---	---	---	---	---	---
7A---- Cotaco	115	23	40	---	4.0	7.0	8.5
7B---- Cotaco	115	23	40	---	4.0	7.0	8.5
7C---- Cotaco	110	22	35	---	3.5	6.5	8.0
8---- Dunning	120	24	---	---	4.0	7.5	8.5
9---- Fluvaquents	---	---	---	---	---	---	---
10B---- Frederick	130	26	50	5.0	4.5	7.5	9.0
10C---- Frederick	120	24	45	4.5	4.0	7.0	8.5
10D---- Frederick	110	22	40	4.0	3.5	6.5	8.0
11C---- Gilpin-Lily	85	17	40	4.0	3.0	6.0	7.0

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Wheat	Alfalfa hay	Grass-legume hay	Kentucky bluegrass	Tall fescue
	Bu	Ton	Bu	Ton	Ton	AUM*	AUM*
11D---- Gilpin-Lily	---	---	---	3.5	2.5	5.5	6.5
11F---- Gilpin-Lily	---	---	---	---	---	---	---
12B---- Groseclose-Urban land	---	---	---	---	---	---	---
12C---- Groseclose-Urbanland	---	---	---	---	---	---	---
13B---- Groseclose and Poplimento	130	26	55	5.0	4.5	7.5	9.0
13C---- Groseclose and Poplimento	125	25	50	4.5	4.0	7.0	8.5
13D---- Groseclose and Poplimento	---	---	45	4.0	3.5	6.5	8.0
14C---- Klinesville-Berks	---	---	30	3.0	2.5	4.0	5.0
14F---- Klinesville-Berks	---	---	---	---	---	---	---
15C---- Leck Kill-Rayne	120	24	50	4.5	3.5	6.0	7.0
15D---- Leck Kill-Rayne	---	---	45	4.0	3.0	5.5	6.5
16D---- Lily-Ramsey	---	---	---	---	---	---	---
16F---- Lily-Ramsey	---	---	---	---	---	---	---
17---- Lindside-Nolin	130	26	---	---	4.5	7.5	9.0
18B---- Lodi	130	26	50	5.0	4.0	7.0	9.0
18C---- Lodi	125	25	45	4.5	3.5	6.5	8.5
18D---- Lodi	---	---	40	4.0	3.5	6.0	8.0
19C---- Lodi	---	---	---	4.0	3.5	6.5	8.5
19D---- Lodi	---	---	---	3.5	3.5	6.0	8.0
20B---- Lowell	130	26	45	5.0	4.5	7.5	9.0
20C---- Lowell	125	25	40	4.5	4.0	7.0	8.5
20D---- Lowell	115	23	35	4.0	3.5	6.5	8.0
21B---- Lowell-Urban land	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Wheat	Alfalfa hay	Grass-legume hay	Kentucky bluegrass	Tall fescue
	Bu	Ton	Bu	Ton	Ton	AUM*	AUM*
21C---------- Lowell-Urban land	---	---	---	---	---	---	---
22C---------- Monongahela	100	20	40	---	3.5	6.5	8.0
22D---------- Monongahela	---	---	35	---	3.0	6.0	7.5
23---------- Newark Variant	100	20	---	---	4.5	---	---
24C---------- Nolichucky	110	22	40	4.5	4.0	7.0	8.5
24D, 25C, 25D, 25F-------- Nolichucky	---	---	---	---	---	---	---
26F---------- Ramsey-Lily-Rock outcrop	---	---	---	---	---	---	---
27C---------- Rayne	110	22	45	4.5	4.0	7.0	8.5
27D---------- Rayne	100	20	40	4.0	3.5	6.5	7.5
27E---------- Rayne	---	---	---	---	---	---	---
28F---------- Rayne-Berks-Groseclose	---	---	---	---	---	---	---
29F**---------- Rock outcrop-Newbern-Carbo	---	---	---	---	---	---	---
30C---------- Sherando	---	---	---	---	2.0	---	5.4
31F---------- Sherando	---	---	---	---	---	---	---
32B---------- Slabtown	120	24	40	---	4.0	7.5	9.0
32C---------- Slabtown	115	23	35	---	4.0	7.0	8.5
33**. Urban land							
34---------- Wheeling	130	26	50	5.0	4.5	7.5	9.0
35C---------- Wurno-Newbern-Faywood	---	---	40	4.0	3.5	6.0	7.0
35D---------- Wurno-Newbern-Faywood	---	---	---	3.5	3.0	5.5	6.5
35E---------- Wurno-Newbern-Faywood	---	---	---	---	---	---	---
36---------- Zoar	110	22	45	---	3.5	7.5	9.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available. Norway spruce and red pine are suitable as Christmas-tree species. Red pine is suitable at an elevation of more than 1,800 feet, and black cherry is suitable at an elevation of more than 3,000 feet]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
1C*:								
Berks	3f	Slight	Slight	Moderate	Slight	Northern red oak Black oak Virginia pine	65 70 70	Virginia pine, eastern white pine, Norway spruce, red pine.
Gilpin	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar	80 95	Virginia pine, eastern white pine, black cherry, yellow-poplar.
1D*:								
Berks (South aspect)	4f	Slight	Moderate	Moderate	Slight	Northern red oak Black oak Virginia pine	60 60 60	Virginia pine, eastern pitch pine, Norway spruce, red pine.
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Slight	Northern red oak Yellow-poplar	70 80	Virginia pine, eastern white pine, black cherry, yellow-poplar.
1D*:								
Berks (North aspect)	3f	Slight	Moderate	Moderate	Slight	Northern red oak Black oak Virginia pine	65 70 70	Virginia pine, eastern white pine, pitch pine, Norway spruce, red pine.
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	80 95	Virginia pine, eastern white pine, black cherry, yellow-poplar.
1F*:								
Berks (South aspect)	4f	Moderate	Severe	Moderate	Slight	Northern red oak Black oak Virginia pine	60 60 60	Virginia pine, eastern white pine, pitch pine, Norway spruce, red pine.
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Slight	Northern red oak Yellow-poplar	70 80	Virginia pine, eastern white pine, black cherry, yellow-poplar.
1F*:								
Berks (North aspect)	3f	Moderate	Severe	Moderate	Slight	Northern red oak Black oak Virginia pine	70 70 70	Virginia pine, eastern white pine, pitch pine, Norway spruce, red pine.
Gilpin (North aspect)	2r	Severe	Severe	Slight	Slight	Northern red oak Yellow-poplar	80 95	Virginia pine, eastern white pine, black cherry, yellow-poplar.
2B, 2C Braddock	2o	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine Virginia pine Shortleaf pine	80 90 95 76 76	Yellow-poplar, eastern white pine, Northern red oak.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
2D---------- Braddock	2r	Moderate	Severe	Slight	Slight	Northern red oak----	80	Yellow-poplar, eastern white pine, northern red oak, shortleaf pine.
						Yellow-poplar-------	90	
						Eastern white pine--	95	
						Virginia pine-------	76	
						Shortleaf pine------	76	
3B*:								
Braddock----------	2o	Slight	Moderate	Slight	Slight	Northern red oak----	80	Yellow-poplar, eastern white pine, northern red oak, shortleaf pine.
						Yellow-poplar-------	90	
						Eastern white pine--	95	
						Virginia pine-------	76	
						Shortleaf pine------	76	
Urban land.								
4C---------- Carbo	3c	Slight	Moderate	Moderate	Slight	Northern red oak----	70	Shortleaf pine, black locust, white oak.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
4D---------- Carbo	3r	Moderate	Severe	Moderate	Slight	Northern red oak----	70	Shortleaf pine, black locust, white oak.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
5C---------- Carbo	3c	Slight	Moderate	Moderate	Slight	Northern red oak----	70	Shortleaf pine, black locust, white oak.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
5D---------- Carbo	3r	Moderate	Severe	Moderate	Slight	Northern red oak----	70	Shortleaf pine, black locust, white oak.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
6E*:								
Carbo----------	3r	Moderate	Severe	Moderate	Slight	Northern red oak----	70	Shortleaf pine, black locust, white oak.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
Rock outcrop.								
7A, 7B, 7C--------- Cotaco	2o	Slight	Slight	Slight	Slight	Northern red oak----	83	Eastern white pine, yellow-poplar, white oak, northern red oak,
						Virginia pine-------	80	
						Shortleaf pine------	80	
8---------- Dunning	1w	Slight	Severe	Severe	Slight	Pin oak-------------	95	Green ash, white oak. sweetgum.
						Sweetgum------------	95	
						Eastern cottonwood--	100	
10B, 10C---------- Frederick	2c	Slight	Moderate	Slight	Slight	Northern red oak----	76	Shortleaf pine, yellow-poplar, white oak.
						Yellow-poplar-------	86	
10D---------- Frederick	2c	Moderate	Moderate	Slight	Slight	Northern red oak----	76	Yellow-poplar, white oak, shortleaf pine.
						Yellow-poplar-------	86	
11C*:								
Gilpin----------	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Virginia pine, pitch pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
11C*:								
Lily	4o	Slight	Slight	Slight	Slight	Shortleaf pine Virginia pine	63 61	Shortleaf pine, Virginia pine, chestnut oak.
11D*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Slight	Northern red oak Yellow-poplar	70 80	Northern red oak, Virginia pine, eastern white pine, black cherry.
Lily (South aspect)	4r	Moderate	Moderate	Slight	Slight	Shortleaf pine Virginia pine	53 65	Shortleaf pine, eastern white pine, chestnut oak.
11D*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	80 95	Virginia pine, eastern white pine, black cherry, yellow-poplar.
Lily (North aspect)	4r	Moderate	Moderate	Slight	Slight	Shortleaf pine Virginia pine	63 65	Shortleaf pine, Virginia pine.
11F*:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Slight	Northern red oak Yellow-poplar	70 80	Virginia pine, eastern white pine, black cherry.
Lily (South aspect)	4r	Severe	Severe	Slight	Slight	Shortleaf pine Virginia pine	53 65	Shortleaf pine, eastern white pine, Virginia pine.
11F*:								
Gilpin (North aspect)	2r	Severe	Severe	Slight	Slight	Northern red oak Yellow-poplar	80 95	Virginia pine, eastern white pine, black cherry, yellow-poplar, northern red oak.
Lily (North aspect)	4r	Severe	Severe	Slight	Slight	Shortleaf pine Virginia pine	63 65	Shortleaf pine, Virginia pine.
12B*:								
Groseclose	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Eastern white pine Yellow-poplar	85 85 90 86	Eastern white pine, yellow-poplar, white oak, shortleaf pine.
Urban land.								
12C*:								
Groseclose	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Eastern white pine Yellow-poplar	85 85 90 86	Eastern white pine, yellow-poplar, white oak.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
12C*: Urban land.								
13B*, 13C*: Groseclose	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Eastern white pine Yellow-poplar	85 85 90 86	Eastern white pine, yellow-poplar, white oak.
Poplimento	2c	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar	80 90	Shortleaf pine, yellow-poplar.
13D*: Groseclose	2r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Eastern white pine Yellow-poplar	85 85 90 86	Eastern white pine, yellow-poplar, white oak.
Poplimento	2r	Moderate	Severe	Slight	Slight	Northern red oak Yellow-poplar	80 90	Shortleaf pine, yellow-poplar.
14C*: Klinesville	4d	Slight	Slight	Moderate	Moderate	Northern red oak Virginia pine	60 60	Virginia pine, eastern white pine, red pine, pitch pine.
Berks	3f	Slight	Slight	Moderate	Slight	Northern red oak Black oak Virginia pine	70 70 70	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
14F*: Klinesville (South aspect)	5d	Moderate	Severe	Severe	Moderate	Northern red oak Virginia pine	50 50	Virginia pine, pitch pine.
Berks (South aspect)	4f	Moderate	Severe	Moderate	Slight	Northern red oak Black oak Virginia pine	60 60 60	Virginia pine, eastern white pine, Norway spruce, red pine, black locust.
14F*: Klinesville (North aspect)	4d	Moderate	Severe	Moderate	Moderate	Northern red oak Virginia pine	60 60	Virginia pine, pitch pine.
Berks (North aspect)	3f	Moderate	Severe	Moderate	Slight	Northern red oak Black oak Virginia pine	65 70 70	Virginia pine, eastern white pine, Norway spruce, red pine.
15C*: Leck Kill	3o	Slight	Slight	Slight	Slight	Northern red oak	68	Eastern white pine, Virginia pine, pitch pine.
Rayne	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine Virginia pine Shortleaf pine	80 90 90 75 75	Eastern white pine, yellow-poplar, black cherry, Virginia pine, Norway spruce.
15D*: Leck Kill	3r	Slight	Moderate	Slight	Slight	Northern red oak	68	Eastern white pine, Virginia pine, pitch pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
15D*:								
Rayne	2r	Slight	Moderate	Slight	Slight	Northern red oak	80	Northern red oak, eastern white pine, yellow-poplar, black cherry, Virginia pine, Norway spruce.
						Yellow-poplar	90	
						Eastern white pine	90	
						Virginia pine	75	
						Shortleaf pine	75	
16D*, 16F*:								
Lily	4r	Moderate	Moderate	Slight	Slight	Virginia pine	65	Virginia pine, pitch pine.
						Pitch pine	63	
Ramsey	4x	Severe	Severe	Moderate	Severe	White oak	61	Virginia pine, pitch pine.
						Shortleaf pine	59	
						Virginia pine	22	
						Eastern white pine	70	
17*:								
Lindside	1w	Slight	Moderate	Slight	Slight	Northern red oak	86	Eastern white pine, yellow-poplar, white oak, black walnut.
						Yellow-poplar	95	
						White ash	85	
						White oak	80	
Nolin	1w	Slight	Moderate	Slight	Slight	Sweetgum	85	Yellow-poplar, eastern white pine black walnut, white ash, cherrybark oak.
						Northern red oak	85	
						Yellow-poplar	90	
18B, 18C Lodi	2c	Slight	Moderate	Slight	Slight	Northern red oak	76	Eastern white pine, yellow-poplar, white oak, black walnut.
						Yellow-poplar	86	
						White oak	70	
18D Lodi	2r	Moderate	Moderate	Slight	Slight	Northern red oak	76	Eastern white pine, yellow-poplar, white oak, black walnut.
						Yellow-poplar	86	
						White oak	70	
19C Lodi	2c	Slight	Moderate	Slight	Slight	Northern red oak	76	Eastern white pine, yellow-poplar, white oak, black walnut.
						Yellow-poplar	86	
						White oak	76	
19D Lodi	2r	Moderate	Moderate	Slight	Slight	Northern red oak	76	Eastern white pine, yellow-poplar, white oak.
						Yellow-poplar	86	
						White oak	70	
20B, 20C Lowell	2o	Slight	Slight	Slight	Slight	Northern red oak	80	Yellow-poplar, eastern white pine, shortleaf pine, Virginia pine, white oak, black walnut.
						Yellow-poplar	90	
						Shortleaf pine	80	
						Virginia pine	80	
20D Lowell	2o	Moderate	Moderate	Slight	Slight	Northern red oak	80	Yellow-poplar, eastern white pine, shortleaf pine, Virginia pine, white oak.
						Yellow-poplar	90	
						Shortleaf pine	80	
						Virginia pine	80	
21B*, 21C*:								
Lowell	2o	Slight	Slight	Slight	Slight	Northern red oak	70	Yellow-poplar, eastern white pine, shortleaf pine, Virginia pine, white oak.
						Yellow-poplar	90	
						Shortleaf pine	80	
						Virginia pine	80	
Urban land.								

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
22C---- Monongahela	3o	Slight	Slight	Slight	Slight	Northern red oak----	70	Eastern white pine, Virginia pine, white oak, yellow-poplar.
						Yellow-poplar-------	85	
						Eastern white pine--	76	
						Virginia pine-------	66	
22D---- Monongahela	3r	Severe	Moderate	Slight	Slight	Northern red oak----	70	Eastern white pine, white oak, white ash, yellow-poplar.
						Yellow-poplar-------	85	
						Eastern white pine--	76	
						Virginia pine-------	66	
23---- Newark Variant	1w	Slight	Moderate	Slight	Moderate	Northern red oak----	85	Sweetgum, red maple, American sycamore, yellow-poplar.
						Yellow-poplar-------	95	
						Sweetgum----------	88	
24C---- Nolichucky	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Shortleaf pine, eastern white pine, yellow-poplar.
						Northern red oak----	70	
						Shortleaf pine------	70	
						Loblolly pine-------	80	
						Virginia pine-------	70	
						Eastern white pine--	80	
24D---- Nolichucky	3r	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	90	Shortleaf pine, loblolly pine, eastern white pine, yellow-poplar.
						Northern red oak----	70	
						Shortleaf pine------	70	
						Loblolly pine-------	80	
						Virginia pine-------	70	
						Eastern white pine--	80	
25C---- Nolichucky	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Shortleaf pine, eastern white pine, yellow-poplar.
						Northern red oak----	70	
						Shortleaf pine------	70	
						Loblolly pine-------	80	
						Virginia pine-------	70	
						Eastern white pine--	80	
25D---- Nolichucky	3r	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	90	Shortleaf pine, eastern white pine, yellow-poplar.
						Northern red oak----	70	
						Shortleaf pine------	70	
						Loblolly pine-------	80	
						Virginia pine-------	70	
						Eastern white pine	80	
25F---- Nolichucky	3r	Severe	Severe	Slight	Slight	Yellow-poplar-------	90	Shortleaf pine, eastern white pine, yellow-poplar.
						Northern red oak----	70	
						Shortleaf pine------	70	
						Loblolly pine-------	80	
						Virginia pine-------	70	
						Eastern white pine--	80	
26F : Ramsey----------	4x	Severe	Severe	Moderate	Severe	White oak----------	61	Virginia pine, shortleaf pine, eastern white pine.
						Shortleaf pine------	59	
						Virginia pine-------	65	
						Eastern white pine--	70	
Lily----------	4r	Severe	Severe	Slight	Slight	Pitch pine----------	55	Virginia pine, chestnut oak.
						Virginia pine-------	55	
Rock outcrop.								
27C---- Rayne	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Eastern white pine, yellow-poplar, black cherry, Virginia pine, Norway spruce.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
						Virginia pine-------	76	
						Shortleaf pine------	76	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
27D---------- Rayne	2r	Slight	Moderate	Slight	Slight	Northern red oak----	80	Eastern white pine, yellow-poplar, black cherry, Virginia pine, Norway spruce.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
						Virginia pine-------	76	
						Shortleaf pine------	76	
27E---------- Rayne	2r	Moderate	Severe	Slight	Slight	Northern red oak----	80	Eastern white pine, yellow-poplar, black cherry, Virginia pine, Norway spruce.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
						Virginia pine-------	76	
						Shortleaf pine------	76	
28F*:								
Rayne---------- (South aspect)	3r	Moderate	Severe	Slight	Slight	Northern red oak----	70	Yellow-poplar, black cherry, Virginia pine.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
						Virginia pine-------	70	
						Shortleaf pine------	70	
Berks---------- (South aspect)	4f	Moderate	Severe	Moderate	Slight	Northern red oak----	60	Virginia pine, eastern white pine, pitch pine.
						Black oak----------	60	
						Virginia pine-------	60	
Groseclose-------- (South aspect)	3r	Severe	Severe	Slight	Slight	White oak----------	75	Yellow-poplar, white oak.
						Northern red oak----	75	
						Eastern white pine--	80	
						Yellow-poplar-------	76	
28F*:								
Rayne---------- (North aspect)	2r	Moderate	Severe	Slight	Slight	Northern red oak----	80	Yellow-poplar, black cherry, Virginia pine, pine, Norway spruce.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
						Virginia pine-------	76	
						Shortleaf pine------	76	
Berks---------- (North aspect)	3f	Moderate	Severe	Moderate	Slight	Northern red oak----	70	Virginia pine, eastern white pine.
						Black oak----------	70	
						Virginia pine-------	70	
Groseclose-------- (North aspect)	2r	Severe	Severe	Slight	Slight	White oak----------	85	Eastern white pine, yellow-poplar, white oak.
						Northern red oak----	85	
						Eastern white pine--	90	
						Yellow-poplar-------	86	
29F*:								
Rock outcrop.								
Newbern---------- (South aspect)	4d	Moderate	Severe	Severe	Moderate	Virginia pine-------	55	Pitch pine, redcedar.
						Northern red oak----	55	
Carbo---------- (South aspect)	4r	Severe	Severe	Moderate	Slight	Northern red oak----	70	White oak, shortleaf pine.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
29F*:								
Rock outcrop.								
Newbern---------- (North aspect)	3d	Moderate	Severe	Severe	Moderate	Virginia pine-------	65	Virginia pine, shortleaf pine, redcedar.
						Northern red oak----	65	
Carbo---------- (North aspect)	3r	Severe	Severe	Moderate	Slight	Northern red oak----	70	Northern red oak, yellow-poplar, shortleaf pine.
						Yellow-poplar-------	80	
						Eastern white pine--	80	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
30C---------- Sherando	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Yellow-poplar, northern red oak shortleaf pine, eastern white pine.
						Yellow-poplar-------	95	
						Virginia pine-------	80	
							80	
31F---------- Sherando (South aspect)	3f	Moderate	Severe	Severe	Slight	Northern red oak----	66	Shortleaf pine, Virginia pine.
						Shortleaf pine------	66	
						Virginia pine-------	66	
31F---------- Sherando (North aspect)	2f	Moderate	Severe	Moderate	Slight	Northern red oak----	76	Yellow-poplar, shortleaf pine, northern red oak, eastern white pine.
						Yellow-poplar-------	95	
						Virginia pine-------	76	
32B, 32C---------- Slabtown	3o	Slight	Slight	Slight	Slight	Northern red oak----	70	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	85	
						Black walnut--------	80	
34---------- Wheeling	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar-------	90	
35C*:								
Wurno----------	3f	Slight	Slight	Slight	Slight	Virginia pine-------	70	Shortleaf pine, eastern white pine.
						Northern red oak----	70	
Newbern----------	3d	Slight	Slight	Severe	Moderate	Virginia pine-------	65	Shortleaf pine, eastern white pine.
						Northern red oak----	65	
Faywood----------	3c	Slight	Slight	Slight	Slight	Northern red oak----	70	Shortleaf pine, eastern white pine, black locust, eastern redcedar.
						Eastern white pine--	80	
						Virginia pine-------	70	
35D*:								
Wurno---------- (North aspect)	3f	Slight	Moderate	Slight	Slight	Eastern white pine--	80	Shortleaf pine, eastern white pine.
						Virginia pine-------	70	
						Northern red oak----	70	
Newbern---------- (North aspect)	3d	Slight	Moderate	Severe	Moderate	Virginia pine-------	65	Virginia pine, shortleaf pine, eastern white pine.
						Northern red oak----	65	
						Eastern white pine--	75	
Faywood---------- (North aspect)	3c	Moderate	Moderate	Slight	Slight	Northern red oak----	70	Shortleaf pine, loblolly pine, eastern white pine, black locust, eastern redcedar.
						Eastern white pine--	80	
						Virginia pine-------	70	
35D*:								
Wurno---------- (South aspect)	4f	Slight	Moderate	Slight	Slight	Virginia pine-------	60	Shortleaf pine, pitch pine, redcedar.
						Northern red oak----	60	
Newbern---------- (South aspect)	4d	Slight	Moderate	Severe	Moderate	Virginia pine-------	55	Pitch pine, redcedar.
						Northern red oak----	55	
Faywood---------- (South aspect)	4c	Moderate	Moderate	Slight	Slight	Northern red oak----	60	Shortleaf pine, eastern white pine, black locust, eastern redcedar.
						Eastern white pine--	70	
						Virginia pine-------	60	
35E*:								
Wurno---------- (South aspect)	4f	Moderate	Severe	Slight	Slight	Virginia pine-------	60	Pitch pine, redcedar.
						Northern red oak----	60	
Newbern---------- (South aspect)	4d	Moderate	Severe	Severe	Moderate	Virginia pine-------	55	Pitch pine, redcedar.
						Northern red oak----	55	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
35E*:								
Faywood (South aspect)	4c	Severe	Severe	Slight	Slight	Northern red oak Eastern white pine Virginia pine	60 70 60	Shortleaf pine, eastern white pine, black locust, eastern redcedar.
35E*:								
Wurno (North aspect)	3f	Moderate	Severe	Slight	Slight	Virginia pine Northern red oak	70 70	Virginia pine, shortleaf pine, eastern white pine.
Newbern (North aspect)	3d	Moderate	Severe	Severe	Moderate	Virginia pine Northern red oak	65 65	Virginia pine, shortleaf pine, eastern white pine.
Faywood (North aspect)	3c	Severe	Severe	Slight	Slight	Northern red oak Eastern white pine Virginia pine	70 80 70	Shortleaf pine, eastern white pine, black locust, eastern redcedar.
36 Zoar	3w	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Virginia pine Eastern white pine Black oak White oak	70 80 70 80 70 70	Eastern white pine, shortleaf pine, Virginia pine, yellow-poplar.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1C*:					
Berks	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Slight	Severe: small stones.
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
1D*, 1F*:					
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
2B Braddock	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
2C Braddock	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
2D Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
3B*:					
Braddock	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Urban land.					
4C Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
4D Carbo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
5C Carbo	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
5D Carbo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
6E*:					
Carbo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
7A Cotaco	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
7B Cotaco	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
7C Cotaco	Moderate: wetness.	Moderate: wetness.	Severe: slope.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
8---------- Dunning	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
9. Fluvaquents					
10B---------- Frederick	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
10C---------- Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
10D---------- Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
11C*: Gilpin----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
Lily----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
11D*, 11F*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lily----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12B*: Groseclose----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
Urban land.					
12C*: Groseclose----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Urban land.					
13B*: Groseclose----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
Poplimento----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Slight.
13C*: Groseclose----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Poplimento----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.
13D*: Groseclose----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13D*:					
Poplimento	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
14C*:					
Klinesville	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.	Severe: small stones, thin layer.
Berks	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Slight	Severe: small stones.
14F*:					
Klinesville	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.	Severe: small stones, slope, thin layer.
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
15C*:					
Leck Kill	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Rayne	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
15D*:					
Leck Kill	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
16D*, 16F*:					
Lily	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Ramsey	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: slope, thin layer.
17*:					
Lindside	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Nolin	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
18B Lodi	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
18C Lodi	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
18D Lodi	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
19C Lodi	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
19D---------- Lodi	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
20B---------- Lowell	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
20C---------- Lowell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
20D---------- Lowell	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
21B*: Lowell----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
Urban land.					
21C*: Lowell----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Urban land.					
22C---------- Monongahela	Moderate: wetness, slope.	Moderate: slope, wetness.	Slope----------	Severe: erodes easily.	Moderate: slope.
22D---------- Monongahela	Severe: slope.	Severe: slope.	Slope----------	Severe: erodes easily.	Severe: slope.
23---------- Newark Variant	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
24C---------- Nolichucky	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
24D---------- Nolichucky	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
25C---------- Nolichucky	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Slight----------	Severe: small stones.
25D---------- Nolichucky	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: small stones, slope.
25F---------- Nolichucky	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, slope.
26F*: Ramsey----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: slope, thin layer.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
26F*: Lily	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
27C Rayne	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
27D Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
27E Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
28F*: Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
Groseclose	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
29F*: Rock outcrop.					
Newbern	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: thin layer, slope, small stones.
Carbo	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
30C Sherando	Moderate: large stones.	Moderate: large stones.	Severe: large stones, slope.	Moderate: large stones.	Severe: large stones.
31F Sherando	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
32B Slabtown	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
32C Slabtown	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
33*. Urban land					
34 Wheeling	Slight	Slight	Slight	Slight	Slight.
35C*: Wurno	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: thin layer, small stones.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
35C*:					
Newbern	Severe: depth to rock, small stones.	Severe: depth to rock, small stones.	Severe: slope, depth to rock, small stones.	Slight	Severe: thin layer, small stones.
Faywood	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
35D*:					
Wurno	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.	Severe: slope, droughty.
Newbern	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock, small stones.	Moderate: slope.	Severe: thin layer, slope, small stones.
Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
35E*:					
Wurno	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, droughty.
Newbern	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: thin layer, slope, small stones.
Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
36 Zoar	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: erodes easily.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1C*:											
Berks	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
Gilpin	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.
1D*:											
Berks	Very poor.	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Gilpin	Very poor.	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
1F*:											
Berks	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Gilpin	Very poor.	Poor	Good	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
2B---- Braddock	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
2C---- Braddock	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
2D---- Braddock	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
3B*:											
Braddock	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Urban land.											
4C---- Carbo	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
4D---- Carbo	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
5C---- Carbo	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
5D---- Carbo	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
6E*:											
Carbo	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.											
7A---- Cotaco	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
7B---- Cotaco	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
7C---- Cotaco	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life
8---------- Dunning	Very poor.	Poor	Poor	Poor	Poor	---	Good	Good	Poor	Poor	Good
9. Fluvaquents											
10B---------- Frederick	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
10C---------- Frederick	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
10D---------- Frederick	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
11C*: Gilpin----------	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.
Lily----------	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
11D*: Gilpin----------	Very poor.	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
Lily----------	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
11F*: Gilpin----------	Very poor.	Poor	Good	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Lily----------	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
12B*: Groseclose--------	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Urban land.											
12C*: Groseclose--------	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.											
13B*: Groseclose--------	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Poplimento--------	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
13C*: Groseclose--------	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Poplimento--------	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
13D*: Groseclose--------	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
13D*:											
Poplimento	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor
14C*:											
Klinesville	Very poor.	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
14F*:											
Klinesville	Very poor.	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Berks	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
15C*:											
Leck Kill	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Rayne	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
15D*:											
Leck Kill	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Rayne	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
16D*:											
Lily	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Ramsey	Very poor.	Very poor.	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
16F*:											
Lily	Very poor.	Very poor.	Good	Good	Good	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Ramsey	Very poor.	Very poor.	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
17*:											
Lindside	Poor	Fair	Fair	Good	Good	---	Poor	Poor	Fair	Good	Poor
Nolin	Poor	Fair	Fair	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.
18B---- Lodi	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
18C---- Lodi	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
18D---- Lodi	Fair	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
19C---- Lodi	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
19D---- Lodi	Fair	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
20B---- Lowell	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
20C---- Lowell	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
20D---- Lowell	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
21B*: Lowell----	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Urban land.											
21C*: Lowell----	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.											
22C---- Monongahela	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
22D---- Monongahela	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
23---- Newark Variant	Poor	Fair	Fair	Good	Good	---	Fair	Fair	Fair	Good	Fair
24C---- Nolichucky	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
24D---- Nolichucky	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
25C---- Nolichucky	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
25D---- Nolichucky	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
25F---- Nolichucky	Very poor.	Very poor.	Good	Good	Good	---	Very poor.	Very poor.	Poor	Fair	Very poor.
26F*: Ramsey----	Very poor.	Very poor.	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Lily----	Very poor.	Very poor.	Good	Good	Good	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.											
27C---- Rayne	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
27D---- Rayne	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
27E---- Rayne	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
28F*: Rayne----	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
28F*:											
Berks	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Groseclose	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
29F*:											
Rock outcrop.											
Newbern	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Carbo	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
30C---- Sherando	Fair	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
31F---- Sherando	Very poor.	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
32B---- Slabtown	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
32C---- Slabtown	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
33*. Urban land											
34---- Wheeling	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
35C*:											
Wurno	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Newbern	Fair	Good	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
Faywood	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
35D*:											
Wurno	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Newbern	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
Faywood	Poor	Poor	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
35E*:											
Wurno	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Newbern	Very poor.	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Faywood	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
36---- Zoar	Fair	Good	Good	Good	Good	---	Good	Fair	Good	Good	Fair

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1C*:						
Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
1D*, 1F*:						
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
2B Braddock	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
2C Braddock	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
2D Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
3B*:						
Braddock	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.
Urban land.						
4C Carbo	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
4D Carbo	Severe: slope, depth to rock.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
5C Carbo	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope, thin layer.
5D Carbo	Severe: slope, depth to rock.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
6E*:						
Carbo	Severe: slope, depth to rock.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Rock outcrop.						
7A Cotaco	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
7B---------- Cotaco	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness.
7C---------- Cotaco	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness.
8---------- Dunning	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
9. Fluvaquents						
10B---------- Frederick	Moderate: too clayey.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
10C---------- Frederick	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Severe: shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
10D---------- Frederick	Severe: slope.	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
11C*: Gilpin----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
Lily----------	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, thin layer.
11D*, 11F*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lily----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
12B*: Groseclose-------	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Urban land.						
12C*: Groseclose-------	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: slope.
Urban land.						
13B*: Groseclose-------	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
Poplimento-------	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
13C*:						
Groseclose	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: slope.
Poplimento	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
13D*:						
Groseclose	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Poplimento	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
14C*:						
Klinesville	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: small stones, thin layer.
Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
14F*:						
Klinesville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope, thin layer.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
15C*:						
Leck Kill	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Rayne	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
15D*:						
Leck Kill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
16D*, 16F*:						
Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ramsey	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
17*:						
Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
18B	Moderate:	Moderate:	Moderate:	Moderate:	Severe:	Slight.
Lodi	too clayey.	shrink-swell.	shrink-swell.	shrink-swell, slope.	low strength.	
18C	Moderate:	Moderate:	Moderate:	Severe:	Severe:	Moderate:
Lodi	slope, too clayey.	shrink-swell, slope.	slope, shrink-swell.	slope.	low strength.	slope.
18D	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Lodi	slope.	slope.	slope.	slope.	low strength, slope.	slope.
19C	Moderate:	Moderate:	Moderate:	Severe:	Severe:	Severe:
Lodi	slope, too clayey.	shrink-swell, slope.	slope, shrink-swell.	slope.	low strength.	small stones.
19D	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Lodi	slope.	slope.	slope.	slope.	low strength, slope.	small stones, slope.
20B	Moderate:	Moderate:	Moderate:	Moderate:	Severe:	Slight.
Lowell	depth to rock, too clayey.	shrink-swell.	depth to rock, shrink-swell.	shrink-swell, slope.	low strength.	
20C	Moderate:	Moderate:	Moderate:	Severe:	Severe:	Moderate:
Lowell	depth to rock, too clayey, slope.	shrink-swell, slope.	depth to rock, slope, shrink-swell.	slope.	low strength.	slope.
20D	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Lowell	slope.	slope.	slope.	slope.	low strength, slope.	slope.
21B*:						
Lowell	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Urban land.						
21C*:						
Lowell	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Urban land.						
22C	Severe:	Moderate:	Severe:	Severe:	Moderate:	Moderate:
Monongahela	wetness.	wetness, slope.	wetness.	slope.	slope, low strength, wetness.	slope.
22D	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Monongahela	slope, wetness.	slope.	slope, wetness.	slope.	slope.	slope.
23	Severe:	Severe:	Severe:	Severe:	Severe:	Severe:
Newark Variant	wetness.	flooding, wetness.	flooding, wetness.	flooding, wetness.	low strength, wetness, flooding.	wetness.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
24C---------- Nolichucky	Moderate: slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
24D---------- Nolichucky	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
25C---------- Nolichucky	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Severe: small stones.
25D, 25F---------- Nolichucky	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: small stones, slope.
26F*: Ramsey----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer.
Lily----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
27C---------- Rayne	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
27D, 27E---------- Rayne	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
28F*: Rayne----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Groseclose----------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, slope, shrink-swell.	Severe: slope.
29F*: Rock outcrop.						
Newbern----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: thin layer, slope, small stones.
Carbo----------	Severe: slope, depth to rock.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
30C---------- Sherando	Severe: cutbanks cave.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: large stones.	Severe: large stones.
31F---------- Sherando	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
32B---------- Slabtown	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Moderate: wetness, shrink-swell, slope.	Moderate: shrink-swell, low strength.	Moderate: wetness.
32C---------- Slabtown	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: wetness, slope.
33*. Urban land						
34---------- Wheeling	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: frost action, low strength.	Slight.
35C*: Wurno----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: thin layer, small stones.
Newbern----------	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: thin layer, small stones.
Faywood----------	Severe: depth to rock.	Moderate: slope, depth to rock, shrink-swell.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
35D*, 35E*: Wurno----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Newbern----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: thin layer, slope, small stones.
Faywood----------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
36---------- Zoar	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1C*:					
Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
1D*, 1F*:					
Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
2B	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack.
Braddock					
2C	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Braddock					
2D	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Braddock					
3B*:					
Braddock	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack.
Urban land.					
4C	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Carbo					
4D	Severe: depth to rock, percs slowly, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Carbo					
5C	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Carbo					
5D	Severe: depth to rock, percs slowly, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Carbo					

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
6E*: Carbo	Severe: depth to rock, percs slowly, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
7A, 7B--- Cotaco	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: small stones, wetness.
7C--- Cotaco	Severe: wetness.	Severe: wetness, slope.	Severe: wetness.	Severe: seepage, wetness.	Fair: small stones, wetness.
8--- Dunning	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
9. Fluvaquents					
10B--- Frederick	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight---	Poor: too clayey, hard to pack.
10C--- Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
10D--- Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
11C*: Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
11D*, 11F*: Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
12B*: Groseclose	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
Urban land.					

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
12C*:					
Groseclose	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Urban land.					
13B*:					
Groseclose	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
13C*:					
Groseclose	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Poplimento	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
13D*:					
Groseclose	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Poplimento	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
14C*:					
Klinesville	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, seepage, small stones.
Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
14F*:					
Klinesville	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, seepage, small stones.
Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
15C*:					
Leck Kill	Moderate: percs slowly, slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
Rayne	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: small stones, thin layer, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15D*:					
Leck Kill	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: small stones, slope.
Rayne	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
16D*, 16F*:					
Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Ramsey	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
17*:					
Lindside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey.
18B---- Lodi	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
18C---- Lodi	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
18D---- Lodi	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope, hard to pack.
19C---- Lodi	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
19D---- Lodi	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope, hard to pack.
20B---- Lowell	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
20C---- Lowell	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
20D---- Lowell	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21B*:					
Lowell	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
Urban land.					
21C*:					
Lowell	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Urban land.					
22C					
Monongahela	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Fair: small stones, wetness, slope.
22D					
Monongahela	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope.
23					
Newark Variant	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
24C					
Nolichucky	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey, slope.	Moderate: slope.	Fair: too clayey, small stones.
24D					
Nolichucky	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Fair: too clayey, small stones.
25C					
Nolichucky	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
25D, 25F					
Nolichucky	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
26F*:					
Ramsey	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
27C					
Rayne	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: small stones, thin layer, slope.
27D, 27E					
Rayne	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28F*:					
Rayne	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Berks	Severe: depth to rock, slope.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
Groseclose	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
29F*:					
Rock outcrop.					
Newbern	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: thin layer, area reclaim, slope.
Carbo	Severe: depth to rock, percs slowly, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
30C					
Sherando	Severe: poor filter.	Severe: seepage, large stones.	Severe: seepage, large stones.	Severe: seepage.	Poor: seepage, large stones.
31F					
Sherando	Severe: poor filter, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: slope, seepage.	Poor: seepage, large stones, slope.
32B					
Slabtown	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
32C					
Slabtown	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
33*.					
Urban land					
34					
Wheeling	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
35C*:					
Wurno	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones, thin layer.
Newbern	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, area reclaim.
Faywood	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
35D*, 35E*: Wurno	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope, thin layer.
Newbern	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: thin layer, area reclaim, slope.
Faywood	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: area reclaim, too clayey, hard to pack.
36--- Zoar	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1C*:				
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
1D*, 1F*:				
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
2B, 2C Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
2D Braddock	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
3B*:				
Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Urban land.				
4C, 4D, 5C, 5D Carbo	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
6E*:				
Carbo	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
Rock outcrop.				
7A, 7B, 7C Cotaco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
8 Dunning	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
9. Fluvaquents				
10B, 10C Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
10D Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, thin layer.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11C*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Lily	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
11D*, 11F*:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Lily	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
12B*:				
Groseclose	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
12C*:				
Groseclose	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
13B*, 13C*:				
Groseclose	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Poplimento	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
13D*:				
Groseclose	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Poplimento	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
14C*:				
Klinesville	Poor: area reclaim.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, small stones.
Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
14F*:				
Klinesville	Poor: area reclaim, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, small stones, slope.
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
15C*:				
Leck Kill	Fair: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Rayne	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
15D*:				
Leck Kill	Fair: thin layer, slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rayne	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
16D*, 16F*:				
Lily	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ramsey	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
17*:				
Lindside	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
18B, 18C Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
18D Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
19C Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
19D Lodi	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
20B, 20C Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
20D Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
21B*, 21C*:				
Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Urban land.				

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
22C---------- Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
22D---------- Monongahela	Fair: low strength, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
23---------- Newark Variant	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
24C---------- Nolichucky	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
24D---------- Nolichucky	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
25C---------- Nolichucky	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones, slope.
25D---------- Nolichucky	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
25F---------- Nolichucky	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
26F*: Ramsey----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Lily----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
27C---------- Rayne	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
27D---------- Rayne	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
27E---------- Rayne	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
28F*: Rayne----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
28F*:				
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Groseclose	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
29F*:				
Rock outcrop.				
Newbern	Poor: thin layer, area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, area reclaim, slope.
Carbo	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, large stones.
30C	Fair: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
Sherando				
31F	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim, slope.
Sherando				
32B	Fair: low strength, thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Slabtown				
32C	Fair: low strength, thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Slabtown				
33*.				
Urban land				
34	Fair: low strength.	Probable	Probable	Fair: small stones.
Wheeling				
35C*:				
Wurno	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, thin layer.
Newbern	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, area reclaim.
Faywood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
35D*:				
Wurno	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, thin layer.
Newbern	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, area reclaim, slope.
Faywood	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
35E*:				
Wurno	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, thin layer.
Newbern	Poor: thin layer, area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, area reclaim, slope.
Faywood	Poor: area reclaim, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
36 Zoar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1C*, 1D*, 1F*: Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
2B Braddock	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
2C, 2D Braddock	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
3B*: Braddock	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
Urban land.						
4C*, 4D, 5C, 5D--- Carbo	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
6E*: Carbo	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						
7A Cotaco	Moderate: seepage.	Severe: piping, wetness.	Favorable	Wetness	Erodes easily, wetness.	Erodes easily.
7B, 7C Cotaco	Moderate: seepage.	Severe: piping, wetness.	Slope	Wetness, slope.	Erodes easily, wetness.	Erodes easily.
8 Dunning	Slight	Severe: wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
9. Fluvaquents						
10B Frederick	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
10C, 10D Frederick	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
11C*, 11D*, 11F*: Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
12B*:						
Groseclose	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Urban land.						
12C*:						
Groseclose	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Urbanland.						
13B*:						
Groseclose	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Poplimento	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
13C*, 13D*:						
Groseclose	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Poplimento	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
14C*, 14F*:						
Klinesville	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Slope, droughty, depth to rock.
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
15C*, 15D*:						
Leck Kill	Severe: seepage, slope.	Moderate: thin layer.	Deep to water	Slope	Slope	Slope.
Rayne	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
16D*, 16F*:						
Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Ramsey	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
17*:						
Lindside	Moderate: seepage.	Severe: piping.	Flooding, frost action.	Flooding, wetness, erodes easily.	Wetness, erodes easily.	Erodes easily.
Nolin	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
18B Lodi	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
18C, 18D---------- Lodi	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
19C, 19D---------- Lodi	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope----------	Slope----------	Slope.
20B---------- Lowell	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
20C---------- Lowell	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
20D---------- Lowell	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
21B*: Lowell----------	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Urban land.						
21C*: Lowell----------	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
Urban land.						
22C, 22D---------- Monongahela	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
23---------- Newark Variant	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
24C---------- Nolichucky	Moderate: seepage.	Slight---------	Deep to water	Slope----------	Slope----------	Slope.
24D---------- Nolichucky	Severe: slope.	Slight---------	Deep to water	Slope----------	Slope----------	Slope.
25C, 25D, 25F----- Nolichucky	Severe: seepage, slope.	Moderate: large stones, piping.	Deep to water	Slope----------	Slope, large stones.	Large stones, slope.
26F*: Ramsey----------	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Lily----------	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.						
27C, 27D, 27E----- Rayne	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
28F*: Rayne----------	Severe: slope.	Severe: piping.	Deep to water	Slope----------	Slope----------	Slope.
Berks----------	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty, depth to rock.	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
Groseclose-------	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, slope, erodes easily.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
29F*: Rock outcrop.						
Newbern	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, droughty.	Slope, depth to rock.	Slope, depth to rock, droughty.
Carbo	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
30C Sherando	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Large stones	Large stones, droughty.
31F Sherando	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
32B Slabtown	Moderate: seepage, slope.	Moderate: piping, wetness.	Slope	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
32C Slabtown	Severe: slope.	Moderate: piping, wetness.	Slope	Wetness, slope, erodes easily.	Slope, erodes easily, wetness.	Slope, erodes easily.
33*. Urban land						
34 Wheeling	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
35C*, 35D*, 35E*: Wurno	Severe: slope, seepage.	Severe: thin layer, piping.	Deep to water	Depth to rock, slope, droughty.	Slope, depth to rock.	Slope, depth to rock, droughty.
Newbern	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, droughty.	Slope, depth to rock.	Slope, depth to rock, droughty.
Faywood	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
36 Zoar	Slight	Severe: hard to pack, thin layer.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness.	Erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1C*, 1D*, 1F*:											
Berks	0-7	Shaly silt loam	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	7-15	Shaly loam, very shaly loam, shaly silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	15-27	Shaly loam, very shaly loam, shaly silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin	0-9	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	9-17	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	17-23	Channery loam, very channery silt loam, shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-65	20-65	15-45	15-40	20-40	4-15
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
2B, 2C, 2D---- Braddock	0-7	Loam	CL, SM, ML, SC	A-2, A-4	0-5	85-100	75-95	50-85	25-65	<30	NP-10
	7-60	Clay loam, gravelly sandy clay, clay.	MH, CH, CL, SC	A-7, A-2	0-15	70-95	70-90	45-90	20-80	42-60	15-33
3B*:											
Braddock	0-7	Loam	CL, SM, ML, SC	A-2, A-4	0-5	85-100	75-95	50-85	25-65	<30	NP-10
	7-60	Clay loam, gravelly sandy clay, clay.	MH, CH, CL, SC	A-7, A-2	0-15	70-95	70-90	45-90	20-80	42-60	15-33
Urban land.											
4C, 4D, 5C, 5D--- Carbo	0-5	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	5-31	Clay	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
6E*:											
Carbo	0-5	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-25
	5-31	Clay	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
7A, 7B, 7C---- Cotaco	0-15	Loam	ML, CL-ML, SM, SM-SC	A-4	0-5	80-100	75-95	55-85	35-80	<30	NP-7
	15-60	Sandy clay loam, clay loam, loam.	SC, SM, ML, CL	A-2, A-4, A-6	0-10	80-100	75-95	40-70	20-70	<35	NP-15
8---- Dunning	0-17	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-95	34-42	15-22
	17-60	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
9. Fluvaquents											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
10B, 10C, 10D---- Frederick	0-7	Loam----------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	7-28	Silty clay, clay, cherty clay.	CH, MH-CH	A-7	0-5	80-100	65-100	65-100	65-100	50-70	25-40
	28-43	Clay, clay loam, silty clay.	CH, ML-CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	43-60	Clay, silty clay	CH, MH	A-7	0-5	90-100	85-100	75-100	65-95	60-85	25-55
11C*, 11D*, 11F*: Gilpin----------	0-9	Silt loam---------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	9-17	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	17-23	Channery loam, very channery silt loam, shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lily----------	0-3	Sandy loam-------	SM	A-4, A-2	0-5	90-100	85-100	55-80	25-50	<20	NP-4
	3-34	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6, A-1-B	0-10	65-100	50-100	40-95	20-75	<35	3-15
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
12B*: Groseclose------	0-8	Silt loam---------	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	80-100	70-100	50-100	30-90	25-40	5-15
	8-60	Clay, silty clay loam, clay loam.	CH	A-7	0	80-100	70-100	70-100	50-95	50-95	30-60
Urban land.											
12C*: Groseclose------	0-8	Silt loam---------	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	80-100	70-100	50-100	30-90	25-40	5-15
	8-60	Clay, silty clay loam, clay loam.	CH	A-7	0	80-100	70-100	70-100	50-95	50-95	30-60
Urban land.											
13B*, 13C*, 13D*: Groseclose------	0-8	Silt loam---------	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	80-100	70-100	50-100	30-90	25-40	5-15
	8-60	Clay, silty clay loam, clay loam.	CH	A-7	0	80-100	70-100	70-100	50-95	50-95	30-60
Poplimento------	0-14	Silt loam---------	CL, CL-ML	A-4, A-6	0-5	80-100	75-100	65-100	50-90	25-40	5-15
	14-60	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	80-100	75-100	65-95	60-90	45-65	30-60
14C*, 14F*: Klinesville-----	0-7	Shaly silt loam	GM, SM	A-2, A-4	0-10	55-85	45-60	35-50	25-40	---	---
	7-14	Shaly silt loam, very shaly silt loam.	GM, GP, SM, SP	A-2, A-1, A-4	0-10	25-75	15-55	10-50	4-40	20-35	NP-9
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
14C*, 14F*:											
Berks	0-7	Shaly silt loam	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	7-15	Shaly loam, very shaly loam, shaly silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	15-27	Shaly loam, very shaly loam, shaly silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
15C*:											
Leck Kill	0-8	Silt loam	ML, CL	A-4	0	85-100	75-95	65-95	50-85	---	---
	8-60	Silty clay loam, loam, shaly silty clay loam.	GM, SC, GC, CL	A-4, A-2, A-6	0-10	60-90	50-85	40-80	30-70	23-40	2-17
Rayne	0-7	Silt loam	ML, CL	A-4	0-5	85-100	80-100	70-85	60-80	---	---
	7-18	Loam, silty clay loam, channery clay loam.	GM, ML, GC, CL	A-4, A-6, A-2	0-15	60-95	60-95	40-85	30-60	20-40	2-15
	18-60	Channery sandy loam, shaly silt loam, very shaly silty clay loam.	SM, ML, GM, GP-GM	A-4, A-2, A-1	0-35	40-90	15-80	15-75	10-60	20-35	NP-10
	60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15D*:											
Leck Kill	0-8	Silt loam	ML, CL	A-4	0	85-100	75-95	65-95	50-85	---	---
	8-60	Silty clay loam, loam, shaly silty clay loam.	GM, SC, GC, CL	A-4, A-2, A-6	0-10	60-90	50-85	40-80	30-70	23-40	2-17
Rayne	0-7	Silt loam	ML, CL	A-4	0-5	85-100	80-100	70-85	60-80	---	---
	7-18	Loam, silty clay loam, channery clay loam.	GM, ML, GC, CL	A-4, A-6, A-2	0-15	60-95	60-95	40-85	30-60	20-40	2-15
	18-62	Channery sandy loam, shaly silt loam, very shaly silty clay loam.	SM, ML, GM, GP-GM	A-4, A-2, A-1	0-35	40-90	15-80	15-75	10-60	20-35	NP-10
	62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
16D*, 16F*:											
Lily	0-3	Very stony sandy loam.	SM, ML	A-2, A-4	5-20	90-95	85-90	55-90	25-75	<35	NP-7
	3-34	Sandy clay loam, loam, gravelly loam.	SM, GC, ML, CL	A-2, A-4, A-6	5-20	65-95	60-90	50-85	20-75	<35	NP-15
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ramsey	0-6	Very stony sandy loam.	SM, SC, ML, CL	A-4, A-2	15-30	75-90	65-85	50-75	34-65	15-25	2-8
	6-16	Gravelly sandy loam, loam.	SM	A-2	0-10	75-95	65-90	50-75	25-45	<10	NP
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
17*:											
Lindside	0-10	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	10-38	Silty clay loam, silt loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
	38-60	Silt loam, silty clay loam, gravelly loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	60-100	55-100	50-100	35-95	20-40	4-18
Nolin	0-12	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	12-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
18B, 18C, 18D---- Lodi	0-8	Loam	ML, CL, SM, SC	A-2, A-4, A-6	0-5	80-100	75-95	50-90	25-85	<30	NP-15
	8-12	Loam, silt loam, clay loam.	CL	A-6	0-10	85-100	75-95	65-90	55-85	25-40	10-20
	12-40	Clay, silty clay loam, sandy clay loam.	CH, MH, CL, SC	A-7, A-6	0-5	85-100	75-95	60-95	40-80	40-60	20-35
	40-65	Silty clay, clay loam, loam.	ML, SM, CL	A-4, A-6	0-5	85-100	75-95	60-85	40-80	<40	NP-25
19C, 19D---- Lodi	0-8	Cherty loam	GM, GC, SM, SC	A-2, A-4, A-6	15-25	50-85	40-75	30-60	15-50	<30	NP-15
	8-12	Loam, silt loam, clay loam.	CL	A-6	0-10	85-100	75-95	65-90	55-85	25-40	10-20
	12-40	Clay, silty clay loam, sandy clay loam.	CH, MH, CL, SC	A-7, A-6	0-5	85-100	75-95	60-95	40-80	40-60	20-35
	40-65	Silty clay, clay loam, loam.	ML, SM, CL	A-4, A-6	0-5	85-100	75-95	60-85	40-80	<40	NP-25
20B, 20C, 20D---- Lowell	0-11	Silt loam	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	4-10
	11-38	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	38-60	Silty clay, silty clay loam.	CH, MH, CL	A-7	0-20	95-100	90-100	85-100	75-100	45-75	20-40
21B*, 21C*:											
Lowell	0-11	Silt loam	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	4-10
	11-38	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	38-60	Silty clay, silty clay loam.	CH, MH, CL	A-7	0-20	95-100	90-100	85-100	75-100	45-75	20-40
Urban land.											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22C, 22D--------- Monongahela	0-7	Silt loam---------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	7-23	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	23-46	Silt loam, sandy clay loam, gravelly silt loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	46-60	Silt loam, clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
23--------------- Newark Variant	0-21	Silt loam---------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	21-42	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-95	22-42	3-20
	42-63	Silty clay loam, very gravelly or clay loam.	CH, GC CL-ML	A-6, A-7	0-10	50-60	40-55	30-45	20-35	>50	30-60
24C, 24D--------- Nolichucky	0-16	Gravelly sandy loam.	SM, GM, SC, GC	A-4, A-2, A-1-B	0-20	60-75	55-75	30-70	15-50	15-25	3-10
	16-43	Clay loam, gravelly loam, loam.	SC, GC, CL	A-4, A-2, A-6	0-20	60-100	55-100	45-90	20-75	25-35	8-15
	43-52	Clay loam, gravelly clay loam, sandy clay loam.	CL, SC, GC	A-6, A-7, A-2	0-20	60-100	55-100	45-95	25-85	35-45	15-22
	52-60	Clay loam, clay, gravelly clay loam.	CL, CH, SC, GC	A-6, A-7, A-2	0-20	60-100	55-100	45-95	25-90	38-55	17-30
25C, 25D, 25F---- Nolichucky	0-16	Very stony sandy loam.	GW-GM, GM, SM	A-1, A-2, A-4	5-20	40-65	35-60	25-50	10-40	<30	NP-10
	16-43	Sandy clay loam, gravelly sandy loam, loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0-15	65-95	60-95	50-80	25-65	20-30	5-15
	43-52	Sandy clay loam, clay loam, gravelly clay loam.	GC, SC, CL	A-6, A-7	0-15	65-100	60-100	50-95	36-70	30-50	11-25
	52-60	Clay, clay loam, sandy clay loam.	GC, SC, CL, CH	A-6, A-7	0-15	65-100	60-100	50-95	36-75	35-60	15-35
26F*: Ramsey----------	0-16	Stony sandy loam	SM, SC, ML, CL	A-4, A-2	15-30	75-90	65-85	50-75	34-65	15-25	2-8
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lily----------	0-3	Very stony sandy loam.	SM, ML	A-2, A-4	5-20	90-95	85-90	55-90	25-75	<35	NP-7
	3-34	Sandy clay loam, loam, gravelly loam.	SM, GC, ML, CL	A-2, A-4, A-6	5-20	65-95	60-90	50-85	20-75	<35	NP-15
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27C, 27D, 27E---- Rayne	0-7	Silt loam--------	ML, CL	A-4	0-5	85-100	80-100	70-85	60-80	---	---
	7-18	Loam, silty clay loam, channery clay loam.	GM, ML, GC, CL	A-4, A-6, A-2	0-15	60-95	60-95	40-85	30-60	20-40	2-15
	18-60	Channery sandy loam, shaly silt loam, very shaly silty clay loam.	SM, ML, GM, GP-GM	A-4, A-2, A-1	0-35	40-90	15-80	15-75	10-60	20-35	NP-10
	60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
28F*:											
Rayne----------	0-7	Silt loam--------	ML, CL	A-4	0-5	85-100	80-100	70-85	60-80	---	---
	7-18	Loam, silty clay loam, channery clay loam.	GM, ML, GC, CL	A-4, A-6, A-2	0-15	60-95	60-95	40-85	30-60	20-40	2-15
	18-60	Channery sandy loam, shaly silt loam, very shaly silty clay loam.	SM, ML, GM, GP-GM	A-4, A-2, A-1	0-35	40-90	15-80	15-75	10-60	20-35	NP-10
	60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks----------	0-7	Shaly silt loam	GM, ML, GC, SC	A-2, A-4	0-20	50-80	45-70	40-60	30-55	25-36	5-10
	7-15	Shaly loam, very shaly loam, shaly silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	15-27	Shaly loam, very shaly loam, shaly silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
Groseclose------	0-8	Silt loam--------	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	80-100	70-100	50-100	30-90	25-40	5-15
	8-60	Clay, silty clay loam, clay loam.	CH	A-7	0	80-100	70-100	70-100	50-95	50-95	30-60
29F*: Rock outcrop.											
Newbern---------	0-5	Silt loam--------	ML, CL-ML, CL, GM	A-2, A-4	0-5	60-100	50-95	30-95	20-90	10-20	NP-10
	5-13	Loam, silt loam, shaly silt loam.	ML, CL, CL-ML, GM	A-2, A-4, A-6	0-5	60-100	50-95	30-95	20-90	10-30	NP-15
	13-18	Weathered bedrock	---	---	---	---	---	---	---	---	---
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Carbo----------	0-5	Silty clay loam	CL	A-6, A-7	0-2	95-100	90-100	85-95	75-85	30-50	10-15
	5-31	Clay------------	CH	A-7	0-5	95-100	85-100	80-95	70-90	60-80	35-55
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
30C---------- Sherando	0-4	Gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-25	50-80	40-75	25-60	12-40	<25	NP-5
	4-60	Gravelly sandy loam, cobbly sandy loam.	GM, SM, SM-SC	A-2, A-1	5-50	30-75	30-70	20-60	12-30	<25	NP-9
31F---------- Sherando	0-4	Rubbly sandy loam	SM, GM	A-2, A-4, A-1	50-75	50-75	40-75	40-60	20-40	<25	NP-5
	4-60	Gravelly sandy loam, cobbly sandy loam.	GM, SM, SM-SC	A-2, A-1	5-50	50-80	40-75	25-50	12-30	<30	NP-9

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
32B---------- Slabtown	0-18	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0-5	85-100	80-95	70-90	60-85	15-35	NP-15
	18-34	Loam, silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-5	85-100	80-95	70-90	60-85	20-40	4-20
	34-45	Silt loam, silty clay loam, gravelly silty clay loam.	CL-ML, CL	A-4, A-6, A-7	0-5	85-100	70-90	65-85	60-80	25-45	7-25
	45-76	Silty clay loam, silty clay, clay.	CH, CL	A-7	0-5	90-100	85-100	80-100	70-95	45-70	20-40
32C---------- Slabtown	0-18	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0-5	85-100	80-95	70-90	60-85	15-35	NP-15
	18-34	Loam, silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-5	85-100	80-95	70-90	60-85	20-40	4-20
	34-45	Silt loam, silty clay loam, gravelly silty clay loam.	CL-ML, CL	A-4, A-6, A-7	0-5	85-100	70-90	65-85	60-80	25-45	7-25
	45-60	Silty clay loam, silty clay, clay.	CH, CL	A-7	0-5	90-100	85-100	80-100	70-95	45-70	20-40
33*. Urban land											
34---------- Wheeling	0-10	Loam, sandy loam	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	10-33	Silty clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	33-60	Gravelly sandy loam, sandy loam	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	5-45	<20	NP-10
35C*, 35D*, 35E*: Wurno----------	0-8	Silt loam--------	GM, GC, ML, CL	A-2, A-4	0-5	60-100	50-95	30-95	20-85	<30	NP-10
	8-14	Shaly silty clay loam, very shaly silt loam.	GM, GC, ML, CL	A-1, A-2, A-4, A-6	0-5	40-100	10-85	5-80	5-75	<30	NP-15
	14-21	Shaly silt loam, very shaly silt loam.	GM, GC, ML, CL	A-1, A-2, A-4	0-5	30-100	10-85	5-80	5-75	<30	NP-10
	21-27	Weathered bedrock	---	---	---	---	---	---	---	---	---
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Newbern----------	0-5	Silt loam--------	ML, CL-ML, CL, GM	A-2, A-4	0-5	60-100	50-95	30-95	20-90	10-20	NP-10
	5-13	Loam, silt loam, shaly loam.	ML, CL, CL-ML, GM	A-2, A-4, A-6	0-5	60-100	50-95	30-95	20-90	10-30	NP-15
	13-18	Very shaly loam, very shaly silt loam, shaly silt loam.	GM, GC, GM-GC	A-1, A-2	0-5	15-50	10-45	10-45	5-35	10-20	NP-10
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Faywood----------	0-10	Silt loam--------	ML, CL, CL-ML	A-4	0-15	100	95-100	90-100	85-100	25-35	4-10
	10-28	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
36---------- Zoar	0-18	Loam----------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-40	3-15
	18-26	Silty clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	85-100	30-55	11-32
	26-60	Clay loam, silty clay, clay.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	75-95	30-60	11-35

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
1C*, 1D*, 1F*:										
Berks	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low	0.17	3	.5-3
	7-15	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low	0.17		
	15-27	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low	0.17		
	27	---	---	---	---	---	---	---		
Gilpin	0-9	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3	1-4
	9-17	18-35	1.20-1.50	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24		
	17-23	15-35	1.20-1.50	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24		
	23	---	---	---	---	---	---	---		
2B, 2C, 2D	0-7	10-25	1.20-1.50	0.6-6.0	0.14-0.19	4.5-5.5	Low	0.32	4	1-2
Braddock	7-60	35-55	1.20-1.50	0.6-2.0	0.14-0.19	4.5-5.5	Moderate	0.24		
3B*:										
Braddock	0-7	10-25	1.20-1.50	0.6-6.0	0.14-0.19	4.5-5.5	Low	0.32	4	1-2
	7-60	35-55	1.20-1.50	0.6-2.0	0.14-0.19	4.5-5.5	Moderate	0.24		
Urban land.										
4C, 4D, 5C, 5D	0-5	20-40	1.20-1.40	0.6-2.0	0.16-0.19	4.5-7.3	Moderate	0.37	2	.5-3
Carbo	5-31	60-80	1.30-1.50	0.06-0.2	0.10-0.14	5.6-7.8	High	0.24		
	31	---	---	---	---	---	---	---		
6E*:										
Carbo	0-5	20-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate	0.37	2	.5-3
	5-31	60-80	1.30-1.50	0.06-0.2	0.10-0.14	6.6-7.8	High	0.24		
	31	---	---	---	---	---	---	---		
Rock outcrop.										
7A, 7B, 7C	0-15	7-27	1.20-1.40	0.6-6.0	0.12-0.20	4.5-5.5	Low	0.37	3	.5-4
Cotaco	15-60	18-35	1.20-1.50	0.6-2.0	0.07-0.15	4.5-5.5	Low	0.28		
8	0-17	27-40	1.20-1.40	0.6-2.0	0.19-0.23	5.6-7.8	Moderate	0.32	5	2-10
Dunning	17-60	35-60	1.40-1.65	0.06-0.2	0.14-0.18	5.6-7.8	Moderate	0.28		
9.										
Fluvaquents										
10B, 10C, 10D	0-7	13-23	1.25-1.50	2.0-6.0	0.15-0.24	4.5-6.0	Low	0.32	4	1-3
Frederick	7-28	40-75	1.40-1.65	0.6-2.0	0.09-0.18	4.5-5.5	Moderate	0.24		
	28-43	50-85	1.40-1.65	0.6-2.0	0.09-0.18	4.5-5.5	High	0.24		
	43-60	45-80	1.40-1.65	0.6-2.0	0.09-0.20	4.5-5.5	Moderate	0.24		
11C*, 11D*, 11F*:										
Gilpin	0-9	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3	1-4
	9-17	18-35	1.20-1.50	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24		
	17-23	15-35	1.20-1.50	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24		
	23	---	---	---	---	---	---	---		
Lily	0-3	5-20	1.20-1.40	2.0-6.0	0.09-0.16	3.6-5.5	Low	0.28	3	.5-4
	3-8	18-35	1.25-1.55	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.28		
	8-34	20-35	1.25-1.55	2.0-6.0	0.08-0.17	3.6-5.5	Low	0.17		
	34	---	---	---	---	---	---	---		
12B*:										
Groseclose	0-8	7-27	1.25-1.55	2.0-6.0	0.11-0.20	4.5-5.5	Low	0.43	4	1-2
	8-60	35-60	1.35-1.60	0.06-0.2	0.10-0.17	4.5-5.5	High	0.24		
Urban land.										

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
12C*:										
Groseclose------	0-8	7-27	1.25-1.55	2.0-6.0	0.11-0.20	4.5-5.5	Low----------	0.43	4	1-2
	8-60	35-60	1.35-1.60	0.06-0.2	0.10-0.17	4.5-5.5	High---------	0.24		
Urbanland.										
13B*, 13C*, 13D*:										
Groseclose------	0-8	7-27	1.25-1.55	2.0-6.0	0.11-0.20	4.5-5.5	Low----------	0.43	4	1-2
	8-60	35-60	1.35-1.60	0.06-0.2	0.10-0.17	4.5-5.5	High---------	0.24		
Poplimento------	0-14	17-27	1.20-1.35	0.6-2.0	0.15-0.22	4.5-6.0	Low----------	0.32	4	.5-2
	14-60	35-60	1.30-1.60	0.2-0.6	0.10-0.14	4.5-6.0	High---------	0.24		
14C*, 14F*:										
Klinesville-----	0-7	10-25	1.20-1.40	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20	2	.5-2
	7-14	10-20	1.40-1.60	2.0-6.0	0.06-0.10	4.5-6.0	Low----------	0.20		
	14	---	---	---	---	---	----------	----		
Berks----------	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	.5-3
	7-15	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	15-27	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	27	---	---	---	---	---	----------	----		
15C*:										
Leck Kill-------	0-8	10-20	1.20-1.50	0.6-6.0	0.16-0.20	4.5-5.5	Low----------	0.32	3	1-3
	8-60	17-32	1.40-1.70	0.6-6.0	0.12-0.16	4.5-5.5	Low----------	0.24		
Rayne----------	0-7	10-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.28	3	1-3
	7-18	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.20		
	18-60	10-30	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.20		
	60	---	---	---	---	---	----------	----		
15D*:										
Leck Kill-------	0-8	10-20	1.20-1.50	0.6-6.0	0.16-0.20	4.5-5.5	Low----------	0.32	3	1-3
	8-60	17-32	1.40-1.70	0.6-6.0	0.12-0.16	4.5-5.5	Low----------	0.24		
Rayne----------	0-7	10-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.28	3	1-3
	7-18	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.20		
	18-62	10-30	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.20		
	62	---	---	---	---	---	----------	----		
16D*, 16F*:										
Lily----------	0-3	5-25	1.20-1.40	0.6-6.0	0.09-0.16	4.5-5.5	Low----------	0.24	3	.5-4
	3-8	18-35	1.25-1.55	2.0-6.0	0.12-0.18	4.5-5.5	Low----------	0.24		
	8-34	18-35	1.25-1.55	2.0-6.0	0.08-0.17	4.5-5.5	Low----------	0.17		
	34	---	---	---	---	---	----------	----		
Ramsey----------	0-16	5-15	1.20-1.40	6.0-20	0.06-0.10	4.5-5.5	Low----------	0.17	1	---
	16	---	---	---	---	---	----------	----		
17*:										
Lindside--------	0-10	15-27	1.20-1.40	0.6-2.0	0.20-0.26	5.6-7.8	Low----------	0.37	5	2-4
	10-38	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.6-7.8	Low----------	0.32		
	38-60	18-35	1.20-1.40	0.2-6.0	0.12-0.18	5.6-7.8	Low----------	0.32		
Nolin----------	0-12	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43	5	2-4
	12-60	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43		
18B, 18C, 18D----	0-8	12-25	1.20-1.50	0.6-6.0	0.14-0.18	4.5-5.5	Low----------	0.37	4	.5-2
Lodi	8-12	35-60	1.30-1.60	0.6-2.0	0.12-0.15	4.5-5.5	Moderate-----	0.28		
	12-40	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate-----	0.28		
	40-65	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate-----	----		
19C----------	0-8	12-25	1.25-1.55	0.6-6.0	0.07-0.14	4.5-5.5	Low----------	0.28	4	.5-2
Lodi	8-12	35-60	1.30-1.60	0.6-2.0	0.12-0.15	4.5-5.5	Moderate-----	0.28		
	12-40	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate-----	0.28		
	40-65	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate-----	----		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
29F*:										
Newbern	0-5	10-27	1.20-1.50	0.6-2.0	0.07-0.20	5.6-7.3	Low	0.28	2	1-2
	5-13	10-27	1.30-1.60	0.6-2.0	0.07-0.20	6.1-7.3	Low	0.28		
	13-18	10-27	1.30-1.60	0.6-2.0	0.02-0.10	6.6-7.8	Low	0.17		
	18	---	---	---	---	---	---	---		
Carbo	0-5	20-40	1.20-1.40	0.6-2.0	0.16-0.19	6.1-7.3	Moderate	0.37	2	.5-3
	5-31	60-80	1.30-1.50	0.06-0.2	0.10-0.14	6.6-7.8	High	0.24		
	31	---	---	---	---	---	---	---		
30C	0-4	5-15	1.35-1.65	2.0-6.0	0.08-0.12	4.5-5.5	Low	0.24	4	.5-2
Sherando	4-60	10-20	1.40-1.65	2.0-20	0.05-0.08	4.5-5.5	Low	0.17		
31F	0-4	10-20	1.40-1.65	2.0-6.0	0.06-0.10	4.5-5.5	Low	0.20	4	.5-2
Sherando	4-60	10-20	1.40-1.65	2.0-20	0.05-0.08	4.5-5.5	Low	0.17		
32B	0-18	10-27	1.25-1.50	0.6-2.0	0.18-0.22	5.6-7.8	Low	0.43	4	1-3
Slabtown	18-35	15-32	1.25-1.50	0.6-2.0	0.16-0.20	5.6-7.8	Low	0.43		
	35-46	20-35	1.30-1.60	0.6-2.0	0.14-0.20	6.1-7.8	Moderate	0.32		
	46-76	35-60	1.25-1.55	0.2-0.6	0.11-0.16	6.1-7.8	High	0.24		
32C	0-18	10-27	1.25-1.50	0.6-2.0	0.18-0.22	5.6-7.8	Low	0.43	4	1-3
Slabtown	18-35	15-32	1.25-1.50	0.6-2.0	0.16-0.20	5.6-7.8	Low	0.43		
	35-46	20-35	1.30-1.60	0.6-2.0	0.14-0.20	6.1-7.8	Moderate	0.32		
	46-60	35-60	1.25-1.55	0.2-0.6	0.11-0.16	6.1-7.8	High	0.24		
33*.										
Urban land										
34	0-10	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.0	Low	0.37	4	1-3
Wheeling	10-33	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low	0.32		
	33-60	8-15	1.30-1.50	6.0-20	0.04-0.08	5.1-6.0	Low	0.20		
35C*, 35D*, 35E*:										
Wurno	0-8	10-27	1.20-1.50	0.6-2.0	0.07-0.20	6.1-7.8	Low	0.28	2	1-2
	8-14	20-35	1.30-1.60	0.6-2.0	0.03-0.20	6.1-7.8	Low	0.17		
	14-21	10-27	1.30-1.60	0.6-2.0	0.03-0.14	6.6-7.8	Low	0.17		
	21-27	---	---	---	---	---	---	---		
	27	---	---	---	---	---	---	---		
Newbern	0-5	10-27	1.20-1.50	0.6-2.0	0.07-0.20	5.6-7.3	Low	0.28	2	1-2
	5-13	10-27	1.30-1.60	0.6-2.0	0.07-0.20	6.1-7.3	Low	0.28		
	13-18	10-27	1.30-1.60	0.6-2.0	0.02-0.10	6.6-7.8	Low	0.17		
	18	---	---	---	---	---	---	---		
Faywood	0-10	15-27	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Low	0.37	3	1-4
	10-28	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.3	Moderate	0.28		
	28	---	---	---	---	---	---	---		
36	0-18	15-30	1.20-1.40	0.6-2.0	0.15-0.18	4.5-5.5	Low	0.43	3	1-4
Zoar	18-26	35-50	1.30-1.60	0.06-0.6	0.12-0.15	4.5-5.5	Moderate	0.32		
	26-60	35-50	1.40-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Moderate	0.32		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
19D----------	0-8	12-25	1.25-1.55	0.6-6.0	0.07-0.14	4.5-5.5	Low----------	0.28	4	.5-2
Lodi	8-12	35-60	1.30-1.60	0.6-2.0	0.12-0.15	4.5-5.5	Moderate-----	0.28		
	12-40	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate-----	0.28		
	40-60	10-50	1.35-1.65	0.6-2.0	0.08-0.18	4.5-5.5	Moderate-----	----		
20B, 20C, 20D----	0-11	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low----------	0.37	3	1-4
Lowell	11-38	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate-----	0.28		
	38-60	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
21B*, 21C*:										
Lowell----------	0-11	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low----------	0.37	3	1-4
	11-38	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate-----	0.28		
	38-60	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
Urban land.										
22C, 22D---------	0-7	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.43	3	2-4
Monongahela	7-23	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43		
	23-46	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43		
	46-60	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
23----------	0-21	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low----------	0.43	5	1-4
Newark Variant	21-42	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43		
	42-63	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43		
24C, 24D---------	0-16	10-20	1.30-1.45	0.6-2.0	0.08-0.14	4.5-6.5	Low----------	0.15	5	.5-2
Nolichucky	16-43	18-30	1.30-1.45	0.6-2.0	0.08-0.17	4.5-5.5	Low----------	0.20		
	43-52	25-35	1.40-1.55	0.6-2.0	0.09-0.17	4.5-5.5	Low----------	0.20		
	52-60	35-50	1.40-1.55	0.6-2.0	0.07-0.15	4.5-5.5	Moderate-----	0.20		
25C, 25D, 25F----	0-16	10-20	1.30-1.45	0.6-2.0	0.06-0.08	4.5-5.5	Low----------	0.20	5	.5-2
Nolichucky	16-43	15-30	1.30-1.45	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.20		
	43-52	25-40	1.40-1.55	0.6-2.0	0.12-0.14	4.5-5.5	Moderate-----	0.20		
	52-60	30-55	1.40-1.55	0.6-2.0	0.10-0.14	4.5-5.5	Moderate-----	0.20		
26F*:										
Ramsey----------	0-16	8-25	1.20-1.40	6.0-20	0.06-0.10	4.5-5.5	Low----------	0.17	1	.5-2
	16	---	---	---	---	---	----------	----		
Lily----------	0-3	5-25	1.20-1.40	0.6-6.0	0.09-0.16	3.6-5.5	Low----------	0.24	3	.5-4
	3-8	18-35	1.25-1.55	2.0-6.0	0.12-0.18	3.6-5.5	Low----------	0.24		
	8-34	18-35	1.25-1.55	2.0-6.0	0.08-0.17	3.6-5.5	Low----------	0.17		
	34	---	---	---	---	---	----------	----		
Rock outcrop.										
27C, 27D, 27E----	0-7	10-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.28	3	1-3
Rayne	7-18	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.20		
	18-60	10-30	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.20		
	60	---	---	---	---	---	----------	----		
28F*:										
Rayne----------	0-7	10-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.28	3	1-3
	7-18	18-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.20		
	18-60	10-30	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.20		
	60	---	---	---	---	---	----------	----		
Berks----------	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	.5-3
	7-15	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	15-27	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low----------	0.17		
	27	---	---	---	---	---	----------	----		
Groseclose------	0-8	7-27	1.25-1.55	2.0-6.0	0.11-0.20	3.6-5.5	Low----------	0.43	4	1-2
	8-60	35-60	1.35-1.60	0.06-0.2	0.10-0.17	3.6-5.5	High---------	0.24		
29F*:										
Rock outcrop.										

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
1C*, 1D*, 1F*: Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low	High.
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
2B, 2C, 2D--- Braddock	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
3B*: Braddock	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Urban land.												
4C, 4D, 5C, 5D--- Carbo	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
6E*: Carbo	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Rock outcrop.												
7A, 7B, 7C--- Cotaco	C	None	---	---	1.5-2.5	Apparent	Nov-May	>60	---	High	Moderate	High.
8--- Dunning	D	Occasional	Brief	Dec-May	0-0.5	Apparent	Jan-Apr	>60	---	High	High	Moderate.
9. Fluvaquents												
10B, 10C, 10D--- Frederick	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
11C*, 11D*, 11F*: Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Lily	B	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate	High.
12B*: Groseclose	C	None	---	---	>6.0	---	---	>48	Hard	Moderate	High	High.
Urban land.												
12C*: Groseclose	C	None	---	---	>6.0	---	---	>48	Hard	Moderate	High	High.
Urban land.												
13B*, 13C*, 13D*: Groseclose	C	None	---	---	>6.0	---	---	>48	Hard	Moderate	High	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
13B*, 13C*, 13D*: Poplimento	C	None	---	---	>6.0	---	---	>48	Hard	Moderate	High	Moderate.
14C*, 14F*: Klinesville	C/D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	High.
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low	High.
15C*, 15D*: Leck Kill	B	None	---	---	>6.0	---	---	>40	Soft	Moderate	Low	Moderate.
Rayne	B	None	---	---	>6.0	---	---	>40	Soft	Moderate	Low	High.
16D*, 16F*: Lily	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	High.
Ramsey	D	None	---	---	>6.0	---	---	7-20	Hard	Low	Low	Moderate.
17*: Lindside	C	Frequent	Very brief	Dec-May	1.5-3.0	Apparent	Dec-Apr	>60	---	High	Moderate	Low.
Nolin	B	Frequent	Brief to long.	Dec-May	3.0-6.0	Apparent	Dec-May	>60	---	High	Low	Moderate.
18B, 18C, 18D, 19C, 19D--- Lodi	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
20B, 20C, 20D--- Lowell	C	None	---	---	>6.0	---	---	>40	Hard	Moderate	High	Moderate.
21B*, 21C*: Lowell	C	None	---	---	>6.0	---	---	>40	Hard	Moderate	High	Moderate.
Urban land.												
22C, 22D--- Monongahela	C	None	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High	High.
23--- Newark Variant	C	Occasional	Brief	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High	High	Low.
24C, 24D--- Nolichucky	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
25C, 25D, 25F--- Nolichucky	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
26F*: Ramsey	D	None	---	---	>6.0	---	---	7-20	Hard	Low	Low	Moderate.
Lily	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	High.
Rock outcrop.												

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
27C, 27D, 27E----- Rayne	B	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	Low-------	High.
28F*:												
Rayne----------	B	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	Low-------	High.
Berks----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low-------	Low-------	High.
Groseclose-------	C	None--------	---	---	>6.0	---	---	>48	Hard	Moderate	High------	High.
29F*: Rock outcrop.												
Newbern----------	C	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Low-------	Low.
Carbo----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High------	Low.
30C, 31F---------- Sherando	B	None--------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	High.
32B, 32C---------- Slabtown	B	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	Low.
33*. Urban land												
34---------- Wheeling	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low-------	Moderate.
35C*, 35D*, 35E*:												
Wurno----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low-------	Low.
Newbern----------	C	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Low-------	Low.
Faywood----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High------	Moderate.
36---------- Zoar	C	None--------	---	---	1.5-2.5	Perched	Dec-Apr	>60	---	Moderate	High------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Braddock	Clayey, mixed, mesic Typic Hapludults
Carbo	Very-fine, mixed, mesic Typic Hapludalfs
*Cotaco	Fine-loamy, mixed, mesic Aquic Hapludults
Dunning	Fine, mixed, mesic Fluvaquentic Haplaquolls
Faywood	Fine, mixed, mesic Typic Hapludalfs
Fluvaquents	Fluvaquents
Frederick	Clayey, mixed, mesic Typic Paleudults
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Groseclose	Clayey, mixed, mesic Typic Hapludults
Klinesville	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Leck Kill	Fine-loamy, mixed, mesic Typic Hapludults
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Lodi	Clayey, mixed, mesic Typic Hapludults
Lowell	Fine, mixed, mesic Typic Hapludalfs
*Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Newark Variant	Fine-loamy, mixed, mesic Aquic Hapludalfs
Newbern	Loamy, mixed, mesic Lithic Eutrochrepts
*Nolichucky	Fine-loamy, siliceous, mesic Typic Paleudults
*Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Poplimento	Fine, mixed, mesic Ultic Hapludalfs
Ramsey	Loamy, siliceous, mesic Lithic Dystrochrepts
Rayne	Fine-loamy, mixed, mesic Typic Hapludults
Sherando	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Slabtown	Fine-loamy, mixed, mesic Aquic Paleudalfs
*Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs
Wurno	Loamy-skeletal, mixed, mesic Dystric Eutrochrepts
*Zoar	Clayey, mixed, mesic Aquic Hapludults

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