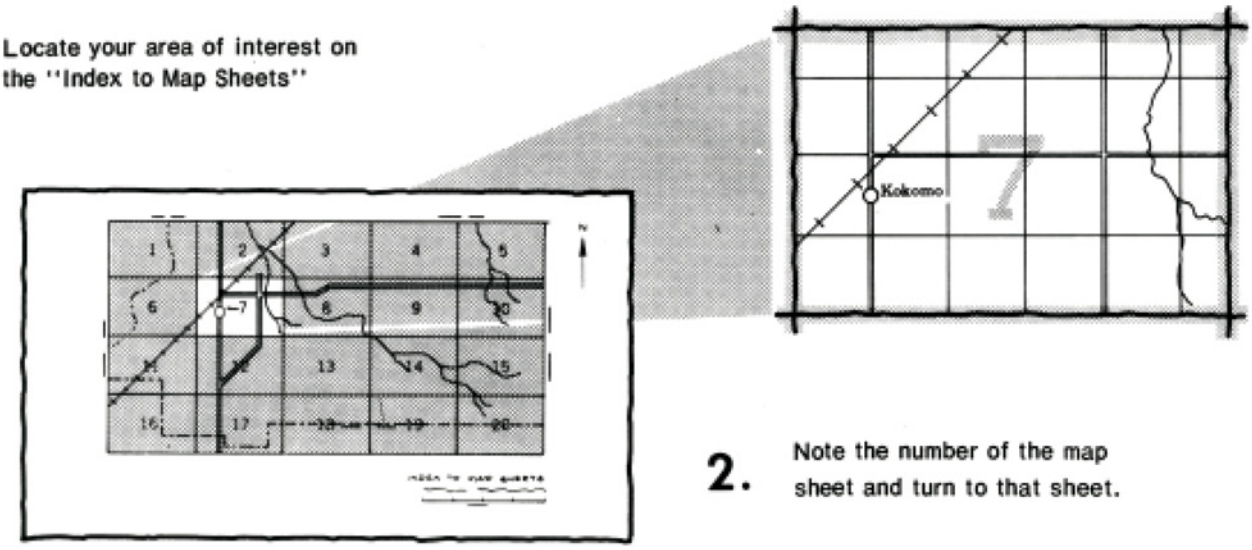
Soil Survey of
Marion and Monongalia Counties
West Virginia

United States Department of Agriculture
Soil Conservation Service
in cooperation with
West Virginia University
Agricultural Experiment Station

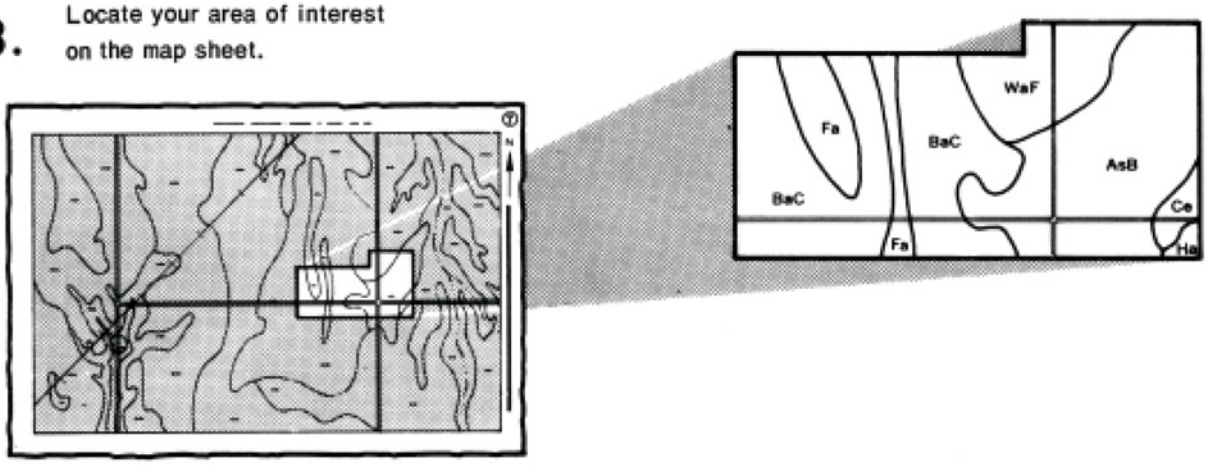
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

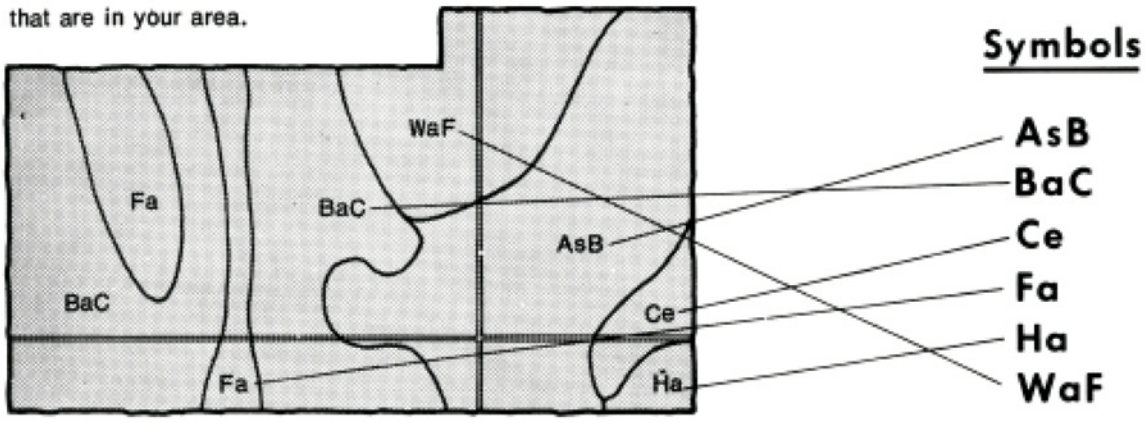


2. Note the number of the map sheet and turn to that sheet.

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

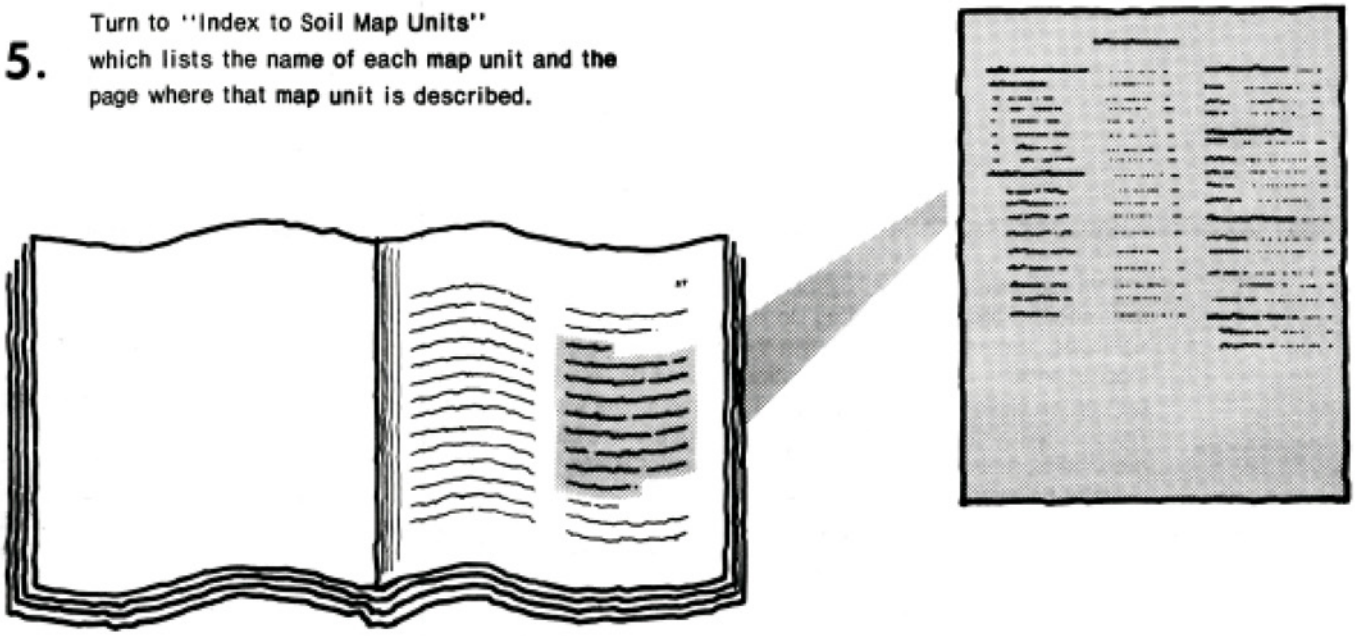


4. List the map unit symbols that are in your area.

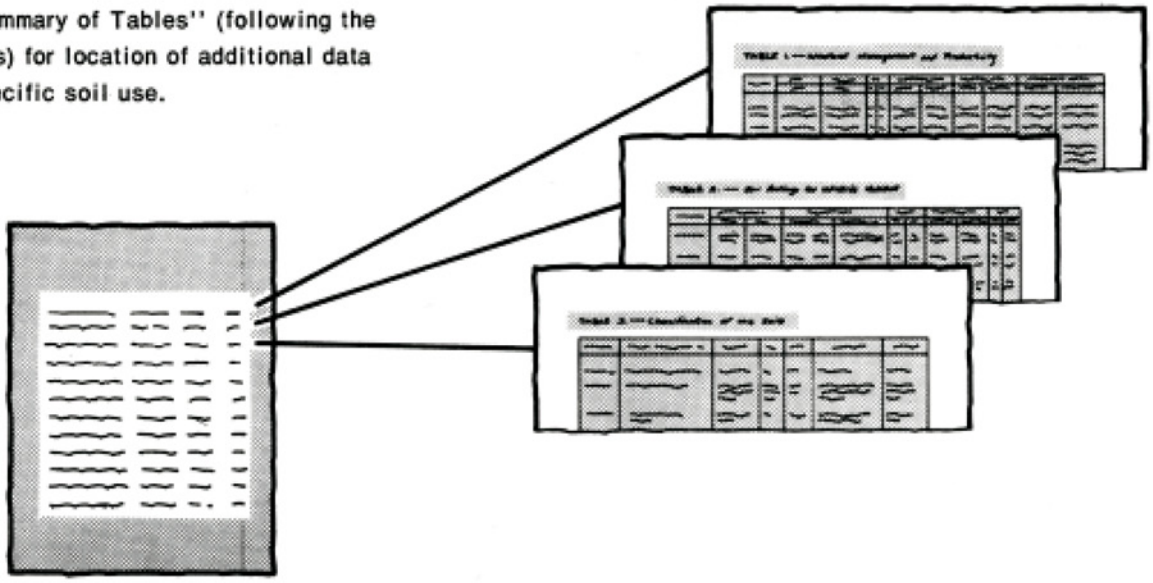


THIS SOIL SURVEY

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; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. 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 the period 1972-76. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service, the Marion County Commission, the Monongalia County Commission, and the West Virginia University Agricultural Experiment Station. The survey is part of the technical assistance furnished to the Monongahela Soil Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: This pasture is on an area of gently sloping to strongly sloping Ernest silt loam.

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Issued July 1982

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Foreword

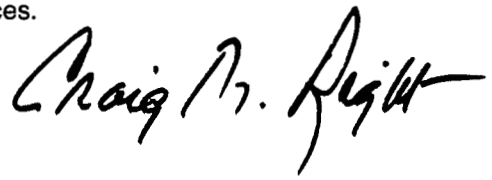
The Soil Survey of Marion and Monongalia Counties contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

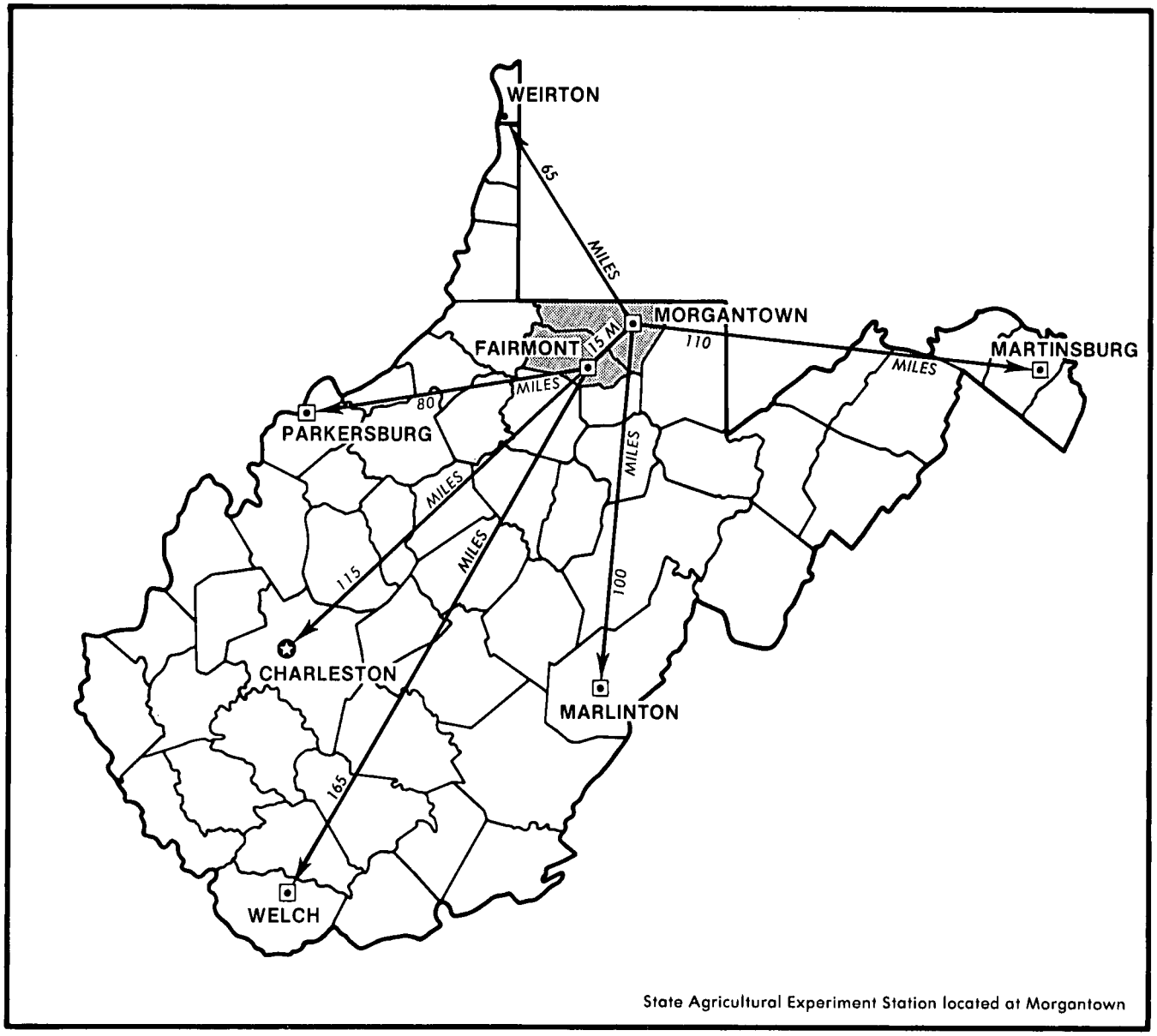
Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption 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 kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.



Craig M. Right
State Conservationist
Soil Conservation Service



Location of Marion and Monongalia Counties in West Virginia.

Soil Survey of
Marion and Monongalia Counties, West Virginia

by Edward L. Wright, Charles H. Delp, Kelley Sponaugle,
Carlos Cole, John T. Ammons, John Gorman, and F. Dale Childs,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with
West Virginia University Agricultural Experiment Station

MARION and MONONGALIA COUNTIES are in the north-central part of West Virginia. The survey area is 679 square miles, or 434,560 acres, 4,390 acres of which is water. The major rivers in the area are the Tygart Valley, the West Fork, the Monongahela, and the Cheat.

Marion County was formed from a part of Monongalia County in 1842. Fairmont, the largest city and the county seat, is located at the confluence of the Tygart Valley River and the West Fork River. The population of Marion County in 1970 was 61,356.

Monongalia County was formed while still a part of Virginia, under Governor Patrick Henry, on October 11, 1776. Its original territory covered what is now 21 counties, three of which are in Pennsylvania. Morgantown, the county seat and the location of West Virginia University, was settled by Zackquill Morgan in 1772. In 1970 the population of Monongalia County was 63,714.

A network of State and Federal highways, three railroads, and two airports meet the transportation needs of the survey area. In addition, the Monongahela River provides barges with a route for transporting coal and other raw materials. The mining and processing of coal make up the major industry in the area and provide the major source of employment.

General nature of the area

This section provides information about farming in the area, and it describes the relief and drainage, geology, and climate.

Farming

According to the 1974 Census of Agriculture (*7*), Marion County had 297 farms and a total farm acreage of 38,649; Monongalia County had 336 farms and a total farm acreage of 48,105.

The number of farms in the survey area decreased by 227—64 in Marion County and 163 in Monongalia County—between 1969 and 1974. During that period the average-sized farm increased from 122 to 130 acres in Marion County and from 120 to 143 acres in Monongalia County.

Most of the farms in the survey area are used for beef cattle or sheep or for dairying and poultry, and most are operated on a part-time basis.

Relief and drainage

Marion and Monongalia Counties are in two major land resource areas (*4*). The eastern quarter of Monongalia County is part of the Eastern Allegheny Plateaus and Mountains. The rest of Monongalia County and all of Marion County are part of the Central Allegheny Plateau.

The two-county area is characterized by mountain ranges oriented in a northeast-southwest direction and by steep hillsides and narrow valleys. The eastern part of Monongalia County and the southeastern part of Marion County are slighlty more rugged than the rest of the survey area. Streams have cut narrow valleys into the plateau, and steep slopes and narrow flood plains are along the stream courses.

The topography of the central part of the survey area along the Monongahela River is rather smooth. Most of the adjacent areas have rounded ridgetops and steep hillsides.

The western half of the survey area has narrow ridgetops, steep and very steep hillsides, and narrow valleys. The hillsides are marked with long, narrow benches.

Elevation in the survey area ranges from 2,526 feet above sea level near Sand Springs in Monongalia County to 793 feet above sea level at normal pool elevation on the Monongahela River near the Pennsylvania state line.

Most of Marion County is drained by the Tygart, West Fork, and Monongahela Rivers and by Buffalo Creek and

Pricketts Creek. Monongalia County is drained mainly by the Cheat and Monongahela Rivers, Deckers Creek, and Dunkard Creek. All drainage from the two-county area flows through the Monongahela River and its tributaries and into the Ohio River.

Geology

Gordon Bayles, state geologist, Soil Conservation Service, assisted with the preparation of this section.

Most of the exposed rock in the two counties is part of the Dunkard, Monongahela, Conemaugh, and Pottsville Groups and the Allegheny Formation (*3*). The exposed rock includes interbedded, limy and acid, gray shale, siltstone, sandstone, coal, limestone, and a few thin beds of limy, red shale.

The dominant rock types of the Dunkard, Monongahela, and Conemaugh Groups are shale, siltstone, and shaly limestone. Most of the commercial coal is in the Monongahela Group. Acid sandstone and gray shale are the dominant rock type of the Allegheny Formation. Acid, gray sandstone is dominant in the Pottsville Group.

Small areas of older rock of the Mauch Chunk and Greenbrier Groups are exposed in eastern Monongalia County, particularly along Route 7 and in the Cheat River gorge. Most of the commercial limestone is part of the Greenbrier Group. Soils in the western part of the two counties formed mainly in material weathered from the rock of the Dunkard Group.

With the exception of some areas along the Monongahela River, the soils of the central part of the survey area formed in material weathered mainly from rock of the Monongahela and Conemaugh Groups. The soils of the eastern quarter of the survey area formed primarily in material weathered from rocks of the Allegheny Formation and the Pottsville Group.

Climate

Winters are cold and snowy at high elevations in Marion and Monongalia Counties. In valleys it is also frequently cold, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm on mountain slopes and very warm with occasional very hot days in the valleys. Rainfall is evenly distributed during the year, but it is appreciably heavier on the windward, west-facing slopes than in the valleys. The normal annual precipitation generally is adequate for all crops, but summer temperatures and the growing season length, particularly at higher elevations, may be inadequate.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Morgantown, West Virginia, for the period 1951 to 1973. 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 Morgantown on January 16, 1972, is -20 degrees. In summer the average temperature is 72 degrees, and the average daily maximum temperature is 83 degrees. The highest recorded temperature, which occurred on September 3, 1953, is 102 degrees.

Growing degree days, shown in table 1, 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.

Of the total annual precipitation, 22 inches, or 56 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 5.01 inches at Morgantown on August 5, 1956. Thunderstorms occur on about 35 days each year, and most occur in summer.

Average seasonal snowfall is 32 inches. The greatest snow depth at any one time during the period of record was 17 inches. On the average, 16 days have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon in spring is about 55 percent; during the rest of the year it is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The percentage of possible sunshine is 60 percent in summer and 35 percent in winter. The prevailing wind is from the west-southwest. Average windspeed is highest, 11 miles per hour, in March.

Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. 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; the kinds of rock; and many facts about the soils. They dug many holes to expose 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 the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the section "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices 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 is readily available to different groups of users, among them farmers, managers of woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

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

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it 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 kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

General soil map descriptions

1. Gilpin-Culleoka-Upshur association

Moderately steep to very steep, well drained, acid and lime-influenced soils; on uplands

This association consists of ridgetops, hillsides, benches, and narrow valleys in the extreme western part of the survey area (fig. 1). The association makes up about 38 percent of the survey area and is about 28 percent Gilpin soils, 23 percent Culleoka soils, 15 percent Upshur soils, and 34 percent minor soils.

Gilpin soils are moderately deep. They formed in acid material weathered from siltstone, shale, and sandstone. Gilpin soils have a dark brown, medium-textured surface layer and a yellowish brown, medium-textured and moderately fine textured subsoil that is channery in the lower part.

Culleoka soils are moderately deep. They formed in lime-influenced material weathered from shale, siltstone, sandstone, and some limestone. Culleoka soils have a dark brown, medium-textured surface layer and a brown and strong brown, medium-textured and moderately fine textured subsoil that is shaly in the lower part.

Upshur soils are deep. They formed in lime-influenced material weathered mainly from shale. Upshur soils have a reddish brown, medium-textured surface layer and a reddish brown, fine-textured subsoil.

The minor soils in this association are Dormont and Guernsey soils on uplands, Clarksburg soils on foot slopes, and Chagrin, Lobdell, and Holly soils on flood plains.

Most of this association is wooded or is reverting to woodland. A few areas are used for pasture.

Slope, a slip hazard, shallow depth to bedrock, a high shrink-swell potential, and a clayey texture are the main concerns for nonfarm uses of these soils. The main concerns for the minor soils are shallow depth to the water table, permeability, and a hazard of flooding.

2. Westmoreland-Culleoka-Clarksburg association

Gently sloping to very steep, well drained and moderately well drained, lime-influenced soils; on uplands and foot slopes

This association consists of ridgetops, hillsides, benches, and narrow valleys in the central part of the survey area. The association makes up about 37 percent of the survey area and is about 30 percent Westmoreland soils, 25 percent Culleoka soils, 12 percent Clarksburg soils, and 33 percent minor soils.

Westmoreland soils are deep and well drained and are on uplands. They formed in material weathered from shale, siltstone, sandstone, and some limestone. Westmoreland soils have a dark brown and brown, medium-textured surface layer and a yellowish brown and strong brown, medium-textured and moderately fine textured subsoil that is shaly in the lower part.

Culleoka soils are moderately deep and well drained and are on uplands. They formed in material weathered from shale, siltstone, sandstone, and some limestone. Culleoka soils have a dark brown, medium-textured surface layer and a brown and strong brown, medium-textured and moderately fine textured subsoil that is shaly in the lower part.

Clarksburg soils are deep and moderately well drained and are on foot slopes and at the head of drainageways. They formed in material that moved downslope mostly from Culleoka and Westmoreland soils on uplands. Clarksburg soils have a very dark grayish brown and brown, medium-textured surface layer and a strong brown and yellowish brown, medium-textured subsoil that is very firm and brittle in the lower part.

The minor soils in the association are Gilpin, Dekalb, Upshur, Dormont, and Guernsey soils and Udorthents on uplands; and Chagrin, Lobdell, and Holly soils on flood plains.

More than half of this association is idle or farmed. The remainder is wooded or is reverting to woodland.

Slope, a slip hazard, shallow depth to bedrock and to the water table, and permeability are the main concerns for nonfarm uses of these soils. The hazard of flooding is a concern for use of the minor soils.

3. Monongahela-Zoar-Allegheny association

Gently sloping and strongly sloping, moderately well drained and well drained, acid soils; on terraces

This association is on terraces adjacent to or near the Monongahela and Tygart Valley Rivers in the central part of the survey area. The association makes up about 5 percent of the survey area and is about 20 percent Monongahela soils, 8 percent Zoar soils, 7 percent Allegheny soils, and 65 percent minor soils.

Monongahela soils are deep and moderately well drained. They formed in alluvial material washed from soils on uplands. Monongahela soils have a dark brown, medium-textured surface layer and a yellowish brown and strong brown, medium-textured and moderately fine textured subsoil that is firm and brittle in the lower part.

Zoar soils are deep and moderately well drained. They formed in slack-water deposits of old stream sediments. Zoar soils have a dark brown, medium-textured surface layer and a yellowish brown and brown, moderately fine textured or fine textured subsoil that is firm in the lower part.

Allegheny soils are deep and well drained. They formed in alluvial material washed from soils on uplands. Allegheny soils have a dark grayish brown, medium-textured surface layer and a yellowish brown, medium-textured and moderately fine textured subsoil.

The minor soils in this association consist of Kanawha soils on high flood plains and Chagrin, Lobdell, and Holly soils on flood plains. The association also has areas of Urban land mixed with Allegheny, Culleoka, Monongahela, and Zoar soils; areas of Udorthents, cut and fill; and areas of Clarksburg soils.

Most of this association is heavily populated and industrialized. A few areas are used for farming and recreation.

Slope, permeability, and shallow depth to the water table are the main concerns for nonfarm uses of the soils. A hazard of flooding is a concern for use of the minor soils.

4. Gilpin-Ernest-Lily association

Gently sloping to very steep, well drained and moderately well drained, acid soils; on uplands and foot slopes

This association consists of ridgetops, benches, hillsides, and narrow valleys in the eastern part of the survey area (fig. 2). The association makes up about 13 percent of the survey area and is about 45 percent Gilpin soils, 15 percent Ernest soils, 11 percent Lily soils, and 29 percent minor soils.

Gilpin soils are moderately deep and well drained and are on uplands. They formed in material weathered from siltstone, shale, and sandstone. Gilpin soils have a dark brown, medium-textured surface layer and a yellowish brown, medium-textured and moderately fine textured subsoil that is channery in the lower part.

Ernest soils are deep and moderately well drained and are on foot slopes and at the head of drainageways. They formed in material that moved downslope mostly from Gilpin soils on uplands. Ernest soils have a very dark grayish brown and dark brown, medium-textured surface layer and a yellowish brown, medium-textured and moderately fine textured subsoil that is firm and brittle in the lower part.

Lily soils are moderately deep and well drained and are on uplands. They formed in material weathered mostly from sandstone. Lily soils have a very dark grayish brown and dark brown, medium-textured surface

layer and a yellowish brown and strong brown, moderately fine textured to moderately coarse textured subsoil.

The minor soils in the association are Dekalb soils and Udorthents on uplands, Buchanan soils on foot slopes, and Pope Variant soils on narrow flood plains.

About half of the association is wooded. The remainder is farmed or is idle.

Slope, a slip hazard, the shallow depth to bedrock and to the water table, and permeability are the main concerns for nonfarm uses of the major soils. A hazard of flooding is a concern for some of the minor soils.

5. Dekalb-Buchanan-Ernest association

Strongly sloping to very steep, well drained and moderately well drained, acid soils; on uplands and foot slopes

This association consists of ridgetops, benches, and hillsides in the extreme eastern part of Monongalia County (fig. 3). The association makes up about 7 percent of the survey area and is about 77 percent Dekalb soils, 9 percent Buchanan soils, 6 percent Ernest soils, and 8 percent minor soils.

Dekalb soils are moderately deep and well drained and are on uplands. They formed in material weathered mostly from sandstone. Dekalb soils have a black and grayish brown, medium-textured surface layer and a yellowish brown, medium-textured subsoil that is very channery in the lower part.

Buchanan soils are deep and moderately well drained and are on foot slopes and at the head of drainageways. They formed in material that moved downslope mostly from Dekalb soils on uplands. Buchanan soils have a very dark gray and yellowish brown, medium-textured surface layer and a yellowish brown and strong brown, medium-textured and moderately fine textured subsoil that is firm and brittle in the lower part.

Ernest soils are deep and moderately well drained and are on foot slopes and at the head of drainageways. They formed in material that moved downslope mostly from Gilpin soils on uplands. Ernest soils have a very dark grayish brown and dark brown, medium-textured surface layer and a yellowish brown, medium-textured and moderately fine textured subsoil that is firm and brittle in the lower part.

The minor soils in the association are Belmont, Gilpin, Lily, and Upshur soils on uplands.

Most of the associaton is wooded. A small acreage is farmed.

Slope, a slip hazard, the shallow depth to bedrock and to the water table, and permeability are the main concerns for nonfarm uses of the soils in this association.

Soil maps for detailed planning

Dr. Richard M. Smith, professor of soil science, West Virginia University Agricultural Experiment Station, assisted in the preparation of this section and the section on soil series.

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. The Upshur series, for example, was named for Upshur County, West Virginia.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Gilpin silt loam, 15 to 25 percent slopes, is one of several phases within the Gilpin series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Culleoka-Westmoreland silt loams, 8 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 there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Buchanan and Ernest very stony soils, 8 to 15 percent slopes, is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Quarries is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit in each county are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary. More detailed information about terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*5*).

Soil descriptions

AgB—Allegheny silt loam, 3 to 8 percent slopes. This gently sloping, well drained soil is on stream terraces mostly in the central part of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is friable and yellowish brown and is 33 inches thick. The upper 5 inches is silt loam, and the lower 28 inches is clay loam mottled with light brownish gray in the lower part. The substratum extends to a depth of 60 inches or more. It is friable, yellowish brown sandy loam mottled with light brownish gray.

Included with this soil in mapping are a few small areas of moderately well drained Monongahela and Zoar soils and a few areas that are subject to rare flooding. Also included are a few small areas of nearly level soils, strongly sloping soils, soils that are sandier than this Allegheny soil, soils that have bedrock at a depth of less than 40 inches, and soils that have a surface layer of loam. These included soils make up about 15 percent of the map unit. Some areas of this unit in the communities of Sunset Beach and Canyon consist of about 50 percent stony soils.

Available water capacity in this soil is moderate or high. Permeability is moderate throughout. Runoff is medium, and natural fertility is low or moderate. Where unlimed, the soil is strongly acid or very strongly acid throughout. The depth to bedrock is generally greater than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Much of the acreage is farmed. The hazard of erosion is moderate in unprotected areas and is a management concern. Cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and good tilth. The use of proper stocking rates to maintain desirable grasses and legumes and rotational grazing are major pasture management needs.

The soil has high potential productivity for trees, but only a small acreage is wooded. Placing logging roads and skid trails on the contour helps to control erosion.

This soil has few, if any, limitations for most urban uses, and many areas are being urbanized. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal and diversion of surface water help to control damage from erosion and sedimentation. Establishing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

AgC—Allegheny silt loam, 8 to 15 percent slopes. This strongly sloping, well drained soil is on stream terraces mostly in the central part of the survey area. Slopes are mainly smooth and convex, but some areas are dissected by drainageways.

Typically the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is friable and yellowish brown and is 30 inches thick. The upper 4 inches is silt loam, and the lower 26 inches is clay loam mottled with light brownish gray in the lower part. The substratum extends to a depth of 60 inches or more. It is friable, yellowish brown sandy loam mottled with light brownish gray.

Included with this soil in mapping are a few small areas of moderately well drained Monongahela and Zoar soils and a few areas that are subject to rare flooding. Also included are a few small areas of gently sloping soils, moderately steep soils, soils that have bedrock at a depth of less than 40 inches, and soils that have a surface layer of loam. These included soils make up about 15 percent of the map unit. Some areas of this unit in the communities of Sunset Beach and Canyon consist of about 50 percent stony soils.

Available water capacity in this soil is moderate or high. Permeability is moderate throughout. Runoff is

rapid, and natural fertility is low or moderate. Where unlimed, the soil is strongly acid or very strongly acid throughout. The depth to bedrock is generally greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Much of the acreage is farmed. The hazard of erosion is severe in unprotected areas and is a major management concern. Minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes and rotational grazing are major pasture management needs.

The soil has high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

This soil has few limitations for most urban uses, and many areas are being urbanized. Slope, however, is a concern for urban and nonfarm uses. Maintaining the plant cover at construction sites, establishing plant cover in unprotected areas, and providing for proper disposal and diversion of surface water help to control erosion and sedimentation. Establishing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

BeC—Buchanan and Ernest very stony soils, 8 to 15 percent slopes. This unit consists of strongly sloping, moderately well drained soils on foot slopes and at the head of drainageways in the eastern part of the survey area. These soils are commonly dissected by drainageways, and seep spots are common in some areas. The soils receive surface and subsurface water from higher lying soils. Stones cover 1 to 3 percent of the surface of the unit. These soils were mapped together because they have no major differences in use and management. Some areas of this unit consist of Buchanan soils, some consist of Ernest soils, and some are both.

Typically the surface layer of the Buchanan soil is very dark gray and yellowish brown loam about 5 inches thick. The subsoil is 52 inches thick. In sequence downward, it is 6 inches of friable, strong brown loam; 6 inches is friable, yellowish brown channery loam; 8 inches of friable, yellowish brown channery light sandy clay loam mottled with strong brown and gray; and 32 inches of firm and brittle, yellowish brown and strong brown channery loam mottled with yellowish red and light brownish gray. The substratum is firm, brown channery heavy sandy loam mottled with light brownish gray and extends to a depth of 60 inches or more.

Typically the surface layer of the Ernest soil is very dark grayish brown and dark brown silt loam about 6 inches thick. The subsoil is 49 inches thick. The upper 11 inches of the subsoil is friable, yellowish brown silt loam. The next 5 inches is friable, yellowish brown light silty clay loam mottled with strong brown and light brownish gray. The lower 33 inches of the subsoil is firm and brittle, yellowish brown heavy loam and channery heavy loam mottled with strong brown and light brownish gray. The substratum is firm, strong brown channery heavy silt loam mottled with gray and extends to a depth of 60 inches or more.

Included with these soils in mapping are a few small areas of Dekalb, Gilpin, and Lily soils. Also included are a few small areas of nearly level soil, moderately steep soils, soils that do not have a firm and brittle subsoil, soils where less than 1 percent or more than 3 percent of the surface is covered by stones, and well drained soils. Included soils make up about 15 percent of this map unit.

Available water capacity is low or moderate in both soils of this unit. Permeability is slow in the brittle part of the subsoil of the Buchanan soil and moderately slow or slow in the brittle part of the subsoil of the Ernest soil. Runoff is rapid on these soils, and natural fertility is low or moderate. The soils have a seasonal high water table about 1 1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, the Buchanan soil is strongly acid to extremely acid throughout and the Ernest soil is strongly acid or very strongly acid throughout. The depth to bedrock is greater than 60 inches in both soils.

These soils are not suited to cultivated crops or hay but are suited to pasture. Stones restrict the use of farm machinery. The hazard of erosion is severe in unprotected areas and is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soils are firm are major pasture management needs.

The soils have moderately high to high potential productivity for trees, and most of the acreage is wooded. The use of equipment is restricted during wet seasons because these soils are soft. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope, a slip hazard, the seasonal high water table, and the moderately slow or slow permeability limit the soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and the proper disposal or diversion of excess surface or subsurface water help to control erosion and sedimentation. Establishing roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass VIs.

BeD—Buchanan and Ernest very stony soils, 15 to 25 percent slopes. This unit consists of strongly sloping, moderately well drained soils on foot slopes and at the head of drainageways in the eastern part of the

survey area. The soils are commonly dissected by drainageways, and seep spots are common in some areas. These soils receive surface and subsurface water from higher lying soils. Stones cover 1 to 3 percent of the surface of the unit. These soils were mapped together because they have no major differences in use and management. Some areas of this unit consist of Buchanan soils, some consist of Ernest soils, and some are both.

Typically the surface layer of the Buchanan soil is very dark gray and yellowish brown loam about 5 inches thick. The subsoil is 56 inches thick. In sequence downward, it is 6 inches of friable, strong brown loam; 6 inches of friable, yellowish brown channery loam; 5 inches of friable, yellowish brown channery light sandy clay loam mottled with strong brown and gray; and 39 inches of firm and brittle, yellowish brown and strong brown channery loam mottled with yellowish red and light brownish gray. The substratum is firm, brown channery heavy sandy loam mottled with light brownish gray and extends to a depth of more than 60 inches.

Typically the surface layer of the Ernest soil is very dark grayish brown and dark brown silt loam about 5 inches thick. The subsoil is 46 inches thick. The upper 11 inches of the subsoil is friable, yellowish brown silt loam. The next 5 inches is friable, yellowish brown light silty clay loam mottled with strong brown and light brownish gray. The lower 30 inches is firm and very firm and brittle, yellowish brown heavy loam and channery loam mottled with strong brown and light brownish gray. The substratum extends to a depth of 60 inches or more. It is firm, strong brown channery heavy silt loam mottled with gray.

Included with these soils in mapping are a few small areas of Dekalb, Gilpin, Lily, and Wharton soils. Also included are a few small areas of strongly sloping soils, steep soils, soils that do not have a firm and brittle subsoil, soils where less than 1 percent or more than 3 percent of the surface is covered by stones, and soils that are well drained. Included soils make up about 20 percent of this unit.

Available water capacity is low or moderate in both soils of this unit. Permeability is slow in the brittle part of the subsoil of the Buchanan soil and moderately slow or slow in the brittle part of the subsoil of the Ernest soil. Runoff is rapid on these soils, and natural fertility is low or moderate. The soils have a seasonal high water table about 1 1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, the Buchanan soil is strongly acid to extremely acid throughout and the Ernest soil is strongly acid or very strongly acid throughout. The depth to bedrock is greater than 60 inches in both soils.

These soils are not suited to cultivated crops or hay but are suited to pasture. Stones restrict the use of farm machinery. The hazard of erosion is severe in unprotected areas and is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soils are firm are major management needs.

These soils have moderately high to high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major hazard. The use of equipment is limited by slope and is restricted during wet seasons because the soils are soft. Placing roads and skid trails on the contour helps to control erosion.

Slope, a slip hazard, the seasonal high water table, and moderately slow or slow permeability limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and the proper disposal or diversion of excess surface or subsurface water help to control erosion and sedimentation. Establishing roads and streets on the contour, for example, helps divert runoff.

This unit is in capability subclass VIs.

Cg—Chagrin silt loam. This nearly level, well drained soil is on flood plains in the central and western parts of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark brown silt loam about 10 inches thick. The subsoil is friable, dark yellowish brown silt loam 28 inches thick. The substratum is very friable, dark yellowish brown loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Kanawha soils, moderately well drained Lobdell soils, and poorly drained Holly soils. Also included are a few small areas of gently sloping soils, soils that are more silty in the subsoil than this Chagrin soil, and soils that have more sand in the subsoil. Included soils make up 15 percent of this unit.

Available water capacity in this soil is high. Permeability is moderate throughout. Runoff is slow, and natural fertility is moderate or high. Where unlimed, the soil is strongly acid to neutral throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Much of the acreage is farmed. However, some small wet areas need artificial drainage. Cultivated crops can be grown continuously on this soil, but the soil needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and tilth.

The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferred grazing in the spring until the soil is firm are major pasture management needs.

The soil has very high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft.

A hazard of flooding is a major limitation for most urban uses. Establishing plant cover on unprotected

areas and providing for proper surface water disposal will help control stream scouring and sedimentation.

This soil is in capability subclass IIw.

CkB—Clarksburg silt loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on alluvial fans at the mouth of hollows, at the head of drainageways, and on foot slopes in the central and western parts of the survey area. The soil is commonly dissected by drainageways, and seep spots are common in some areas. This soil receives surface and subsurface water from higher lying soils. Slopes are smooth and convex.

Typically the surface layer is a very dark grayish brown and dark brown silt loam about 10 inches thick. The subsoil is 50 inches thick. In sequence downward, it is 12 inches of friable, strong brown silt loam mottled with dark brown; 6 inches of friable, yellowish brown heavy silt loam; 8 inches of firm, yellowish brown channery heavy loam mottled with light brownish gray and strong brown; and 24 inches of firm and brittle, yellowish brown channery heavy loam mottled with light brownish gray and strong brown. The substratum, at a depth of more than 60 inches, is very firm, dark yellowish brown channery heavy loam mottled with grayish brown and strong brown.

Included with this soil in mapping are small areas of Culleoka, Gilpin, Westmoreland, Dormont, and Guernsey soils. Also included are small areas of nearly level soils, strongly sloping soils, soils that are better drained than this Clarksburg soil and that do not have a firm and brittle subsoil, soils with a very stony surface, and soils on alluvial fans that contain more stones than this Clarksburg soil. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is moderate. Permeability is moderately slow or slow in the brittle part of the subsoil. Runoff is medium, and natural fertility is moderate or high. The soil has a seasonal high water table about 1 1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, the soil is strongly acid to slightly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Most areas are used for hay and pasture. The hazard of erosion is moderate in unprotected areas and is a management concern. If this soil is farmed, cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, deferment of grazing in the spring until the soil is firm, and rotational grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but less than half the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

The shallow depth to the seasonal high water table and the moderately slow or slow permeability are the main limitations of the soil for urban or other nonfarm uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal or diversion of surface water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

CkC—Clarksburg silt loam, 8 to 15 percent slopes. This strongly sloping, moderately well drained soil is at the head of drainageways and on foot slopes in the central and western parts of the survey area. This soil is commonly dissected by drainageways, and seep spots are common in some areas. The soil receives surface and subsurface water from higher lying soils.

Typically the surface layer is very dark grayish brown and dark brown silt loam about 10 inches thick. The subsoil is 50 inches thick. In sequence downward, it is 11 inches of friable, strong brown silt loam mottled with dark brown; 7 inches of friable, yellowish brown heavy silt loam; 7 inches of firm, yellowish brown channery heavy loam mottled with light brownish gray and strong brown; and 25 inches of firm and brittle, yellowish brown channery heavy loam mottled with light brownish gray and strong brown. The substratum, at a depth of more than 60 inches, is very firm, dark yellowish brown channery heavy loam mottled with grayish brown and strong brown.

Included with this soil in mapping are small areas of Dormont, Guernsey, Culleoka, Gilpin, and Westmoreland soils. Also included are small areas of gently sloping soils, moderately steep soils, soils that are better drained than this Clarksburg soil and that do not have a firm subsoil, soils with a very stony surface, and soils on alluvial fans that contain more stones than this Clarksburg soil. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is moderate. Permeability is moderately slow or slow in the brittle part of the subsoil. Runoff is rapid, and natural fertility is moderate or high. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, the soil is strongly acid to slightly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Much of the acreage is used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintain-

ing shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing in the spring until the soil is firm, and seeding of bare areas are major pasture management needs.

This soil has moderately high potential productivity for trees, but less than half the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft. Erosion on logging roads and skid trails is a major hazard that can be controlled by placing the roads and trails on the contour.

Slope, a slip hazard, the shallow depth to the seasonal high water table, and the moderately slow or slow permeability limit the soil for most urban and other nonfarm uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for proper disposal or diversion of surface water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

CkD—Clarksburg silt loam, 15 to 25 percent slopes. This moderately steep, moderately well drained soil is at the head of drainageways and on foot slopes in the central and western parts of the survey area. This soil is commonly dissected by drainageways, and seep spots are common in some areas. The soil receives surface and subsurface water from higher lying soils.

Typically the surface layer is very dark grayish brown and dark brown silt loam about 10 inches thick. The subsoil is 51 inches thick. In sequence downward, it is 11 inches of friable, strong brown silt loam mottled with dark brown; 6 inches of friable, yellowish brown heavy silt loam; 7 inches of firm, yellowish brown channery heavy loam mottled with light brownish gray and strong brown; and 27 inches of firm and brittle, yellowish brown channery heavy loam mottled with light brownish gray and strong brown. The substratum, at a depth of more than 61 inches, is very firm, dark yellowish brown channery heavy loam mottled with grayish brown and strong brown.

Included with this soil in mapping are small areas of Dormont, Guernsey, Culleoka, Gilpin, and Westmoreland soils. Also included are small areas of strongly sloping soils, steep soils, soils that are better drained than this Clarksburg soil and that do not have a firm subsoil, and soils with a very stony surface. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is moderate. Permeability is moderately slow or slow in the brittle part of the subsoil. Runoff is rapid, and natural fertility is moderate or high. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, this soil is strongly acid to slightly acid throughout. The depth to bedrock is greater than 60 inches.

This soil has limited suitability for cultivated crops. Most of the acreage is in hay or pasture, uses to which the soil is better suited. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing in the spring until the soil is firm, and seeding of bare areas are the major pasture management needs.

This soil has moderately high potential productivity for trees, but less than half the acreage is wooded. The use of equipment is limited by slope and is limited during wet seasons because the soil is soft. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope, a slip hazard, the shallow depth to the seasonal high water table, and the moderately slow or slow permeability limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IVe.

CwB—Culleoka-Westmoreland silt loams, 3 to 8 percent slopes. This complex consists of gently sloping, well drained soils on ridgetops in the central part of the survey area. These soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 50 percent Culleoka silt loam, 30 percent Westmoreland silt loam, and 20 percent other soils.

Typically the surface layer of the Culleoka soil is dark brown silt loam about 7 inches thick. The subsoil is friable and is 19 inches thick. The upper 5 inches of the subsoil is brown heavy silt loam. The middle 6 inches is brown, shaly light silty clay loam. The lower 8 inches is strong brown and brown, shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 30 inches.

Typically the surface layer of the Westmoreland soil is dark brown and brown silt loam about 8 inches thick. The subsoil is friable and is 32 inches thick. The upper 4 inches of the subsoil is yellowish brown silt loam. The middle 12 inches is strong brown heavy silt loam. The lower 16 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam that extends to bedrock at a depth of about 52 inches.

Included with these soils in mapping are small areas of Dekalb, Gilpin, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of nearly level soils, strongly sloping soils, and soils that have a very stony surface.

The Culleoka soil has moderate available water capacity. Permeability is moderate throughout. Runoff is medium, and natural fertility is moderate. Where unlimed, the soil is medium acid or strongly acid throughout. The root zone of some plants in the Culleoka soil is restricted by bedrock, which is at a depth of 20 to 40 inches.

The Westmoreland soil has high available water capacity. Permeability is moderate throughout. Runoff is medium, and natural fertility is high. Where unlimed, the soil is medium acid to very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. Bedrock is at a depth of 40 to 72 inches or more in the Westmoreland soil.

The soils in this complex are suited to cultivated crops and to hay and pasture. Much of the acreage is used for hay and pasture. The hazard of erosion is moderate in unprotected areas and is a management concern. If these soils are farmed, cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are major pasture management needs.

These soils have moderately high to high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

The shallow depth to bedrock in the Culleoka soil is the main limitation for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This complex is in capability subclass IIe.

CwC—Culleoka-Westmoreland silt loams, 8 to 15 percent slopes. This complex consists of strongly sloping, well drained soils on ridgetops and benches in the central part of the survey area. The benches are dissected in places by drainageways, and seep spots are common on some benches. These soils are so intermingled that it was not practical to map them separately. The complex is about 40 percent Culleoka silt loam, 35 percent Westmoreland silt loam, and 25 percent other soils.

Typically the surface layer of the Culleoka soil is dark brown silt loam about 6 inches thick. The subsoil is friable and is 17 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The middle 5 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 32 inches.

Typically the surface layer of the Westmoreland soil is dark brown and brown silt loam about 8 inches thick. The subsoil is friable and is 29 inches thick. The upper 4 inches of the subsoil is yellowish brown silt loam. The middle 10 inches is strong brown heavy silt loam. The lower 15 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam that extends to bedrock at a depth of about 57 inches.

Included with these soils in mapping are small areas of Dekalb, Gilpin, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of gently sloping soils, moderately steep soils, and soils that have a very stony surface.

The Culleoka soil has moderate available water capacity. Permeability is moderate throughout. Runoff is rapid, and natural fertility is moderate. Where unlimed, the soil is medium acid or strongly acid throughout. The root zone of some plants in the Culleoka soil is restricted by bedrock, which is at a depth of 20 to 40 inches.

The Westmoreland soil has high available water capacity. Permeability is moderate throughout. Runoff is rapid, and natural fertility is high. Where unlimed, the soil is medium acid or very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. Bedrock is at a depth of 40 to 72 inches or more in the Westmoreland soil.

The soils in this complex are suited to cultivated crops and to hay and pasture. Much of the acreage is used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If these soils are farmed, cultivating on the contour, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are major pasture management needs.

The soils have moderately high to high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope, a slip hazard, and the shallow depth to bedrock are the main limitations of these soils for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This complex is in capability subclass IIIe.

CwD—Culleoka-Westmoreland silt loams, 15 to 25 percent slopes. This complex consists of moderately steep, well drained soils on ridgetops and benches in the central part of the survey area. The benches are commonly dissected by drainageways, and seep spots are common on some benches. These soils are so intermingled that it was not practical to map them separately. The complex is about 40 percent Culleoka silt loam, 35 percent Westmoreland silt loam, and 25 percent other soils.

Typically the surface layer of the Culleoka soil is dark brown silt loam about 6 inches thick. The subsoil is friable and is 19 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The middle 6 inches is brown shaly light silty clay loam. The lower 9 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 34 inches.

Typically the surface layer of the Westmoreland soil is dark brown and brown silt loam about 8 inches thick. The subsoil is friable and is 32 inches thick. The upper 4 inches of the subsoil is yellowish brown silt loam. The middle 10 inches is strong brown heavy silt loam. The lower 18 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam that extends to bedrock at a depth of about 60 inches.

Included with these soils in mapping are small areas of Dekalb, Gilpin, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of strongly sloping soils, steep soils, and soils that have a very stony surface.

The Culleoka soil has moderate available water capacity. Permeability is moderate throughout. Runoff is rapid, and natural fertility is moderate. Where unlimed, the soil is medium acid or strongly acid throughout. The root zone of some plants in the Culleoka soil is restricted by bedrock, which is at a depth of 20 to 40 inches.

The Westmoreland soil has high available water capacity. Permeability is moderate throughout. Runoff is rapid, and natural fertility is high. Where unlimed, the soil is medium acid or very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. Bedrock is at a depth of 40 to 72 inches or more in the Westmoreland soil.

The soils in this complex have limited suitability for cultivated crops and are better suited to hay and pasture. Much of the acreage is used for pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If these soils are cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are major pasture management needs.

These soils have moderately high to high potential productivity for trees. About half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is limited by slope.

Slope, a slip hazard, and the shallow depth to bedrock limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This complex is in capability subclass IVe.

CwE—Culleoka-Westmoreland silt loams, 25 to 35 percent slopes. This complex consists of steep, well drained soils on hillsides, benches, and narrow ridgetops in the central part of the survey area. The hillsides and benches are commonly dissected by drainageways, and seep spots are common on some benches. These soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Culleoka silt loam, 30 percent Westmoreland silt loam, and 20 percent other soils.

Typically the surface layer of the Culleoka soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and is 21 inches thick. The upper 5 inches of the subsoil is brown heavy silt loam. The middle 8 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 34 inches.

Typically the surface layer of the Westmoreland soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and is 24 inches thick. The upper 4 inches of the subsoil is yellowish brown silt loam. The middle 8 inches is strong brown heavy silt loam. The lower 12 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam that extends to bedrock at a depth of about 50 inches.

Included with these soils in mapping are small areas of Dekalb, Gilpin, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of moderately steep soils, very steep soils, and soils that have a very stony surface.

The Culleoka soil has moderate available water capacity. Permeability is moderate throughout. Runoff is very rapid, and natural fertility is moderate. Where unlimed, the soil is medium acid or strongly acid throughout. The root zone of some plants in the Culleoka soil is restricted by bedrock, which is at a depth of 20 to 40 inches.

The Westmoreland soil has high available water capacity. Permeability is moderate throughout. Runoff is very rapid, and natural fertility is high. Where unlimed, this soil is medium acid or very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. Bedrock is at a depth of 40 to 72 inches or more in the Westmoreland soil.

The soils in this complex are not suited to cultivated crops or hay but are suited to pasture. Some areas are used for pasture. The hazard of erosion is very severe in unprotected areas, and the prevention of overgrazing is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas to permanent cover are major pasture management needs.

These soils have moderately high to high potential productivity for trees. About three-fourths of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope, a slip hazard, and the shallow depth to bedrock limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This complex is in capability subclass VIe.

CwF—Culleoka-Westmoreland silt loams, 35 to 65 percent slopes. This complex consists of very steep, well drained soils on hillsides and narrow ridgetops in the central part of the survey area. The hillsides are commonly dissected by drainageways. These soils are so intermingled that it was not practical to map them separately. The complex is about 55 percent Culleoka silt loam, 25 percent Westmoreland silt loam, and 20 percent other soils.

Typically the surface layer of the Culleoka soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and is 17 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The middle 5 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 34 inches.

Typically the surface layer of the Westmoreland soil is dark brown silt loam about 6 inches thick. The subsoil is friable and is 24 inches thick. The upper 4 inches of the subsoil is yellowish brown silt loam. The middle 8 inches is strong brown heavy silt loam. The lower 12 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam that extends to bedrock at a depth of about 50 inches.

Included with these soils in mapping are small areas of Dekalb, Gilpin, Upshur, and Clarksburg soils. Also included are small areas of steep soils, soils with a clayey subsoil, and soils that have a very stony surface.

The Culleoka soil has moderate available water capacity. Permeability is moderate throughout. Runoff is very rapid, and natural fertility is moderate. Where unlimed, the soil is medium acid or strongly acid throughout. The root zone of some plants in the Culleoka soil is restricted by bedrock, which is at a depth of 20 to 40 inches.

The Westmoreland soil has high available water capacity. Permeability is moderate throughout. Runoff is very rapid, and natural fertility is high. Where unlimed, the soil is medium acid or very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. Bedrock is at a depth of 40 to 72 inches or more in the Westmoreland soil.

The soils in this complex are not suited to cultivated crops or hay and are poorly suited to pasture. The soils have moderately high to high potential productivity for trees. About three-fourths of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is limited by slope.

Slope, a slip hazard, and the shallow depth to bedrock limit these soils for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This complex is in capability subclass VIIe.

DaB—Dekalb channery loam, 3 to 8 percent slopes. This gently sloping, well drained soil is on ridgetops in the eastern part of the survey area. Slopes are smooth and convex.

Typically the surface layer is black and grayish brown channery loam about 6 inches thick. The subsoil is very friable, yellowish brown channery loam and very channery loam 23 inches thick. The substratum is friable, yellowish brown very channery sandy loam that extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of Gilpin, Lily, and Wharton soils. Also included are small areas of nearly level soils, strongly sloping soils, and soils with a firm and brittle layer in the subsoil. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is very low to low. Permeability is moderately rapid or rapid throughout. Runoff is medium, and natural fertility is low. Where unlimed, the soil is strongly acid or extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to hay and pasture. A moderate erosion hazard in unprotected areas

and droughtiness are the major management concerns. If this soil is farmed, cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes and the use of rotational grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

The shallow depth to bedrock is the main limitation of this soil for urban or other nonfarm uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

DaC—Dekalb channery loam, 8 to 15 percent slopes. This strongly sloping, well drained soil is on ridgetops and benches in the eastern part of the survey area. The benches are dissected in places by drainageways. Slopes are smooth and convex.

Typically the surface layer is black and grayish brown channery loam about 6 inches thick. The subsoil is very friable, yellowish brown channery loam and very channery loam 24 inches thick. The substratum is friable, yellowish brown very channery sandy loam that extends to bedrock at a depth of about 36 inches.

Included with this soil in mapping are a few small areas of Gilpin, Lily, Wharton, Buchanan, and Ernest soils. Also included are a few small areas of gently sloping soils and moderately steep soils. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is very low to low. Permeability is moderately rapid or rapid throughout. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to hay and pasture. A severe erosion hazard in unprotected areas and droughtiness are the major management concerns. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are the major pasture management needs.

This soil has moderately high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope and the shallow depth to bedrock are the main limitations of this soil for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

DaD—Dekalb channery loam, 15 to 25 percent slopes. This moderately steep, well drained soil is on ridgetops and benches in the eastern part of the survey area. The benches are commonly dissected by drainageways. Slopes are smooth and convex.

Typically the surface layer is black and grayish brown channery loam about 6 inches thick. The subsoil is very friable, yellowish brown channery loam and very channery loam 24 inches thick. The substratum is friable, yellowish brown very channery sandy loam that extends to bedrock at a depth of about 36 inches.

Included with this soil in mapping are a few small areas of Gilpin, Lily, Wharton, Buchanan, and Ernest soils. Also included are a few small areas of strongly sloping soils and steep soils. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is very low to low. Permeability is moderately rapid or rapid throughout. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil has limited suitability for cultivated crops but is better suited to hay and pasture. A severe erosion hazard in unprotected areas and droughtiness are the major management concerns. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and good tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are the major pasture management needs.

The soil has moderately high to high potential productivity for trees. Most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope and the shallow depth to bedrock are the main limitations of this soil for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IVe.

DaE—Dekalb channery loam, 25 to 35 percent slopes. This steep, well drained soil is on hillsides and narrow ridgetops in the eastern part of the survey area. The hillsides are commonly dissected by drainageways. Slopes are smooth and convex.

Typically the surface layer is black and grayish brown channery loam about 5 inches thick. The subsoil is very friable, yellowish brown channery loam and very channery loam 21 inches thick. The substratum is friable, yellowish brown very channery sandy loam that extends to bedrock at a depth of 30 inches.

Included with this soil in mapping are a few small areas of Gilpin, Lily, Buchanan, and Ernest soils. Also included are a few small areas of moderately steep soils and very steep soils. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is very low to low. Permeability is moderately rapid or rapid throughout. Runoff is very rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or hay, but it is suited to pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas to permanent plant cover are the major pasture management needs.

The soil has moderately high to high potential productivity for trees. Most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope and the shallow depth to bedrock are the main limitations of this soil for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass VIe.

DdC—Dekalb very stony loam, 3 to 15 percent slopes. This strongly sloping or gently sloping, well drained soil is on ridgetops and benches in the eastern part of the survey area. The benches are dissected in places by drainageways. Slopes are smooth and convex. Stones cover 1 to 3 percent of the surface of the soil.

Typically the surface layer is black and grayish brown channery loam about 6 inches thick. The subsoil is very friable, yellowish brown channery loam and very channery loam 24 inches thick. The substratum is friable, yellowish brown very channery sandy loam that extends to bedrock at a depth of about 36 inches.

Included with this soil in mapping are a few small areas of Gilpin, Lily, Wharton, Buchanan, and Ernest soils. Also included are a few small areas of nearly level soils, moderately steep soils, and soils that do not have stones on the surface. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is very low to low. Permeability is moderately rapid or rapid throughout. Runoff is medium or rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or hay but has limited suitability for pasture. The stones on the surface restrict the use of farm machinery. The hazard of erosion is severe in unprotected areas and is a major management concern. The use of proper stocking rates to maintain grasses and legumes and the use of rotational grazing are major pasture management needs.

The soil has moderately high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope and the shallow depth to bedrock are the main limitations of this soil for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass VIIs.

DdE—Dekalb very stony loam, 15 to 35 percent slopes. This steep or moderately steep, well drained soil is on ridgetops, benches, and hillsides in the eastern part of the survey area. The hillsides and benches are commonly dissected by drainageways. Slopes are smooth and convex. Stones cover 1 to 3 percent of the surface of the soil.

Typically the surface layer is black and grayish brown channery loam about 5 inches thick. The subsoil is very friable, yellowish brown channery loam and very channery loam 21 inches thick. The substratum is friable, yellowish brown very channery sandy loam that extends to bedrock at a depth of about 30 inches.

Included with this soil in mapping are a few small areas of Gilpin, Lily, Wharton, Buchanan, and Ernest soils. Also included are small areas of strongly sloping soils, very steep soils, and soils that do not have stones on the surface. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is very low to low. Permeability is moderately rapid or rapid throughout. Runoff is very rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or extremely acid throughout. The root zone of plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or hay and is difficult to manage for pasture. The stones on the sur-

face and slope restrict the use of farm machinery. The hazard of erosion is very severe in unprotected areas and is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes and the use of rotational grazing are the major pasture management needs.

The soil has moderately high to high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope and the shallow depth to bedrock are the main limitations of this soil for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass VIIs.

DdF—Dekalb very stony loam, 35 to 65 percent slopes. This very steep, well drained soil is on narrow ridgetops and hillsides in the eastern part of the survey area. The hillsides are commonly dissected by drainageways. Slopes are smooth and convex. Stones cover 1 to 3 percent of the surface of the soil.

Typically the surface layer is black and grayish brown channery loam about 4 inches thick. The subsoil is very friable, yellowish brown channery loam and very channery loam 18 inches thick. The substratum is friable, yellowish brown very channery sandy loam that extends to bedrock at a depth of about 25 inches.

Included with this soil in mapping are a few small areas of Gilpin, Lily, Buchanan, and Ernest soils. Also included are small areas of steep soils and soils that do not have stones on the surface. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is very low to low. Permeability is moderately rapid or rapid throughout. Runoff is very rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or to hay or pasture. The stones on the surface and slope restrict the use of farm machinery.

The soil has moderately high to high potential productivity for trees. Most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope and the shallow depth to bedrock are the main limitations of this soil for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass VIIs.

DgB—Dormont and Guernsey silt loams, 3 to 8 percent slopes. This unit consists of gently sloping, moderately well drained soils on ridgetops mostly in the central part of the survey area. Slopes are smooth and convex. The soils were mapped together because they have no major differences in use and management. Some areas of this unit are made up of the Dormont soil, some of the Guernsey soil, and some of both. The total acreage of this unit is about 45 percent Dormont silt loam, 40 percent Guernsey silt loam, and 15 percent other soils.

Typically the surface layer of the Dormont soil is dark brown and dark yellowish brown silt loam about 10 inches thick. The subsoil is 35 inches thick. The upper 4 inches of the subsoil is friable, strong brown heavy silt loam. The middle 10 inches is friable to firm, yellowish brown silty clay loam. The lower 21 inches is firm, yellowish brown and gray heavy silty clay loam mottled with gray and strong brown. The substratum extends to a depth of 60 inches or more. Between depths of 45 and 51 inches it is firm, gray light silty clay mottled with strong brown. At a depth of more than 51 inches it is firm, dark brown shaly silt loam mottled with gray and strong brown.

Typically the surface layer of the Guernsey soil is dark grayish brown and dark brown silt loam about 9 inches thick. The subsoil is 34 inches thick. The upper 5 inches of the subsoil is friable, strong brown silt loam. The middle 8 inches is friable, yellowish brown silty clay loam mottled with gray. The lower 21 inches is firm, gray silty clay mottled with yellowish red and heavy silty clay mottled with yellowish brown and yellowish red. The substratum is firm, gray, brownish yellow, and yellowish brown heavy silty clay that extends to bedrock at a depth of about 52 inches.

Included with these soils in mapping are a few small areas of Culleoka, Westmoreland, Upshur, and Clarksburg soils. Also included are small areas of nearly level soils, strongly sloping soils, sandy soils, and somewhat poorly drained soils. Included soils make up about 15 percent of this map unit.

Available water capacity is high in the Dormont and Guernsey soils. Permeability is mostly moderately slow or slow in the subsoil of both. Runoff is medium, and natural fertility is moderate or high. The soils have a seasonal high water table about 1-1/2 to 3 feet below the surface that restricts the root zone of some plants. Where unlimed, the Dormont soil is medium acid to very strongly acid in the surface layer and upper part of the subsoil and strongly acid or medium acid in the lower part of the subsoil and in the substratum. The Guernsey soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly

acid in the lower part of the subsoil and in the substratum. The depth to bedrock in these soils is 48 inches or more.

These soils are suited to cultivated crops and to pasture and hay. Most of the acreage is used for hay and pasture. The hazard of erosion is moderate in unprotected areas and is a management concern. If these soils are farmed, cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, deferment of grazing in the spring until the soils are firm, rotational grazing, and seeding of bare areas are major pasture management needs.

The soils have high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during the wet season because the soils are soft.

The seasonal high water table and the moderately slow or slow permeability limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass IIe.

DgC—Dormont and Guernsey silt loams, 8 to 15 percent slopes. This unit consists of strongly sloping, moderately well drained soils on ridgetops and benches mostly in the central part of the survey area. The benches are dissected in places by drainageways. Slopes are smooth and convex. The soils were mapped together because they have no major differences in use and management. Some areas of this unit are made up of the Dormont soil, some of the Guernsey soil, and some of both. The total acreage of this unit is about 45 percent Dormont silt loam, 40 percent Guernsey silt loam, and 15 percent other soils.

Typically the surface layer of the Dormont soil is dark brown and dark yellowish brown silt loam about 8 inches thick. The subsoil is 35 inches thick. The upper 5 inches of the subsoil is friable, strong brown heavy silt loam. The middle 9 inches is friable to firm, yellowish brown silty clay loam. The lower 21 inches is firm, yellowish brown and gray heavy silty clay loam mottled with gray and strong brown. The substratum extends to a depth of 60 inches or more. Between depths of 43 and 50 inches it is firm, gray light silty clay mottled with strong brown. At a depth of more than 50 inches it is firm, dark brown shaly silt loam mottled with gray and strong brown.

Typically the surface layer of the Guernsey soil is dark grayish brown and dark brown silt loam about 7 inches thick. The subsoil is 35 inches thick. The upper 5 inches of the subsoil is friable, strong brown silt loam. The middle 8 inches is friable, yellowish brown silty clay loam mottled with gray. The lower 22 inches is firm, gray silty clay mottled with yellowish red and heavy silty clay mottled with yellowish brown and yellowish red. The substratum is firm, gray, brownish yellow, and yellowish brown heavy silty clay that extends to bedrock at a depth of about 52 inches.

Included with these soils in mapping are a few small areas of Culleoka, Westmoreland, Upshur, and Clarksburg soils. Also included are small areas of gently sloping soils, moderately steep soils, sandy soils, and somewhat poorly drained soils. Included soils make up about 15 percent of this map unit.

Available water capacity is high in the Dormont and Guernsey soils. Permeability is mostly moderately slow or slow in the subsoil of both. Runoff is rapid, and natural fertility is moderate or high. The soils have a seasonal high water table about 1-1/2 to 3 feet below the surface that restricts the root zone of some plants. Where unlimed, the Dormont soil is medium acid to very strongly acid in the surface layer and upper part of the subsoil and strongly acid or medium acid in the lower part of the subsoil and in the substratum. The Guernsey soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly acid in the lower part of the subsoil and in the substratum. The depth to bedrock in these soils is 48 inches or more.

These soils are suited to cultivated crops and to hay and pasture. Most areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If these soils are cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, deferment of grazing in the spring until the soils are firm, rotational grazing, and seeding of bare areas are major pasture management needs.

The soils have high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during the wet season because the soils are soft.

Slope, a slip hazard, the seasonal high water table, and the moderately slow or slow permeability limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass IIIe.

DgD—Dormont and Guernsey silt loams, 15 to 25 percent slopes. This unit consists of moderately steep, moderately well drained soils on ridgetops and benches mostly in the central part of the survey area. The benches are dissected in places by drainageways, and landslips are in some areas. Slopes are mostly smooth and convex, but some benches are uneven. These soils were mapped together because they have no major differences in use and management. Some areas of this unit are made up of the Dormont soil, some of the Guernsey soil, and some of both. The total acreage of this unit is about 40 percent Dormont silt loam, 40 percent Guernsey silt loam, and 20 percent other soils.

Typically the surface layer of the Dormont soil is dark brown and dark yellowish brown silt loam about 7 inches thick. The subsoil is 36 inches thick. The upper 6 inches of the subsoil is friable, strong brown heavy silt loam. The middle 9 inches is friable to firm, yellowish brown silty clay loam. The lower 21 inches is firm, yellowish brown and gray heavy silty clay loam mottled with gray and strong brown. The substratum extends to a depth of more than 60 inches. Between depths of 43 and 51 inches it is firm, gray light silty clay mottled with strong brown. At a depth of more than 51 inches it is firm, dark brown shaly silt loam mottled with gray and strong brown.

Typically the surface layer of the Guernsey soil is dark grayish brown and dark brown silt loam about 6 inches thick. The subsoil is 40 inches thick. The upper 6 inches of the subsoil is friable, strong brown silt loam. The middle 8 inches is friable, yellowish brown silty clay loam mottled with gray. The lower 26 inches is firm, gray silty clay mottled with yellowish red and heavy silty clay mottled with yellowish brown and yellowish red. The substratum is firm, gray, brownish yellow, and yellowish brown heavy silty clay that extends to bedrock at a depth of about 57 inches.

Included with these soils in mapping are a few small areas of Culleoka, Westmoreland, Upshur, and Clarksburg soils. Also included are small areas of strongly sloping soils, steep soils, severely eroded soils, and sandy soils. Included soils make up about 20 percent of this map unit.

Available water capacity is high in the Dormont and Guernsey soils. Permeability is mostly moderately slow or slow in the subsoil of both. Runoff is rapid, and natural fertility is moderate or high. The soils have a seasonal high water table about 1-1/2 to 3 feet below the surface that restricts the root zone of some plants. Where unlimed, the Dormont soil is medium acid to very strongly acid in the surface layer and upper part of the subsoil and strongly acid or medium acid in the lower part of the subsoil and in the substratum. The Guernsey soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly acid in the lower part of the subsoil and in the substratum. The depth to bedrock in these soils is 48 inches or more.

These soils have limited suitability for cultivated crops. They are better suited to and are mainly used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If these soils are cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and good tilth. The use of proper stocking rates to maintain desirable grasses and legumes, deferment of grazing in the spring until the soils are firm, rotational grazing, and seeding of bare areas are major pasture management needs.

The soils have high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during the wet season because the soils are soft. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope, a slip hazard, the seasonal high water table, and the moderately slow or slow permeability limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass IVe.

ErB—Ernest silt loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is at the mouth of hollows and the head of drainageways and on foot slopes in the eastern part of the survey area. This soil is commonly dissected by drainageways, and seep spots are common in some areas. The soil receives surface and subsurface water from higher lying soils. Slopes are smooth and convex.

Typically the surface layer is dark brown silt loam about 6 inches thick. The subsoil is 48 inches thick. The upper 12 inches of the subsoil is friable, yellowish brown silt loam and heavy silt loam. The middle 6 inches is friable, yellowish brown light silty clay loam mottled with strong brown and light brownish gray. The lower 30 inches is firm and brittle, yellowish brown heavy loam and channery heavy loam mottled with strong brown and light brownish gray. The substratum extends to a depth of 60 inches or more. It is firm, strong brown channery heavy silt loam mottled with gray.

Included with this soil in mapping are small areas of Buchanan soils. Also included are a few small areas of nearly level soils, strongly sloping soils, well drained soils, soils that do not have a firm subsoil, and soils that are very stony. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is low to moderate. Permeability is moderately slow or slow in the brittle part of the subsoil. Runoff is medium, and natural fertility is low or moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, this soil is very strongly acid or strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is farmed. The hazard of erosion is moderate in unprotected areas and is a management concern. Cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is firm are major pasture management needs.

The soil has high potential productivity for trees, but less than half the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during wet seasons because the soil is soft.

The seasonal high water table and the moderately slow or slow permeability limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

ErC—Ernest silt loam, 8 to 15 percent slopes. This strongly sloping, moderately well drained soil is at the mouth of hollows and the head of drainageways and on foot slopes in the eastern part of the survey area. The soil is commonly dissected by drainageways, and seep spots are common in some areas. This soil receives surface and subsurface water from higher lying soils.

Typically the surface layer is dark brown silt loam about 6 inches thick. The subsoil is 49 inches thick. The upper 11 inches of the subsoil is friable, yellowish brown silt loam and heavy silt loam. The middle 5 inches is friable, yellowish brown light silty clay loam mottled with strong brown and light brownish gray. The lower 33 inches is very firm and brittle, yellowish brown heavy loam and channery heavy loam mottled with strong brown and light brownish gray. The substratum extends to a depth of 60 inches or more. It is firm, strong brown channery heavy silt loam mottled with gray.

Included with this soil in mapping are small areas of Buchanan soils. Also included are a few small areas of gently sloping soils, moderately steep soils, well drained soils, soils that do not have a firm subsoil, and soils that are very stony. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is low to moderate. Permeability is moderately slow or slow in the firm part of the subsoil. Runoff is rapid, and natural fertility is low or moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, the soil is very strongly acid or strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Most of the acreage is used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing in the spring until the soil is firm, and seeding of bare areas are major pasture management needs.

The soil has high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during wet seasons because the soil is soft.

Slope, a slip hazard, the seasonal high water table, and the moderately slow or slow permeability limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

ErD—Ernest silt loam, 15 to 25 percent slopes. This moderately steep, moderately well drained soil is on foot slopes and at the head of drainageways in the eastern part of the survey area. This soil is commonly dissected by drainageways, and seep spots are common in some areas. The soil receives surface and subsurface water from higher lying soils.

Typically the surface layer is dark brown silt loam about 5 inches thick. The subsoil is about 45 inches thick. The upper 10 inches of the subsoil is friable, yellowish brown silt loam and heavy silt loam. The middle 5 inches is friable, yellowish brown light silty clay loam mottled with strong brown and light brownish gray. The lower 30 inches is firm and brittle, yellowish brown heavy loam and channery heavy loam mottled with strong brown and light brownish gray. The substratum extends to a depth of 60 inches or more. It is firm, strong brown channery heavy silt loam mottled with gray.

Included with this soil in mapping are small areas of Buchanan soils. Also included are a few small areas of strongly sloping soils, steep soils, well drained soils, soils that do not have a firm subsoil, and soils that are very stony. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is low to moderate. Permeability is moderately slow or slow in the brittle part of the subsoil. Runoff is rapid, and natural fertility is low or moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, the soil is very strongly acid or strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil has limited suitability for cultivated crops. It is better suited to hay and pasture, and much of the acreage is used for pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing in the spring until the soil is firm, and seeding of bare areas are major pasture management needs.

The soil has high potential productivity for trees, and about half of the acreage is wooded. Ercsion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during wet seasons because the soil is soft.

Slope, a slip hazard, the seasonal high water table, and the moderately slow or slow permeability limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of excess water help to control erosion and sedimentation. Placing roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IVe.

GaB—Gilpin silt loam, 3 to 8 percent slopes. This gently sloping, well drained soil is mostly on broad ridgetops in the eastern part of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark brown silt loam about 8 inches thick. The subsoil is friable and yellowish brown. It is 24 inches thick. The upper 10 inches of the subsoil is heavy silt loam, and the lower 14 inches is channery silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of about 36 inches.

Included with this soil in mapping are small areas of Lily and Wharton soils. Also included are small areas of nearly level soils and strongly sloping soils. Included soils make up about 15 percent of this map unit.

Available water capacity and permeability in this soil are moderate. Runoff is medium, and natural fertility is low to moderate. Where unlimed, the soil is strongly acid or very strongly acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to pasture and hay. Much of the acreage is used for pasture and hay. The hazard of erosion is moderate in unprotected areas and is a management concern. If this soil is farmed, cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes and the use of rotational grazing are major pasture management needs.

The soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

The shallow depth to bedrock limits this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

GaC—Gilpin silt loam, 8 to 15 percent slopes. This strongly sloping, well drained soil is on ridgetops and benches in the eastern part of the survey area. Slopes are mostly smooth and convex.

Typically the surface layer is dark brown silt loam about 8 inches thick. The subsoil is friable and yellowish brown. It is 24 inches thick. The upper 11 inches of the subsoil is heavy silt loam, and the lower 13 inches is channery silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of about 38 inches.

Included with this soil in mapping are small areas of Lily, Wharton, Buchanan, and Ernest soils. Also included are small areas of gently sloping soils, moderately steep soils, and severely eroded soils. Included soils make up about 20 percent of this map unit.

Available water capacity and permeability in this soil are moderate. Runoff is rapid, and natural fertility is low to moderate. Where unlimed, the soil is strongly acid or very strongly acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to pasture and hay. Most of the acreage is used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is

cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are major pasture management needs.

The soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope and the shallow depth to bedrock limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

GaD—Gilpin silt loam, 15 to 25 percent slopes. This moderately steep, well drained soil is on ridgetops and benches in the eastern part of the survey area. The benches are commonly dissected by drainageways. Slopes are mostly smooth and convex.

Typically the surface layer is dark brown silt loam about 8 inches thick. The subsoil is friable and yellowish brown. It is 22 inches thick. The upper 10 inches of the subsoil is heavy silt loam, and the lower 12 inches is channery silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of about 38 inches.

Included with this soil in mapping are a few small areas of Lily, Wharton, Buchanan, and Ernest soils. Also included are small areas of strongly sloping soils, steep soils, severely eroded soils, and channery and very stony soils. Included soils make up about 20 percent of this map unit.

Available water capacity and permeability in this soil are moderate. Runoff is rapid, and natural fertility is low to moderate. Where unlimed, the soil is strongly acid or very strongly acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil has limited suitability for cultivated crops. It is better suited to hay and pasture, and much of the acreage is used for pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are major pasture management needs.

The soil has moderately high to high potential productivity for trees. About half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is limited by slope.

Slope and the shallow depth to bedrock limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IVe.

GaE—Gilpin silt loam, 25 to 35 percent slopes. This steep, well drained soil is on hillsides and narrow ridgetops in the eastern part of the survey area. The hillsides are commonly dissected by drainageways. Slopes are mostly smooth and convex.

Typically the surface layer is dark brown silt loam about 6 inches thick. The subsoil is friable and yellowish brown. It is 18 inches thick. The upper 9 inches of the subsoil is heavy silt loam, and the lower 9 inches is channery light silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of about 35 inches.

Included with this soil in mapping are small areas of the Dekalb, Buchanan, and Ernest soils. Also included are small areas of moderately steep soils, very steep soils, severely eroded soils, and channery and very stony soils. These included soils generally make up about 20 percent of this map unit. However, areas of this unit near Prickett Creek in Marion County and near Whiteday Creek in both counties are about 30 percent Dekalb soils.

Available water capacity and permeability in this soil are moderate. Runoff is very rapid, and natural fertility is low to moderate. Where unlimed, the soil is strongly acid or very strongly acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or hay, but it is suited to pasture. The erosion hazard is very severe in unprotected areas, and overgrazing is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas to a permanent plant cover are the major pasture management needs.

This soil has moderately high to high potential productivity for trees. Most of the acreage is wooded. Erosion on logging roads and skid trails can be controlled by placing the roads and trails on contour. The use of equipment is limited by slope.

Slope and the shallow depth to bedrock limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion

of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass VIe.

GaF—Gilpin silt loam, 35 to 65 percent slopes. This very steep, well drained soil is on hillsides and narrow ridgetops in the eastern part of the survey area. The hillsides are commonly dissected by drainageways. Slopes are mostly smooth and convex.

Typically the surface layer is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and yellowish brown. It is 18 inches thick. The upper 7 inches of the subsoil is heavy silt loam, and the lower 11 inches is channery silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are small areas of Dekalb, Buchanan, and Ernest soils. Also included are small areas of steep soils and small areas of channery and very stony soils. These included soils generally make up about 25 percent of this map unit. However, areas of this unit near Prickett Creek in Marion County and near Whiteday Creek in both counties are about 30 percent Dekalb soils.

Available water capacity and permeability are moderate in this soil. Runoff is very rapid, and natural fertility is low to moderate. Where unlimed, the soil is strongly acid or very strongly acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or hay and is difficult to manage for pasture. It has moderately high to high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is limited by slope.

Slope and the shallow depth to bedrock limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation.

This soil is in capability subclass VIIe.

GcC—Gilpin-Culleoka silt loams, 8 to 15 percent slopes. This complex consists of strongly sloping, well drained soils on ridgetops and benches in the western part of the survey area. The benches are dissected in places by drainageways. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 50 percent Gilpin silt loam, 30 percent Culleoka silt loam, and 20 percent other soils.

Typically the surface layer of the Gilpin soil is dark brown silt loam about 8 inches thick. The subsoil is friable and yellowish brown. It is 24 inches thick. The upper 11 inches of the subsoil is heavy silt loam, and the lower 13 inches is channery silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of about 38 inches.

Typically the surface layer of the Culleoka soil is dark brown silt loam about 6 inches thick. The subsoil is friable and is 17 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The middle 5 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown shaly light silty clay loam that extends to bedrock at a depth of about 32 inches.

Included with these soils in mapping are small areas of Dekalb, Upshur, Westmoreland, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of sloping soils, moderately steep soils, very stony soils, and severely eroded soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. Runoff is rapid, and natural fertility is moderate. Where unlimed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The soils in this complex are suited to cultivated crops and to pasture and hay. Much of the acreage is used for pasture and hay. The hazard of erosion is severe in unprotected areas and is a major management concern. If these soils are cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are major pasture management needs.

These soils have moderately high to high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope, a slip hazard, and the shallow depth to bedrock limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass IIIe.

GcD—Gilpin-Culleoka silt loams, 15 to 25 percent slopes. This complex consists of moderately steep, well drained soils on ridgetops, benches, and hillsides in the western part of the survey area. The benches are dissected in places by drainageways. The soils are in such an intricate pattern that it was not practical to map them

separately. The complex is about 55 percent Gilpin silt loam, 25 percent Culleoka silt loam, and 20 percent other soils.

Typically the surface layer of the Gilpin soil is dark brown silt loam about 8 inches thick. The subsoil is friable and yellowish brown and is 22 inches thick. The upper 10 inches of the subsoil is heavy silt loam, and the lower 12 inches is channery silty clay loam. The substratum is friable, strong brown channery heavy loam extending to bedrock at a depth of about 38 inches.

Typically the surface layer of the Culleoka soil is dark brown silt loam about 6 inches thick. The subsoil is friable and is 19 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The middle 6 inches is brown shaly light silty clay loam. The lower 9 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown shaly light silty clay loam that extends to bedrock at a depth of about 34 inches.

Included with these soils in mapping are small areas of Dekalb, Upshur, Westmoreland, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of strongly sloping soils, steep soils, very stony soils, and severely eroded soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. Runoff is rapid, and natural fertility is moderate. Unless limed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

The soils in this complex have limited suitability for cultivated crops and are better suited to pasture and hay. Much of the acreage is pastured. The hazard of erosion is severe in unprotected areas and is a major management concern. If the soils are cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are major pasture management needs.

The soils have moderately high to high potential productivity for trees. About half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope, a slip hazard, and the shallow depth to bedrock limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass IVe.

GcE—Gilpin-Culleoka silt loams, 25 to 35 percent slopes. This complex consists of steep, well drained soils on hillsides and ridgetops in the western part of the survey area. The hillsides are commonly dissected by drainageways. Slopes are smooth and convex. These soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 55 percent Gilpin silt loam, 25 percent Culleoka silt loam, and 20 percent other soils.

Typically the surface layer of the Gilpin soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and yellowish brown and is 18 inches thick. The upper 9 inches of the subsoil is heavy silt loam, and the lower 9 inches is channery light silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of 35 inches.

Typically the surface layer of the Culleoka soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and is 21 inches thick. The upper 5 inches of the subsoil is brown heavy silt loam. The middle 8 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 34 inches.

Included with these soils in mapping are small areas of Dekalb, Upshur, Westmoreland, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of moderately steep soils, very steep soils, very stony soils, and severely eroded soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. Runoff is very rapid, and natural fertility is moderate. Where unlimed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The soils in this complex are not suited to cultivated crops or hay but are suited to pasture. Some of the acreage is used for pasture. The erosion hazard is very severe in unprotected areas, and overgrazing is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas to permanent plant cover are major pasture management needs.

The soils have high to high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope, a slip hazard, and the shallow depth to bedrock limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and

sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass VIe.

GcF—Gilpin-Culleoka silt loams, 35 to 65 percent slopes. This complex consists of very steep, well drained soils on hillsides and narrow ridgetops in the western part of the survey area. The hillsides are commonly dissected by drainageways. Slopes are smooth and convex. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 55 percent Gilpin silt loam, 25 percent Culleoka silt loam, and 20 percent other soils.

Typically the surface layer of the Gilpin soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and yellowish brown and is 18 inches thick. The upper 7 inches of the subsoil is heavy silt loam, and the lower 11 inches is channery light silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of 34 inches.

Typically the surface layer of the Culleoka soil is dark brown and brown silt loam about 6 inches thick underlain by brown silt loam about 3 inches thick. The subsoil is friable and is 17 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The middle 5 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly silty clay loam that extends to bedrock at a depth of about 30 inches.

Included with these soils in mapping are small areas of Dekalb, Upshur, Westmoreland, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of steep soils and very stony soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. Runoff is very rapid, and natural fertility is moderate. Where unlimed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The soils in this complex are not suited to cultivated crops or hay and are difficult to manage for pasture. Some areas, however, are used for pasture. The erosion hazard is very severe in unprotected areas, and such areas require seeding to a permanent plant cover.

The soils have moderately high to high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope, a slip hazard, and the shallow depth to bedrock limit these soils for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass VIIe.

GuC—Gilpin-Culleoka-Upshur silt loams, 8 to 15 percent slopes. This complex consists of strongly sloping, well drained soils on ridgetops and benches mostly in the western part of the survey area. The benches are dissected in places by drainageways, and landslips are in some areas. Slopes are mostly smooth and convex, but some benches are uneven. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 30 percent Gilpin silt loam, 25 percent Culleoka silt loam, 25 percent Upshur silt loam, and 20 percent other soils.

Typically the surface layer of the Gilpin soil is dark brown silt loam about 8 inches thick. The subsoil is friable and yellowish brown and is 24 inches thick. The upper 11 inches of the subsoil is heavy silt loam, and the lower 13 inches is channery light silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of 38 inches.

Typically the surface layer of the Culleoka soil is dark brown silt loam about 6 inches thick. The subsoil is friable and is 17 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The middle 5 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 32 inches.

Typically the surface layer of the Upshur soil is reddish brown silt loam about 7 inches thick. The subsoil is very sticky, reddish brown and dark reddish brown clay 27 inches thick. The substratum is firm, dark reddish brown shaly silty clay that extends to bedrock at a depth of about 48 inches.

Included with these soils in mapping are a few small areas of Lily, Dekalb, Westmoreland, Dormont, Guernsey, and Clarksburg soils. Also included are small areas of gently sloping soils, moderately steep soils, and very stony soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. They have rapid runoff and moderate natural fertility. Where unlimed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The Upshur soil has moderate to high available water capacity. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock ranges from 40 to

60 inches. The subsoil of the Upshur soil has a high shrink-swell potential.

The soils in this complex are suited to cultivated crops and to pasture and hay. Most of the acreage is used for pasture and hay. The hazard of erosion is severe in unprotected areas and is a major management concern. The Upshur soil is difficult to work and is hard when dry, and water stands on the surface if the soil is worked when it is too wet. If the soils in this complex are cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing until the Upshur soil is firm, and seeding of bare areas are major pasture management needs.

These soils have moderately high to high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope, a slip hazard, the shallow depth to bedrock in the Culleoka and Gilpin soils and the slope, a slip hazard, the clayey texture, and high shrink-swell potential of the subsoil in the Upshur soil are the main limitations for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass IIIe.

GuD—Gilpin-Culleoka-Upshur silt loams, 15 to 25 percent slopes. This complex consists of moderately steep, well drained soils on hillsides, narrow ridgetops, and benches mostly in the western part of the survey area. The benches are dissected in places by drainageways, and landslips are in some areas. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 30 percent Gilpin silt loam, 25 percent Culleoka silt loam, 25 percent Upshur silt loam, and 20 percent other soils.

Typically the surface layer of the Gilpin soil is dark brown silt loam about 8 inches thick. The subsoil is friable and yellowish brown and is 22 inches thick. The upper 10 inches of the subsoil is heavy silt loam, and the lower 12 inches is channery silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of 38 inches.

Typically the surface layer of the Culleoka soil is dark brown silt loam about 6 inches thick. The subsoil is friable and is 19 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The middle 6 inches is brown shaly light silty clay loam. The lower 9 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 34 inches.

Typically the surface layer of the Upshur soil is reddish brown silt loam about 7 inches thick. The subsoil is very sticky, reddish brown and dark reddish brown clay 25 inches thick. The substratum is firm, dark reddish brown shaly silty clay that extends to bedrock at a depth of about 45 inches.

Included with these soils in mapping are a few small areas of well drained Lily, Dekalb, Westmoreland, Dormont, Guernsey, and Clarksburg soils. Also included are small areas of steep soils, strongly sloping soils, and very stony soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. They have rapid runoff and moderate natural fertility. Where unlimed, the Gilpin soil is strongly or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The Upshur soil has moderate to high available water capacity. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock ranges from 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential.

The soils in this complex have limited suitability for cultivated crops. The soils are better suited to pasture and hay, and much of the acreage is used for pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. The Upshur soil is difficult to work and is hard when dry, and water stands on the surface if the soil is worked when it is too wet. If the soils in this complex are cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing until the Upshur soil is firm, and seeding of bare areas are major pasture management needs.

The soils have moderate to high potential productivity for trees. About half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted by slope and is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope, a slip hazard, the shallow depth to bedrock in the Culleoka and Gilpin soils, and the slope, a slip

hazard, the clayey texture, and high shrink-swell potential of the subsoil in the Upshur soil are the main limitations for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass IVe.

GuE—Gilpin-Culleoka-Upshur silt loams, 25 to 35 percent slopes. This complex consists of steep, well drained soils on hillsides, benches, and narrow ridgetops mostly in the western part of the survey area. The benches and hillsides are dissected in places by drainageways, and landslips are in some areas. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 35 percent Gilpin silt loam, 30 percent Culleoka silt loam, 20 percent Upshur silt loam, and 15 percent other soils.

Typically the surface layer of the Gilpin soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and yellowish brown and is 18 inches thick. The upper 9 inches of the subsoil is heavy silt loam, and the lower 9 inches is channery light silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of 35 inches.

Typically the surface layer of the Culleoka soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and is 21 inches thick. The upper 5 inches of the subsoil is brown heavy silt loam. The middle 8 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of 34 inches.

Typically the surface layer of the Upshur soil is dark reddish brown and reddish brown silt loam about 6 inches thick. The subsoil is very sticky, reddish brown and dark reddish brown clay 30 inches thick. The substratum is firm, dark reddish brown shaly silty clay that extends to bedrock at a depth of about 42 inches.

Included with these soils in mapping are a few small areas of Lily, Dekalb, Westmoreland, Dormont, Guernsey, and Clarksburg soils Also included are small areas of moderately steep soils, very steep soils, and very stony soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. They have very rapid runoff and moderate natural fertility. Where unlimed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The Upshur soil has moderate to high available water capacity. Permeability is slow in the subsoil. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock ranges from 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential.

The soils in this complex are not suited to cultivated crops or hay but are suited to pasture. Some areas are used for pasture. The erosion hazard is very severe in unprotected areas, and overgrazing is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing until the Upshur soil is firm, and seeding of bare areas to permanent plant cover are major pasture management needs.

The soils have moderate to high potential productivity for trees. About three-fourths of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted by slope and is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope, a slip hazard, the shallow depth to bedrock in the Culleoka and Gilpin soils and the slope, a slip hazard, the clayey texture, and high shrink-swell potential of the subsoil in the Upshur soil are the main limitations for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass VIe.

GuF—Gilpin-Culleoka-Upshur silt loams, 35 to 65 percent slopes. This complex consists of very steep, well drained soils on hillsides and narrow ridgetops mostly in the western part of the survey area. The hillsides are commonly dissected by drainageways, and landslips are common in places. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 35 percent Gilpin silt loam, 30 percent Culleoka silt loam, 20 percent Upshur silt loam, and 15 percent other soils.

Typically the surface layer of the Gilpin soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and yellowish brown and is 18 inches thick. The upper 7 inches of the subsoil is heavy silt loam, and the lower 11 inches is channery light silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of 34 inches.

Typically the surface layer of the Culleoka soil is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and is 17 inches thick. The upper 4

inches of the subsoil is brown heavy silt loam. The middle 5 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 30 inches.

Typically the surface layer of the Upshur soil is dark reddish brown and reddish brown silt loam about 6 inches thick. The subsoil is very sticky, reddish brown and dark reddish brown clay 27 inches thick. The substratum is firm, dark reddish brown shaly silty clay that extends to bedrock at a depth of about 40 inches.

Included with these soils in mapping are a few small areas of Lily, Dekalb, Westmoreland, Dormont, Guernsey, and Clarksburg soils. Also included are small areas of steep soils and very stony soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. They have very rapid runoff and moderate natural fertility. Where unlimed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The Upshur soil has moderate to high available water capacity. Permeability is slow in the subsoil. Runoff is very rapid, and natural fertility is moderate to high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock ranges from 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential.

The soils in this complex are not suited to cultivated crops or hay and are difficult to manage for pasture. Some areas, however, are in pasture. The erosion hazard is very severe in unprotected areas and is a major management concern, and such areas require seeding to a permanent plant cover.

The soils have high potential productivity for trees. About three-fourths of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted by slope and is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope, a slip hazard, the shallow depth to bedrock in the Culleoka and Gilpin soils and the slope, a slip hazard, the clayey texture, and high shrink-swell potential of the subsoil in the Upshur soil are the main limitations for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass VIIe.

GwD3—Gilpin-Culleoka-Upshur complex, 15 to 25 percent slopes, severely eroded. This complex consists of moderately steep, well drained soils on hillsides, benches, and narrow ridgetops mostly in the western part of the survey area. The hillsides and benches are commonly dissected by drainageways, and landslips are common. Erosion has removed most of the original surface layer of these soils, and the subsoil is exposed in places. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 30 percent Gilpin silt loam, 25 percent Culleoka silt loam, 25 percent Upshur silty clay loam, and 20 percent other soils.

Typically the surface layer of the Gilpin soil is brown silt loam about 6 inches thick. The subsoil is friable and yellowish brown and is 19 inches thick. The upper 9 inches of the subsoil is heavy silt loam, and the lower 10 inches is channery silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of 36 inches.

Typically the surface layer of the Culleoka soil is brown silt loam about 6 inches thick. The subsoil is friable and is 19 inches thick. The upper 5 inches of the subsoil is brown heavy silt loam. The middle 6 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 34 inches.

Typically the surface layer of the Upshur soil is reddish brown silty clay loam about 7 inches thick. The subsoil is very sticky, reddish brown and dark reddish brown clay 25 inches thick. The substratum is firm, dark reddish brown shaly silty clay that extends to bedrock at a depth of about 42 inches.

Included with these soils in mapping are a few small areas of Lily, Dekalb, Westmoreland, Dormont, Guernsey, and Clarksburg soils. Also included are small areas of strongly sloping soils, steep soils, and very stony soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. They have rapid runoff and moderate natural fertility. Where unlimed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The Upshur soil has moderate to high available water capacity. Permeability is slow in the subsoil. Runoff is very rapid, and natural fertility is moderate to high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock ranges from 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential.

The soils in this complex are not suited to cultivated crops or hay but are suited to pasture. Much of the

acreage is used for pasture. The erosion hazard is very severe in unprotected areas and is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing until the Upshur soil is firm, and seeding of bare areas to a permanent cover are major pasture management needs.

The soils have moderate to high potential productivity for trees. About half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted by slope and is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope, a slip hazard, the shallow depth to bedrock in the Culleoka and Gilpin soils and the slope, a slip hazard, the clayey texture, and high shrink-swell potential of the subsoil in the Upshur soil are the main limitations for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass VIe.

GwE3—Gilpin-Culleoka-Upshur complex, 25 to 35 percent slopes, severely eroded. This complex consists of steep, well drained soils on hillsides, benches, and narrow ridgetops mostly in the western part of the survey area. The hillsides and benches are commonly dissected by drainageways, and landslips are common. Erosion has removed most of the original surface layer of these soils, and the subsoil is exposed in places. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 35 percent Gilpin silt loam, 30 percent Culleoka silt loam, 20 percent Upshur silty clay loam, and 15 percent other soils.

Typically the surface layer of the Gilpin soil is brown silt loam about 6 inches thick. The subsoil is friable and yellowish brown and is 18 inches thick. The upper 9 inches of the subsoil is heavy silt loam, and the lower 9 inches is channery light silty clay loam. The substratum is friable, strong brown channery heavy loam that extends to bedrock at a depth of 35 inches.

Typically the surface layer of the Culleoka soil is brown silt loam about 6 inches thick. The subsoil is friable and is 21 inches thick. The upper 5 inches of the subsoil is brown heavy silt loam. The middle 8 inches is brown shaly light silty clay loam. The lower 8 inches is strong brown and brown shaly silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam that extends to bedrock at a depth of about 34 inches.

Typically the surface layer of the Upshur soil is reddish brown silty clay loam about 7 inches thick. The subsoil is very sticky, reddish brown and dark reddish brown clay 29 inches thick. The substratum is firm, dark reddish brown shaly silty clay that extends to bedrock at a depth of about 40 inches.

Included with these soils in mapping are a few small areas of Lily, Dekalb, Westmoreland, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of moderately steep soils, very steep soils, and very stony soils.

The Gilpin and Culleoka soils have moderate available water capacity and moderate permeability. They have very rapid runoff and moderate natural fertility. Where unlimed, the Gilpin soil is strongly acid or very strongly acid throughout and the Culleoka soil is medium acid or strongly acid throughout. The root zone of some plants is restricted by bedrock in these soils, which is at a depth of 20 to 40 inches.

The Upshur soil has moderate to high available water capacity. Permeability is slow in the subsoil. Runoff is very rapid, and natural fertility is moderate to high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock ranges from 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential.

The soils in this complex are not suited to cultivated crops or hay and are difficult to manage for pasture. Some areas, however, are used for pasture. The erosion hazard is very severe in unprotected areas and is a major management concern, and such areas require seeding to a permanent plant cover.

The soils have moderate to high potential productivity for trees. About three-fourths of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted by slope and is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope, a slip hazard, the shallow depth to bedrock in the Culleoka and Gilpin soils and the slope, a slip hazard, the clayey texture, and high shrink-swell potential of the subsoil in the Upshur soil are the main limitations for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is in capability subclass VIIe.

Ho—Holly silt loam. This nearly level, poorly drained soil is on flood plains along streams in the central and western parts of the survey area. Slopes are smooth and generally concave.

Typically the surface layer is 7 inches thick. It is dark grayish brown and dark brown silt loam mottled with yellowish red and strong brown. The subsoil is 29 inches

thick. It is friable, gray loam and heavy loam mottled with strong brown. The substratum between depths of 36 and 52 inches is friable, gray heavy loam mottled with strong brown. From 52 inches to a depth of more than 60 inches it is friable, gray layers of loam, sandy loam, and gravel mottled with strong brown and olive.

Included with this soil in mapping are a few small areas of Chagrin, Kanawha, and Lobdell soils. Also included are small areas of gently sloping soils and a few soils that contain more silt or more sand in the subsoil than this Holly soil. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate or moderately slow in the subsoil. Runoff is slow, and natural fertility is moderate to high. This soil has a seasonal high water table at or near the surface that restricts the root zone of some plants. Where unlimed, the soil is slightly acid to strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay if artificial drainage is provided, but some areas lack suitable drainage outlets. Most of the acreage is used for pasture and hay. In places, crops are subject to damage from flooding. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is firm are major pasture management needs.

The soil has high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft.

Flooding and the high water table limit this soil for most urban uses. Establishing a plant cover in unprotected areas and providing for the proper disposal or diversion of water help to control erosion and sedimentation.

This soil is in capability subclass IIIw.

Ka—Kanawha loam. This nearly level, well drained soil is on flood plains mostly along the Monongahela, West Fork, and Tygart Valley Rivers and Buffalo and Dunkard Creeks. Slopes are mostly smooth and convex.

Typically the surface layer is dark brown loam about 7 inches thick. The subsoil is friable, dark brown loam and heavy loam 56 inches thick. The substratum, at a depth of more than 63 inches, is friable, dark brown loam.

Included with this soil in mapping are a few small areas of Chagrin, Lobdell, and Holly soils. Also included are a few small areas of gently sloping soils and soils that have more sand in the subsoil than this Kanawha soil. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate in the subsoil. Runoff is slow, and natural fertility is moderate to high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid to neutral in the lower part of the subsoil and in the substratum. The depth to bedrock is greater than 60 inches.

This soil is well suited to cultivated crops and to pasture and hay. Most of the acreage is farmed. Cultivated crops can be grown continuously on this soil, but the soil needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes and the use of rotational grazing are major pasture management needs.

The soil has high potential productivity for trees, but only a small acreage is wooded.

A hazard of flooding limits this soil for most urban uses. Establishing a plant cover in unprotected areas and providing for the proper disposal or diversion of water help to control erosion and sedimentation.

This soil is in capability class I.

LaB—Lily loam, 3 to 8 percent slopes. This gently sloping, well drained soil is on broad ridgetops in the eastern part of the survey area. Slopes are smooth and convex.

Typically the surface layer is very dark grayish brown and dark brown loam about 5 inches thick. The subsoil is friable and is 22 inches thick. The upper 4 inches of the subsoil is yellowish brown loam. The middle 13 inches is yellowish brown light sandy clay loam and strong brown sandy clay loam. The lower 5 inches is yellowish brown sandy loam. Bedrock is at a depth of 27 inches.

Included with this soil in mapping are a few small areas of Dekalb, Gilpin, and Wharton soils. Also included are small areas of nearly level soils, strongly sloping soils, and soils with a firm, brittle layer in the subsoil. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is low to moderate. Permeability is moderately rapid in the subsoil. Runoff is medium, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to pasture and hay, but few areas are farmed. The hazard of erosion is moderate in unprotected areas and is a management concern. If this soil is farmed, cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes and the use of rotational grazing are major pasture management needs.

The soil has high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

The shallow depth to bedrock limits the soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of

water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

LaC—Lily loam, 8 to 15 percent slopes. This strongly sloping, well drained soil is on ridgetops and benches in the eastern part of the survey area. The benches are dissected in places by drainageways. Slopes are smooth and convex.

Typically the surface layer is very dark grayish brown and dark brown loam about 5 inches thick. The subsoil is friable and is 26 inches thick. The upper 4 inches of the subsoil is yellowish brown loam. The middle 17 inches is yellowish brown light sandy clay loam and strong brown sandy clay loam. The lower 5 inches is yellowish brown sandy loam. Bedrock is at a depth of about 31 inches.

Included with this soil in mapping are a few small areas of Dekalb, Gilpin, Buchanan, Ernest, and Wharton soils. Also included are small areas of gently sloping soils and moderately steep soils. Included soils make up about 20 percent of the map unit.

Available water capacity in this soil is low to moderate. Permeability is moderately rapid in the subsoil. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to pasture and hay, but few areas are farmed. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are the major pasture management needs.

The soil has high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope and the shallow depth to bedrock limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

LaD—Lily loam, 15 to 25 percent slopes. This moderately steep, well drained soil is on ridgetops and benches in the eastern part of the survey area. The benches are dissected in places by drainageways. Slopes are smooth and convex.

Typically the surface layer is very dark grayish brown and dark brown loam about 5 inches thick. The subsoil is friable and is 26 inches thick. The upper 4 inches of the subsoil is yellowish brown loam. The middle 17 inches is yellowish brown light sandy clay loam and strong brown sandy clay loam. The lower 5 inches of the subsoil is yellowish brown sandy loam. Bedrock is at a depth of 31 inches.

Included with this soil in mapping are a few small areas of Dekalb, Gilpin, Buchanan, Ernest, and Wharton soils. Also included are small areas of strongly sloping soils and steep soils. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is low to moderate. Permeability is moderately rapid in the subsoil. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid throughout. The root zone of some plants is restricted by bedrock, which is at a depth of 20 to 40 inches.

This soil has limited suitability for cultivated crops. It is better suited to pasture and hay. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are the major pasture management needs.

The soil has high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope and the shallow depth to bedrock limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IVe.

Lb—Lobdell silt loam. This nearly level, moderately well drained soil is on flood plains along streams in the central and western parts of the survey area. Slopes are smooth and generally slightly concave.

Typically the surface layer is dark brown silt loam about 7 inches thick. The subsoil is friable and is 27 inches thick. The upper 5 inches of the subsoil is brown silt loam. The middle 9 inches is dark yellowish brown heavy silt loam. The lower 13 inches is dark yellowish brown loam mottled with strong brown and grayish brown. The substratum extends to a depth of 60 inches or more. It is friable, dark yellowish brown loam and

sandy loam mottled with strong brown and grayish brown.

Included with this soil in mapping are a few small areas of Chagrin, Kanawha, and Holly soils. Also included are a few small areas of gently sloping soils and soils that contain more silt or more sand in the subsoil than this Lobdell soil. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate in the subsoil. Runoff is slow, and natural fertility is moderate to high. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface that restricts the root zone of some plants. Where unlimed, the soil is strongly acid to slightly acid in the surface layer and upper part of the subsoil and medium acid to neutral in the lower part of the subsoil and in the substratum. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Most of the acreage is used for hay and pasture (fig. 4). Some small areas of the soil are wet and need artificial drainage if desirable crops are to be grown. Cultivated crops can be grown continuously on this soil, but the soil needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. In places, crops are subject to damage from flooding. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is firm are major pasture management needs.

The soil has very high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft.

A hazard of flooding and the shallow depth to the seasonal high water table limit this soil for urban use. Establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control stream scouring and sedimentation.

This soil is in capability subclass IIw.

Lh—Lobdell-Holly silt loams. This complex consists of nearly level, moderately well drained and poorly drained soils on flood plains along streams in the central and western parts of the survey area. The soils are in such an intricate pattern that it was not practical to map them separately. The complex is about 50 percent Lobdell silt loam, 30 percent Holly silt loam, and 20 percent other soils.

Typically the surface layer of the Lobdell soil is dark brown silt loam about 7 inches thick. The subsoil is friable and is 27 inches thick. The upper 5 inches of the subsoil is brown silt loam. The middle 9 inches is dark yellowish brown heavy silt loam. The lower 13 inches is dark yellowish brown loam mottled with strong brown and grayish brown. The substratum extends to a depth of 60 inches or more. It is friable, dark yellowish brown loam and sandy loam mottled with strong brown and grayish brown.

Typically the surface layer of the Holly soil is dark grayish brown and dark brown silt loam mottled with yellowish red and strong brown. It is about 7 inches thick. The subsoil is friable gray loam and heavy loam mottled with strong brown. It is 29 inches thick. The substratum extends to a depth of 60 inches or more. Between depths of 36 and 52 inches it is friable, gray heavy loam mottled with strong brown. At a depth of more than 52 inches it is friable, gray layers of loam, sandy loam, and gravel mottled with strong brown and olive.

Included with these soils in mapping are a few small areas of Chagrin and Kanawha soils. Also included are small areas of gently sloping soils and soils that contain more silt or more sand in the subsoil than the Lobdell or Holly soils.

The Lobdell and Holly soils have high available water capacity. Runoff is slow on both soils, and natural fertility is moderate to high in both. A seasonal high water table is at a depth of 1-1/2 to 3 feet in the Lobdell soil and is at or near the surface in the Holly soil; the root zone of some plants is restricted in each soil by the high water table. The depth to bedrock in both soils is more than 60 inches.

Permeability is moderate in the subsoil of the Lobdell soil and moderate to moderately slow in the subsoil of the Holly soil. Where unlimed, the Lobdell soil is strongly acid to slightly acid in the surface layer and upper part of the subsoil and medium acid to neutral in the lower part of the subsoil and in the substratum. The Holly soil is strongly acid to slightly acid throughout.

The soils in this complex are suited to cultivated crops and to pasture and hay. Most of the acreage is used for hay and pasture. Wet areas need artificial drainage if desirable crops are to be grown. Cultivated crops can be grown continuously on these soils, but the soils need the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. In places, crops are subject to damage from flooding. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soils are firm are major pasture management needs.

The soils have high to very high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soils are soft.

Flooding and the seasonal high water table limit the soil for urban uses. Establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control stream scouring and sedimentation.

This unit is in capability subclass IIw.

MgB—Monongahela silt loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on stream terraces mostly in the central part of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark brown silt loam about 7 inches thick. The subsoil is 54 inches thick. The upper 15 inches of the subsoil is friable, yellowish brown silt loam and loam. The lower 39 inches is a firm and brittle layer that consists of yellowish brown, strong brown, reddish yellow, and light grayish brown heavy loam and light clay loam. The upper part of this firm and brittle layer is mottled with light brownish gray, light grayish brown, and reddish yellow. The substratum, at a depth of more than 61 inches, is friable to firm, reddish yellow and light grayish brown sandy clay loam.

Included with this soil in mapping are a few small areas of Allegheny and Zoar soils. Also included are small areas of nearly level soils, strongly sloping soils, soils subject to rare flooding, and soils near Sunset Beach that have more sand and small stones than this Monongahela soil. Included soils make up about 25 percent of this map unit.

Available water capacity in this soil is moderate. Permeability is moderately slow or slow in the firm part of the subsoil. Runoff is medium, and natural fertility is low or moderate. This soil has a seasonal high water table about 1-1/2 to 3 feet below the surface that restricts the root zone of some plants. Where unlimed, the soil is strongly acid or very strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Much of the acreage is farmed. The hazard of erosion is moderate in unprotected areas and is a management concern. Cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, deferment of grazing until the soil is firm in the spring, and rotational grazing are major pasture management needs.

The soil has moderately high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Many areas of this soil are being converted to urban uses, but the moderately slow or slow permeability of this soil and the shallow depth to the seasonal high water table limit urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

MgC—Monongahela silt loam, 8 to 15 percent slopes. This strongly sloping, moderately well drained soil is on stream terraces mostly in the central part of the survey area. Slopes are smooth and convex except for areas dissected by drainageways.

Typically the surface layer is dark brown silt loam about 7 inches thick. The subsoil is 54 inches thick. The upper 15 inches of the subsoil is friable, yellowish brown silt loam and loam. The lower 39 inches is a firm and brittle layer that consists of yellowish brown, strong brown, reddish yellow, and light grayish brown heavy loam and light clay loam. The upper part of this firm and brittle layer is mottled with light brownish gray, light grayish brown, and reddish yellow. The substratum, at a depth of more than 61 inches, is friable to firm, reddish yellow and light grayish brown sandy clay loam.

Included with this soil in mapping are a few small areas of Allegheny and Zoar soils. Also included are small areas of gently sloping soils, moderately steep soils, soils subject to rare flooding, and soils near Sunset Beach that have more sand and small stones than this Monongahela soil. Included soils make up about 25 percent of this map unit.

Available water capacity in this soil is moderate. Permeability is moderately slow or slow in the firm part of the subsoil. Runoff is rapid, and natural fertility is low to moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface that restricts the root zone of some plants. Where unlimed, the soil is strongly acid or very strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Much of the acreage is farmed. The hazard of erosion is severe in unprotected areas and is a major management concern. Minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, deferment of grazing in the spring until soil is firm, and rotational grazing are the major pasture management needs.

The soil has moderately high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Many areas of this soil are being converted to urban uses. Slope, the shallow depth to the water table, and the moderately slow or slow permeability limit most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building

roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

Pv—Pope Variant sandy loam. This nearly level, well drained or somewhat excessively drained soil is on flood plains mostly along Whiteday Creek. Slopes are smooth and convex.

Typically the surface layer is dark brown sandy loam about 7 inches thick. The subsoil is friable, yellowish brown and strong brown loamy sand 21 inches thick. The substratum is friable, brown sandy loam between a depth of 28 and 37 inches. From 37 inches to a depth of more than 60 inches it is very friable, yellowish brown loamy sand and fine sandy loam.

Included with this soil in mapping are a few small areas of Buchanan and Ernest soils. Also included are small areas of gently sloping soils, stony soils, gravelly soils, soils with a slightly acid subsoil, and soils that contain more silt in the subsoil than this Pope Variant soil. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is very low to moderate. Permeability is rapid throughout. Runoff is slow, and natural fertility is low. Where unlimed, the soil is strongly acid or very strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay, but most of the acreage is idle. Droughtiness during dry seasons is a major management concern. If cultivated crops are grown on this soil, it needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to improve fertility and maintain tilth. In places, crops are subject to damage from flooding. The use of proper stocking rates to maintain desirable grasses and legumes and the use of rotational grazing are major pasture management needs.

The soil has moderately high potential productivity for trees, but the hazard of flooding limits most types of urban uses. Establishing a plant cover on unprotected areas and providing for the proper disposal of surface water help to control stream scouring and sedimentation.

This soil is in capability subclass IIs.

Qu—Quarries. This unit consists of areas that have been quarried for limestone and sandstone. The areas range from 35 to 90 acres.

The sandstone quarries have little or no vegetation, and the soil material in them is generally very strongly acid or extremely acid. The sandstone quarries are in the eastern part of Monongalia County. They are mainly square or rectangular. The depth of these quarries ranges from 6 feet to more than 25 feet, and some are partially filled with water.

The limestone quarries are sparsely vegetated. They mainly are in the eastern part of Monongalia County near the entrance to limestone mines. A few areas are near surface mines in Marion County. The material in the areas in Monongalia County is slightly acid or mildly alkaline, and the material in Marion County is strongly acid to neutral.

This unit is not assigned to a capability subclass.

TlB—Tilsit silt loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on broad ridgetops in the eastern part of the survey area. Slopes are smooth and convex.

Typically the surface layer is very dark grayish brown and brown silt loam about 7 inches thick. The subsoil is 35 inches thick. The upper 10 inches of the subsoil is friable, yellowish brown heavy silt loam. The middle 4 inches is friable, yellowish brown light silty clay loam mottled with strong brown and light brownish gray. The lower 21 inches is a firm and brittle layer of brownish yellow and yellowish brown light silty clay loam mottled with strong brown, light brownish gray, and gray. The substratum is firm, yellowish brown light silty clay loam mottled with gray, and it extends to bedrock at a depth of about 56 inches.

Included with this soil in mapping are a few small areas of Gilpin, Dekalb, and Wharton soils. Also included are small areas of nearly level soils, strongly sloping soils, and soils with more sand in the subsoil than this Tilsit soil. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is moderate. Permeability is slow in the firm part of the subsoil. Runoff is medium, and natural fertility is moderate. Where unlimed, the soil is strongly acid to extremely acid throughout. The soil has a seasonal high water table about 1-1/2 to 2-1/2 feet below the surface that restricts the root zone of some plants. The depth to bedrock ranges from 42 to 72 inches.

This soil is suited to cultivated crops and to pasture and hay. A small acreage is farmed. The hazard of erosion is moderate in unprotected areas and is a management concern. Cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing in the spring until the soil is firm, and seeding of bare areas are the major pasture management needs.

The soil has moderately high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment during wet seasons is restricted because the soil is soft.

Slow permeability and the shallow depth to the water table limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper

disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

TIC—Tilsit silt loam, 8 to 15 percent slopes. This strongly sloping, moderately well drained soil is on broad ridgetops in the eastern part of the survey area. Slopes are smooth and convex.

Typically the surface layer is very dark grayish brown and brown silt loam about 7 inches thick. The subsoil is 35 inches thick. The upper 10 inches of the subsoil is friable, yellowish brown heavy silt loam. The middle 4 inches is friable, yellowish brown light silty clay loam mottled with strong brown and light brownish gray. The lower 21 inches is a firm and brittle layer of brownish yellow and yellowish brown light silty clay loam mottled with strong brown, light brownish gray, and gray. The substratum is firm, yellowish brown light silty clay loam mottled with gray and extends to bedrock at a depth of about 56 inches.

Included with this soil in mapping are a few small areas of Gilpin, Dekalb, and Wharton soils. Also included are small areas of gently sloping soils, moderately steep soils, and soils with more sand in the subsoil than this Tilsit soil. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is moderate. Permeability is slow in the firm part of the subsoil. Runoff is rapid, and natural fertility is moderate. Where unlimed, the soil is strongly acid to extremely acid throughout. The soil has a seasonal high water table about 1-1/2 to 2-1/2 feet below the surface that restricts the root zone of some plants. The depth to bedrock ranges from 42 to 72 inches.

This soil is suited to cultivated crops and to pasture and hay. A small acreage is farmed. The hazard of erosion is severe in unprotected areas and is a major management concern. Minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, deferment of grazing in the spring until the soil is firm, and seeding of bare areas are the major pasture management needs.

The soil has moderately high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment during wet seasons is restricted because the soil is soft.

Slope, the shallow depth to the water table, and slow permeability limit this soil for most urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

U1—Udorthents, cut and fill. This unit consists mostly of mixed soil material and rock fragments from areas that have been excavated, graded, or filled. The unit is mainly along U.S. Route 48 and Interstate 79 in the eastern part of the survey area.

The soils in this unit have been altered or obscured to the extent that careful onsite investigation is necessary to determine limitations and potentials of the soils for any proposed use. Maintaining the plant cover on this unit, establishing a plant cover in unprotected areas, and providing for the proper disposal of surface water help to control erosion and sedimentation.

This unit is not assigned to a capability subclass.

U2—Udorthents, dumps, low base. These soils are on hillsides, on ridgetops, on terraces, on flood plains, and at the mouth of hollows. They are in areas used for the disposal of refuse from deep mines, loading tipples, and coal cleaning and processing plants. The unit consists of steep or very steep mounds and nearly level or gently sloping, broad and irregularly shaped areas.

The characteristics of these soils vary from one area to another. One of the more common soils has a surface layer of black loam about 3 inches thick. The surface layer is underlain by about 43 inches of friable, black, reddish yellow, reddish brown, dark gray, and yellowish red sandy loam.

Included with these soils in mapping are small areas of Udorthents, dumps, very low base; Udorthents, sandstone and shale, very low base; and Udorthents, mudstone and sandstone, low base. Also included are small areas of Culleoka, Gilpin, Dormont, Guernsey, and Westmoreland soils. Included soils make up about 20 percent of this unit.

Available water capacity, permeability, and natural fertility in this unit are variable. The soils are generally droughty. They are less dense and more porous than the undisturbed soils in the survey area. Runoff is medium to very rapid. Where unlimed, these soils are very strongly acid or strongly acid throughout. The erosion hazard is moderate to very severe in unprotected areas.

These soils have poor potential for farming. The surface layer absorbs heat and has low water-holding capacity. Mulching with straw or hay helps prevent heat damage until plant growth is adequate to shade the soil surface. Seeding grasses and legumes and planting trees during fall will help establish plant cover. Establishing a plant cover quickly requires incorporation of adequate lime and fertilizer or application of a minimum of 6 inches of suitable soil material on the surface.

The invading plant species on this unit are dominantly red maple, bigtooth aspen, black birch, povertygrass,

deerstongue grass, and goldenrod. The planted tree species are dominantly black locust, autumn-olive, European black alder, and white pine. Seeded grass and legume mixtures contain various combinations of tall fescue, birdsfoot trefoil, redtop, lespedeza, and alsike clover.

Onsite investigations and testing are necessary for determining the limitations and potentials of these soils for nonfarm use. The use of grasses, legumes, and trees and proper surface water disposal help control erosion and sedimentation.

This unit is not assigned to a capability subclass.

U3—Udorthents, dumps, very low base. These soils are on hillsides, on ridgetops, on terraces, on flood plains, and at the mouth of hollows. They consist of areas used for the disposal of refuse from deep mines, loading tipples, and coal cleaning and processing plants. The unit consists of steep or very steep mounds and nearly level or gently sloping, broad and irregularly shaped areas.

The characteristics of these soils vary from one area to another. One of the more common soils has a surface layer of black loam about 7 inches thick. The surface layer is underlain by about 43 inches of friable, black, reddish yellow, reddish brown, and dark grayish brown sandy loam mottled with reddish yellow, yellowish brown, and red.

Included with these soils in mapping are small areas of Udorthents, dumps, low base; Udorthents, sandstone and shale, very low base; and Udorthents, mudstone and sandstone, low base. Also included are small areas of Culleoka, Gilpin, Dormont, Guernsey, and Westmoreland soils. Included soils make up about 20 percent of this unit.

Available water capacity, permeability, and natural fertility in this unit are variable. These soils are generally droughty. They are less dense and more porous than the undisturbed soils in the survey area. Runoff is medium to very rapid. Where unlimed, the soils are extremely acid to very strongly acid throughout. The erosion hazard is moderate to very severe in unprotected areas.

These soils have poor potential for farming. The surface layer absorbs heat and has a low water-holding capacity. Mulching with straw and hay helps prevent heat damage until plant growth is adequate to shade the soil surface. Seeding grasses and legumes and planting trees during the fall will help establish plant cover. Establishing a plant cover quickly requires incorporation of adequate lime and fertilizer or application of a minimum of 6 inches of suitable soil material on the surface.

The invading plant species on this unit are dominantly red maple, bigtooth aspen, black birch, povertygrass, deerstongue grass, and goldenrod. The planted tree species are dominantly black locust, autumn-olive, European black alder, and white pine. Seeded grass and legume mixtures contain various combinations of tall fescue, birdsfoot trefoil, redtop, lespedeza, and alsike clover.

Onsite investigations and testing are necessary for determining the limitations and potential of these soils for nonfarm uses. The use of grasses, legumes, and trees and the proper disposal of surface water help control erosion and sedimentation.

This unit is not assigned to a capability subclass.

U4—Udorthents, mudstone and sandstone, high base. These soils are mostly on hillsides in the central and eastern parts of the survey area. They are in areas which have been surface-mined for coal. In most places this unit consists of a high wall, a bench, and an outslope. The high walls that have not been reduced range from 10 to 50 feet in height. The benches are gently sloping to moderately steep and are about 150 to 350 feet wide. The outslopes are moderately steep to very steep and are variable in width. The areas of this unit are mostly long and narrow, but some are broad and irregularly shaped.

The characteristics of these soils vary from one area to another. One of the more common soils on benches has a surface layer about 2 inches thick. It is dark brown silty clay loam with yellowish brown and light gray mottles. The surface layer is underlain by 42 inches of friable, yellowish brown and light yellowish brown channery silty clay loam and very friable, dark grayish brown very channery loam with gray and strong brown mottles.

Included with these soils in mapping are a few small areas of Udorthents, sandstone, low base; Udorthents, sandstone and shale very low base; Udorthents, mudstone and sandstone, low base; Udorthents, dumps, low base; and Udorthents, dumps, very low base. Also included are small areas of Culleoka, Dormont, Guernsey, and Westmoreland soils. Included soils make up 30 percent of this unit.

Available water capacity, permeability, and natural fertility in these soils are variable. Runoff is medium to rapid on the benches and very rapid on the walls and outslopes. When unlimed, the soils are medium acid to moderately alkaline throughout. The erosion hazard is moderate to very severe in unprotected areas. These steeper areas of soil are subject to slipping.

These soils have fair potential for farming. The benches in some areas are used for hay and pasture. These soils have good potential for woodland or for wildlife habitat.

The invading plant species on this unit are dominantly red maple, tulip poplar, bigtooth, aspen, black locust, ironweed, broomsedge, deerstongue grass, sweet clover, Kentucky bluegrass, and Canada bluegrass. The planted tree species are dominantly black locust, bristly locust, autumn-olive, European black alder, and white pine. Seeded grass and legume mixtures contain various combinations of tall fescue, birdsfoot trefoil, redtop, lespedeza, and alsike clover.

Some areas of these soils have been used for buildings, roads for farm and recreational uses, and as winter

feeding sites for livestock. Onsite investigations and testing are necessary for determining the limitations and potentials of the soils for nonfarm uses. The use of grasses, legumes, and trees and the proper disposal of surface water help to control erosion and sedimentation.

This unit is not assigned to a capability subclass.

U5—Udorthents, mudstone and sandstone, low base. These soils are mostly on hillsides in the central and eastern parts of the survey area. They are in areas which have been surface-mined for coal. In most places the unit consists of a high wall, a bench, and an outslope. The high walls that have not been reduced range from 10 to 50 feet in height. The benches are gently sloping to moderately steep and are about 100 to 350 feet wide. The outslopes are moderately steep to very steep and are variable in width. The areas of this unit are mostly long and narrow, but some are broad and irregularly shaped.

The characteristics of these soils vary from one area to another. One of the more common soils on benches has a surface layer about 2 inches thick. It is dark brown silty clay loam with yellowish brown and light gray mottles. The surface layer is underlain by 43 inches of friable, yellowish brown and light yellowish brown channery silty clay loam and very friable, dark grayish brown very channery loam with gray and strong brown mottles.

Included with these soils in mapping are a few small areas of Udorthents, sandstone, very low base; Udorthents, sandstone, low base; Udorthents, sandstone and shale, very low base; and Udorthents, mudstone and sandstone, high base. Also included are small areas of Udorthents, dumps, low base; Udorthents, dumps, very low base; and Culleoka, Dormont, Guernsey, and Westmoreland soils. Included soils make up about 30 percent of this unit.

Available water capacity, permeability, and natural fertility in this unit are variable. Runoff is medium to rapid on the benches and very rapid on the walls and outslopes. Where unlimed, the soils are strongly acid or very strongly acid throughout. The erosion hazard is moderate to very severe in unprotected areas. The steeper areas of soils are subject to slipping.

These soils generally have poor potential for farming, but the benches are suited to pasture. They have good potential for woodland and for wildlife habitat.

The invading plant species on this unit are dominantly red maple, bigtooth aspen, black locust, black birch, broomsedge, and deerstongue grass. The planted tree species are dominantly black locust, bristly locust, autumn-olive, European black alder, and white pine. Seeded grass and legume mixtures contain various combinations of tall fescue, birdsfoot trefoil, redtop, lespedeza, and alsike clover.

Some areas of these soils have been used for buildings, roads for farm and recreational uses, and as winter feeding sites for livestock. Onsite investigations and testing are necessary for determining the limitations and potential of the soils for urban uses. The use of grasses, legumes, and trees and the proper disposal of surface water help to control erosion and sedimentation.

This unit is not assigned to a capability subclass.

U6—Udorthents, sandstone, low base. These soils are mostly on hillsides in the eastern part of the survey area. They are in areas which have been surface-mined for coal. In most places the unit consists of a high wall, a bench, and an outslope. The high walls that have not been reduced range from 10 to 50 feet in height. The benches are gently sloping to moderately steep and are about 100 to 350 feet wide. The outslopes are moderately steep to very steep and are variable in width. The areas of the unit are mostly long and narrow, but some are broad and irregularly shaped.

The characteristics of these soils vary from one area to another. One of the more common soils on benches has a surface layer about 7 inches thick. It is dark brown channery sandy loam with brownish yellow, very dark gray, light brownish gray, and brown mottles. The surface layer is underlain by 48 inches of friable, yellowish brown and dark yellowish brown very channery sandy loam with brownish yellow, gray, and dark brown mottles.

Included with these soils in mapping are a few small areas of Udorthents, sandstone, very low base; Udorthents, sandstone and shale, very low base; and Udorthents, mudstone and sandstone, low base. Also included are a few small areas of Buchanan, Dekalb, Ernest, Gilpin, Lily, and Wharton soils. Included soils make up about 30 percent of this unit.

Available water capacity, permeability, and natural fertility in this unit are variable. The soils are generally droughty. Runoff is medium to rapid on the benches and very rapid on the walls and outslopes. Where unlimed, the soils are strongly acid to very strongly acid throughout. The erosion hazard is moderate to very severe in unprotected areas. Outslope seepage is more common on this unit than it is on those containing more mudstone.

These soils have poor potential for farming. The benches have limited potential for pasture; a few benches that have been limed and fertilized or where suitable soil material has been added to the surface are used for hay and pasture. The soils have good potential for woodland and for wildlife habitat.

The invading plant species on this unit are dominantly red maple, bigtooth aspen, black locust, black birch, broomsedge, coltsfoot, povertygrass, and deerstongue grass. The planted tree species are dominantly black locust, bristly locust, autumn-olive, European black alder, and white pine. Seeded grass and legume mixtures contain various combinations of tall fescue, birdsfoot trefoil, redtop, lespedeza, and alsike clover.

Some areas of these soils have been used for buildings, roads for farm or recreational uses, and as winter

feeding sites for livestock. Onsite investigations and testing are needed to determine the limitations and potentials of the soils for nonfarm uses. The use of grasses, legumes, and trees and the proper disposal of surface water help to control erosion and sedimentation.

This unit is not assigned to a capability subclass.

U7—Udorthents, sandstone, very low base. These soils are mostly on hillsides in the eastern part of the survey area. They are in areas which have been surface-mined for coal. In most places the unit consists of a high wall, a bench, and an outslope. The high walls that have not been reduced range from 10 to 50 feet in height. The benches are gently sloping to moderately steep and are about 100 to 350 feet wide. The outslopes are moderately steep to very steep and are variable in width. The areas of this unit are mostly long and narrow, but some are broad and irregularly shaped.

The characteristics of these soils vary from one area to another. One of the more common soils on benches has a surface layer of brown loamy sand about 2 inches thick. The next 8 inches is friable, yellowish brown loamy sand with brownish yellow mottles. The lower 30 inches is friable, yellowish brown sandy loam mottled with brownish yellow and yellowish red.

Included with these soils in mapping are a few small areas of Udorthents, sandstone, low base; Udorthents, sandstone and shale, very low base; and Udorthents, mudstone and sandstone, low base. Also included are small areas of Dekalb, Gilpin, Lily, and Wharton soils. Included soils make up about 30 percent of this unit.

Available water capacity, permeability, and natural fertility in this unit are variable. The soils are generally droughty. Runoff is medium to rapid on the benches and very rapid on the walls and outslopes. Where unlimed, the soils are extremely acid or very strongly acid throughout. The erosion hazard is moderate to very severe in unprotected areas. Outslope seepage is more common on this unit than it is on those containing more mudstone.

These soils have poor potential for farming. The benches have limited potential for pasture; a few benches that have been limed and fertilized or where suitable soil material has been added to the surface are used for hay and pasture. These soils have good potential for woodland and for wildlife habitat.

The invading plant species on this unit are dominantly red maple, bigtooth aspen, black locust, black birch, broomsedge, coltsfoot, povertygrass, and deerstongue grass. The planted tree species are dominantly black locust, bristly locust, autumn-olive, European black alder, and white pine. Seeded grass and legume mixtures contain various combinations of tall fescue, birdsfoot trefoil, redtop, lespedeza, and alsike clover.

Some areas of this unit have been used for buildings, roads for farm and recreational uses, and as winter feeding sites for livestock. Onsite investigations and testing are needed to determine the limitations and potentials of the soils for nonfarm uses. The use of grasses, legumes, and trees and the proper disposal of surface water help to control erosion and sedimentation.

This unit is not assigned to a capability subclass.

U8—Udorthents, sandstone and shale, very low base. These soils are mostly on hillsides in the central and eastern parts of the survey area. They are in areas which have been surface-mined for coal. In most places this unit consists of a high wall, a bench, and an outslope. The high walls that have not been reduced range from 10 to 50 feet in height. The benches are gently sloping to moderately steep and are 100 to 350 feet wide. The outslopes are moderately steep to very steep and are variable in width. The areas of the unit are mostly long and narrow, but some are broad and irregularly shaped.

The characteristics of these soils vary from one area to another. One of the more common soils on benches has a surface layer of dark grayish brown channery loam about 4 inches thick. The next 5 inches is friable, dark gray silty clay loam mottled with gray and yellowish brown. The next 25 inches is friable, very dark grayish brown, yellowish brown, gray, and red channery or very channery silty clay loam. The lower 8 inches is friable, very dark grayish brown very channery heavy loam mottled with reddish yellow, very pale brown, and gray.

Included with these soils in mapping are a few small areas of Udorthents, sandstone, low base; Udorthents, sandstone, very low base; Udorthents, mudstone and sandstone, low base; Udorthents, mudstone and sandstone, high base; Udorthents, dumps, low base; and Udorthents, dumps, very low base. Also included are small areas of Culleoka, Gilpin, Dormont, Guernsey, and Westmoreland soils. Included soils make up about 30 percent of this unit.

Available water capacity, permeability, and natural fertility in this unit are variable. Runoff is medium to rapid on the benches and very rapid on the walls and outslopes. Where unlimed, the soils are extremely acid or very strongly acid throughout. The erosion hazard is moderate to very severe in unprotected areas.

These soils have poor potential for farming. The benches have limited potential for pasture; a few benches that have been limed and fertilized or where suitable soil material has been added to the surface are used for hay and pasture. The soils have good potential for woodland and for wildlife habitat.

The invading plant species on this unit are dominantly red maple, bigtooth aspen, black locust, broomsedge, and deerstongue grass. The planted tree species are dominantly black locust, bristly locust, autumn-olive, European black alder, and white pine. Grass and legume mixtures that are seeded contain various combinations of tall fescue, birdsfoot trefoil, redtop, lespedeza, and alsike clover.

Some areas of this unit have been used for buildings, roads for farm and recreational uses, and as winter feeding sites for livestock. Onsite investigation and testing are needed to determine the limitations and potentials of the soil for nonfarm use. The use of grasses, legumes, and trees and the proper disposal of surface water help to control erosion and sedimentation.

This unit is not assigned to a capability subclass.

UbF—Upshur-Belmont deep, very stony silt loams, 35 to 65 percent slopes. This complex consists of very steep, very stony, well drained soils on hillsides in the eastern part of the survey area. The hillsides are commonly dissected by drainageways. Stones cover 1 to 3 percent of the surface of the complex. The soils are in such an intricate pattern that it was not practical to map them separately. The complex consists of about 50 percent Upshur silt loam, 30 percent Belmont silt loam, and 20 percent other soils.

Typically the surface layer of the Upshur soil is dark reddish brown and reddish brown silt loam about 6 inches thick. The subsoil is very sticky, reddish brown and dark reddish brown clay 24 inches thick. The substratum is firm, dark reddish brown shaly silty clay extending to bedrock at a depth of about 40 inches.

Typically the surface layer of the Belmont soil is very dark grayish brown and brown light silt loam about 11 inches thick. The subsoil is friable and is 33 inches thick. The upper 6 inches of the subsoil is strong brown light silt loam. The lower 27 inches is reddish brown silty clay loam and light silty clay loam. The substratum extends to a depth of 80 inches. The upper part is very friable, strong brown and yellowish brown sandy clay loam. The lower part is friable, light olive brown silty clay loam. Limestone bedrock is at a depth of 80 inches.

Included with these soils in mapping are a few small areas of Dekalb and Clarksburg soils. Also included are small areas of steep soils, rock outcrop, soils with bedrock at a depth of less than 60 inches, and soils near Greer in Monongalia County that have a mildly alkaline surface layer.

The Upshur soil has moderate to high available water capacity. Permeability is slow in the subsoil. Runoff is very rapid, and natural fertility is moderate to high. Where unlimed, the soil is medium acid or strongly acid in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock in the Upshur soil ranges from 40 to 60 inches. The Belmont soil has high available water capacity. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is moderate to high. Where unlimed, the soil is slightly acid to medium acid in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock in the Belmont soil ranges from 60 to 80 inches.

The soils in this complex are not suited to cultivated crops or to hay and are difficult to manage for pasture. The erosion hazard is very severe in unprotected areas, and such areas require seeding to a permanent cover.

These soils have moderate to high potential productivity for trees. Most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is limited by slope and is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

The slow permeability, clayey subsoil, and hazard of soil slipping in the Upshur soil and the slope and high shrink-swell potential of the complex are the main limitations for urban use. Establishing a plant cover in unprotected areas and providing for the proper disposal of surface water help to control erosion and sedimentation.

This unit is in capability subclass VIIe.

Uc—Urban land. This unit consists of nearly level to moderately steep areas where more than 85 percent of the surface is covered by asphalt, concrete, and other impervious material. Examples are parking lots, business centers, and industrial complexes. These areas are mostly on terraces along the Monongahela, Tygart Valley, and West Fork Rivers in the business districts of Fairmont and Morgantown.

Included with this unit in mapping are small areas of Allegheny, Culleoka, Monongahela, and Zoar soils. Also included are small areas of Udorthents, cut and fill. Included soils make up about 15 percent of this unit.

Onsite investigation of the included soils in this unit is necessary to determine the limitations for a proposed use. Maintaining the plant cover on construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal of surface water help to control erosion and sedimentation.

This unit is not assigned to a capability subclass.

UdC—Urban land-Allegheny complex, 3 to 15 percent slopes. This complex consists of areas covered by urban structures and strongly sloping to gently sloping, well drained Allegheny silt loam. The areas are on stream terraces mostly along the Monongahela, Tygart Valley, and West Fork Rivers in the urbanized communities of the survey area. Some areas are dissected by natural drainageways, and some low areas are subject to rare flooding. The areas of Urban land and Allegheny silt loam are in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Urban land, 25 percent Allegheny silt loam, and 30 percent other soils.

Typically the surface layer of the Allegheny soil is dark grayish brown silt loam about 7 inches thick. The subsoil is friable and yellowish brown and is 30 inches thick. The upper 4 inches of the subsoil is silt loam. The middle 18 inches is clay loam. The lower 8 inches is clay loam mottled with light brownish gray in the lower part. The substratum extends to a depth of 60 inches or more. It is

friable, yellowish brown sandy loan mottled with light brownish gray.

Included with this complex in mapping are a few small areas of Monongahela and Zoar soils. Also included are a few small areas of nearly level soils, moderately steep soils, and Udorthents, cut and fill.

The Allegheny soil has moderate or high available water capacity. Permeability is moderate throughout. Runoff is rapid, and natural fertility is low to moderate. Where unlimed, the soil is strongly acid or very strongly acid throughout. The hazard of erosion is severe in unprotected areas. The depth to bedrock is generally greater than 60 inches.

Slope is the main limitation of the soils in this complex for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is not assigned to a capability subclass.

UeD—Urban land-Culleoka complex, 15 to 25 percent slopes. This complex consists of areas covered by urban structures and moderately steep, well drained Culleoka silt loam. The areas are mostly on benches in the urbanized parts of the survey area. Some are dissected by natural drainageways. The areas of Urban land and Culleoka silt loam are in such an intricate pattern that it was not practical to map them separately. The complex is about 40 percent Urban land, 30 percent Culleoka silt loam, and 30 percent other soils.

Typically the surface layer of the Culleoka soil is dark brown silt loam about 6 inches thick. The subsoil is friable and is 17 inches thick. The upper 4 inches of the subsoil is brown heavy silt loam. The lower 13 inches is brown and strong brown shaly light silty clay loam and silty clay loam. The substratum is friable to firm, brown very shaly light silty clay loam extending to bedrock at a depth of about 32 inches.

Included with this complex in mapping are a few small areas of Dekalb, Gilpin, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of strongly sloping soils, steep soils, and Udorthents, cut and fill.

The Culleoka soil has moderate available water capacity. Permeability is moderate throughout. Runoff is rapid, and natural fertility is moderate. Where unlimed, the soil is medium or strongly acid throughout. The hazard of erosion is severe in unprotected areas. The depth to bedrock ranges from 20 to 40 inches.

Slope, a slip hazard, and the shallow depth to bedrock limit the soils in this complex for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is not assigned to a capability subclass.

UmC—Urban land-Monongahela complex, 3 to 15 percent slopes. This complex consists of areas covered by urban structures and strongly sloping to gently sloping, moderately well drained Monongahela silt loam. The areas are on stream terraces in the urbanized parts of the survey. Some are dissected by natural drainageways. The areas of Urban land and Monongahela silt loam are in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Urban land, 25 percent Monongahela silt loam, and 30 percent other soils.

Typically the surface layer of the Monongahela soil is dark brown silt loam about 7 inches thick. The subsoil is 54 inches thick. The upper 15 inches of the subsoil is friable, yellowish brown silt loam and loam. The lower 39 inches is a firm and brittle layer that consists of yellowish brown, strong brown, reddish yellow, and light grayish brown heavy loam and light clay loam. The upper part of this firm and brittle layer is mottled with light brownish gray, light grayish brown, and reddish yellow. The substratum, at a depth of more than 61 inches, is friable to firm, reddish yellow and light grayish brown sandy clay loam.

Included with this complex in mapping are a few small areas of Allegheny and Zoar soils. Also included are a few small areas of nearly level soils, moderately steep soils, soils subject to rare flooding, and Udorthents, cut and fill.

The Monongahela soil has moderate available water capacity. Permeability is moderately slow or slow in the brittle part of the subsoil. Runoff is rapid, and natural fertility is low to moderate. A seasonal high water table at a depth of about 1-1/2 to 3 feet restricts the root zone of some plants. Where unlimed, the soil is strongly acid or very strongly acid throughout. The hazard of erosion is severe in unprotected areas. The depth to bedrock is greater than 60 inches.

Slope, the seasonal high water table, and the moderately slow or slow permeability are the main limitations of the soils in this complex for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is not assigned to a capability subclass.

UzC—Urban land-Zoar complex, 3 to 15 percent slopes. This complex consists of areas covered by urban structures and strongly sloping to gently sloping, moderately well drained Zoar silt loam. The areas are on terraces in the urbanized parts of the survey area. Some are dissected by natural drainageways. The areas of

Urban land and Zoar silt loam are in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Urban land, 25 percent Zoar silt loam, and 30 percent other soils.

Typically the surface layer of the Zoar soil is dark brown silt loam about 8 inches thick. The subsoil is 30 inches thick. The upper 12 inches of the subsoil is friable, yellowish brown light silty clay loam and silty clay loam. The middle 8 inches is friable, brown silty clay mottled with pinkish gray and reddish brown. The lower 10 inches is firm, brown, strong brown, and pinkish gray silty clay. The substratum is firm, pinkish gray and brown silty clay and clay to a depth of 60 inches or more.

Included with this complex in mapping are a few small areas of Allegheny and Monongahela soils. Also included are a few small areas of nearly level soils, moderately steep soils, somewhat poorly drained soils, and Udorthents, cut and fill.

The Zoar soil has moderate to high available water capacity. Permeability is moderately slow or slow in the subsoil. Runoff is rapid, and natural fertility is low to moderate. A seasonal high water table at a depth of about 1-1/2 to 3 feet restricts the root zone of some plants. Where unlimed, the soil is strongly acid or very strongly acid throughout. The hazard of erosion is severe in unprotected areas. The depth to bedrock is greater than 60 inches.

Slope, a slip hazard, and the moderately slow or slow permeability are the main limitations of the soils in this complex for urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This unit is not assigned to a capability subclass.

WeB—Westmoreland silt loam, 3 to 8 percent slopes. This gently sloping, well drained soil is mostly on broad ridgetops in the central part of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark brown and brown silt loam about 8 inches thick. The subsoil is friable and is 32 inches thick. The upper 16 inches of the subsoil is yellowish brown and strong brown silt loam and heavy silt loam. The lower 16 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam extending to bedrock at a depth of about 52 inches.

Included with this soil in mapping are a few small areas of Culleoka, Dekalb, Upshur, Dormont, and Guernsey soils. Also included are small areas of nearly level soils, strongly sloping soils, and very stony soils. Included soils make up 20 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate throughout. Runoff is medium, and natural fertility is high. Where unlimed, the soil is medium acid to very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. The depth to bedrock ranges from 40 to 72 inches or more.

This soil is suited to cultivated crops and to pasture and hay. Most of the acreage is used for hay and pasture. The hazard of erosion is moderate in unprotected areas and is a management concern. If this soil is farmed, cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes and the use of rotational grazing are major pasture management needs.

The soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

The shallow depth to bedrock is the main limitation of this soil for most types of urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

WeC—Westmoreland silt loam, 8 to 15 percent slopes. This strongly sloping, well drained soil is on ridgetops and benches in the central part of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark brown and brown silt loam about 8 inches thick. The subsoil is friable and is 29 inches thick. The upper 14 inches of the subsoil is yellowish brown and strong brown silt loam and heavy silt loam. The lower 15 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam extending to bedrock at a depth of about 57 inches.

Included with this soil in mapping are a few small areas of Culleoka, Dekalb, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of gently sloping soils, moderately steep soils, and very stony soils. Included soils make up about 25 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate throughout. Runoff is rapid, and natural fertility is high. Where unlimed, the soil is medium acid to very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. The depth to bedrock ranges from 40 to 72 inches or more.

This soil is suited to cultivated crops and to pasture and hay. Most of the acreage is used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop resi-

due to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are the major pasture management needs.

The soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour.

Slope, a slip hazard, and the shallow depth to bedrock are the main limitations of this soil for most types of urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

WeD—Westmoreland silt loam, 15 to 25 percent slopes. This moderately steep, well drained soil is on ridgetops and benches in the central part of the survey area. The benches are commonly dissected by drainageways, and some have seep spots.

Typically the surface layer is dark brown and brown silt loam about 8 inches thick. The subsoil is friable and is 32 inches thick. The upper 14 inches of the subsoil is yellowish brown and strong brown silt loam and heavy silt loam. The lower 18 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam extending to bedrock at a depth of about 66 inches.

Included with this soil in mapping are a few small areas of Culleoka, Dekalb, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of strongly sloping soils, steep soils, very stony soils, and severely eroded soils. Included soils make up about 25 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate throughout. Runoff is rapid, and natural fertility is high. Where unlimed, the soil is medium acid to very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. The depth to bedrock ranges from 40 to 72 inches or more.

This soil has limited suitability for cultivated crops. It is better suited to pasture and hay. Much of the acreage is used for pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas are the major pasture management needs.

The soil has moderately high to high productivity for trees. About half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is limited by slope.

The shallow depth to bedrock, slope, and a slip hazard are the main limitations of this soil for most types of urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IVe.

WeD3—Westmoreland silt loam, 15 to 25 percent slopes, severely eroded. This moderately steep, well drained soil is on ridgetops and benches in the central part of the survey area. Erosion has removed most of the original surface layer of the soil, and the subsoil is exposed in places. The benches are commonly dissected by drainageways, and some have seep spots. The areas of this soil are irregularly shaped or long and narrow.

Typically the surface layer is brown silt loam about 6 inches thick. The subsoil is friable and is 22 inches thick. The upper 14 inches of the subsoil is yellowish brown and strong brown silt loam and heavy silt loam. The lower 18 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam extending to bedrock at a depth of about 60 inches.

Included with this soil in mapping are a few small areas of Culleoka, Dekalb, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of strongly sloping steep soils, steep soils, and very stony soils. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate throughout. Runoff is very rapid, and natural fertility is high. Where unlimed, the soil is medium acid to very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. The depth to bedrock ranges from 40 to 72 inches or more.

This soil is not suited to cultivated crops or hay. It is, however, suited to pasture, and much of the acreage is pastured. The erosion hazard is very severe in unprotected areas and is a major management concern. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas to permanent cover are major pasture management needs.

The soil has moderately high to high potential production for trees. About half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope, a slip hazard, and the shallow depth to bedrock are the main limitations of this soil for most types of urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass VIe.

WeE—Westmoreland silt loam, 25 to 35 percent slopes. This steep, well drained soil is on hillsides, ridgetops, and benches in the central part of the survey area. The hillsides and benches are commonly dissected by drainageways.

Typically the surface layer is dark brown and brown silt loam about 6 inches thick. The subsoil is friable and is 24 inches thick. The upper 12 inches of the subsoil is yellowish brown and strong brown silt loam and heavy silt loam. The lower 12 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam extending to bedrock at a depth of about 50 inches.

Included with this soil in mapping are a few small areas of Culleoka, Dekalb, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of moderately steep soils, very steep soils, very stony soils, and severely eroded soils. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate throughout. Runoff is very rapid, and natural fertility is high. Where unlimed, the soil is medium acid to very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. The depth to bedrock ranges from 40 to 72 inches or more.

This soil is not suited to cultivated crops or hay, but it is suited to pasture. A very severe erosion hazard in unprotected areas and overgrazing of pasture are the major management concerns. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and seeding of bare areas to permanent cover are the major pasture management needs.

The soil has moderately high to high potential productivity for trees. Most of the acreage is wooded or reverting to woody species. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope, a slip hazard, and the shallow depth to bedrock are the main limitations of this soil for most types of urban use. Maintaining the plant cover, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation.

This soil is in capability subclass IIe.

WeF—Westmoreland silt loam, 35 to 65 percent slopes. This very steep, well drained soil is on hillsides and narrow ridgetops in the central part of the survey area. The hillsides are commonly dissected by drainageways.

Typically the surface layer is dark brown silt loam about 6 inches thick. The subsoil is friable and is 24 inches thick. The upper 12 inches of the subsoil is yellowish brown and strong brown silt loam and heavy silt loam. The lower 12 inches is strong brown silty clay loam and shaly silty clay loam. The substratum is firm, strong brown very shaly light silty clay loam extending to bedrock at a depth of about 50 inches.

Included with this soil in mapping are a few small areas of Culleoka, Dekalb, Upshur, Clarksburg, Dormont, and Guernsey soils. Also included are small areas of steep soils and very stony soils. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderate throughout. Runoff is very rapid, and natural fertility is high. Where unlimed, the soil is medium acid to very strongly acid in the surface layer and subsoil and medium acid or strongly acid in the substratum. The depth to bedrock ranges from 40 to 72 inches or more.

The soil is not suited to cultivated crops or hay and is difficult to manage for pasture. It has moderately high to high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. Slope limits the use of equipment.

Slope, a slip hazard, and the shallow depth to bedrock are the main limitations of this soil for most types of urban use. Maintaining the plant cover, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation.

This soil is in capability subclass VIIe.

WhB—Wharton silt loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is mostly on broad ridgetops in the eastern part of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark brown silt loam about 7 inches thick. The subsoil is 28 inches thick. The upper 13 inches of the subsoil is friable to firm, yellowish brown heavy silt loam and heavy silty clay loam. The lower 15 inches is sticky, yellowish brown silty clay mottled with gray and red. The substratum extends to a depth of 60 inches or more. It is sticky, gray clay mottled with yellowish red and grayish brown.

Included with this soil in mapping are a few small areas of Gilpin and Lily soils. Also included are a few small areas of nearly level soils, strongly sloping soils, and soils which have bedrock within a depth of 40 inches. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderately slow or slow in the subsoil. Runoff is medium, and natural fertility is low to moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the rooting zone of some plants. Where unlimed, the soil is strongly acid or very strongly acid in the surface layer and subsoil and strongly acid to extremely acid in the substratum. The depth to bedrock ranges from 40 to 60 inches or more.

This soil is suited to cultivated crops and to pasture and hay. Much of the acreage is used for pasture and hay. The hazard of erosion is moderate in unprotected areas and is a management concern. If this soil is farmed, cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is firm are major pasture management needs.

The soil has high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during wet seasons because the soil is soft and slippery.

The shallow depth to the seasonal high water table and the moderately slow or slow permeability are the main limitations of this soil for most types of urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

WhC—Wharton silt loam, 8 to 15 percent slopes. This strongly sloping, moderately well drained soil is on broad ridgetops and benches in the eastern part of the survey area. Drainageways dissect some of the benches, and seep spots are common on some.

Typically the surface layer is dark brown silt loam about 6 inches thick. The subsoil is 25 inches thick. The upper 12 inches of the subsoil is friable to firm, yellowish brown heavy silt loam and heavy silty clay loam. The lower 13 inches is sticky, yellowish brown silty clay mottled with gray and red. The substratum extends to a depth of 60 inches or more. It is sticky, gray clay mottled with yellowish red and grayish brown.

Included with this soil in mapping are a few small areas of Gilpin and Lily soils. Also included are a few small areas of gently sloping soils, moderately steep soils, and severely eroded soils. Included soils make up about 15 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderately slow or slow in the subsoil. Runoff is rapid, and natural fertility is low to moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the rooting zone of some plants. Where unlimed, the soil is strongly acid or very strongly acid in the surface layer and subsoil and strongly acid to extremely acid in the substratum. The depth to bedrock ranges from 40 to 60 inches or more.

This soil is suited to cultivated crops and to pasture and hay. Much of the acreage is used for pasture and hay. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is firm are major pasture management needs.

This soil has high potential productivity for trees, and about half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during wet seasons because the soil is soft and slippery.

Slope, a slip hazard, the moderately slow or slow permeability, and the shallow depth to the seasonal high water table limit this soil for urban uses. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

WhD—Wharton silt loam, 15 to 25 percent slopes. This moderately steep, moderately well drained soil is on ridgetops and benches in the eastern part of the survey area. Drainageways dissect some benches, and seep spots are common on some.

Typically the surface layer is dark brown silt loam about 6 inches thick. The subsoil is 24 inches thick. The upper 12 inches of the subsoil is friable to firm, yellowish brown heavy silt loam and heavy silty clay loam. The lower 12 inches is sticky, yellowish brown silty clay mottled with gray and red. The substratum extends to a depth of 60 inches or more. It is sticky, gray clay mottled with yellowish red and grayish brown.

Included with this soil in mapping are a few small areas of Gilpin and Lily soils. Also included are a few small areas of strongly sloping soils, steep soils, and severely eroded soils. Included soils make up about 20 percent of this map unit.

Available water capacity in this soil is high. Permeability is moderately slow or slow in the subsoil. Runoff is rapid, and natural fertility is low to moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet

below the surface which restricts the rooting zone of some plants. Where unlimed, the soil is strongly acid or very strongly acid in the surface layer and subsoil and strongly acid to extremely acid in the substratum. The depth to bedrock ranges from 40 to 60 inches or more.

This soil has limited suitability for cultivated crops. It is better suited to pasture and hay. Much of the acreage is pastured. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is firm are major pasture management needs.

The soil has high potential productivity for trees, and about half of the acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted by slope and is restricted during wet seasons because the soil is soft and slippery.

Slope, a slip hazard, the moderately slow or slow permeability, and the shallow depth to the seasonal high water table limit this soil for most types of urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IVe.

ZoB—Zoar silt loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on terraces in the central part of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 29 inches thick. The upper 11 inches of the subsoil is friable, yellowish brown light silty clay loam and silty clay loam. The middle 8 inches is friable, brown silty clay mottled with pinkish gray and reddish brown. The lower 10 inches is firm, brown, strong brown, and pinkish gray silty clay. The substratum is firm, pinkish gray and strong brown silty clay to a depth of 51 inches and firm, brown and pinkish gray clay at a depth of more than 51 inches.

Included with this soil in mapping are a few small areas of Allegheny and Monongahela soils. Also included are small areas of nearly level soils, strongly sloping soils, and somewhat poorly drained soils. Included soils make up 15 percent of this map unit.

Available water capacity in this soil is moderate to high. Permeability is moderately slow or slow in the subsoil. Runoff is medium, and natural fertility is low to moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, the soil is strongly acid or very strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Most of the acreage is farmed. The hazard of erosion is moderate in unprotected areas and is a management concern. Cultivating on the contour, using a rotation that includes hay crops, and returning crop residue to the soil are farming practices that help control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, deferment of grazing until the soil is firm in the spring, and rotational grazing are major pasture management needs.

The soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during wet seasons because the soil is soft.

The shallow depth to the seasonal high water table and the moderately slow or slow permeability are the main limitations of this soil for most types of urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIe.

ZoC—Zoar silt loam, 8 to 15 percent slopes. This strongly sloping, moderately well drained soil is on terraces in the central part of the survey area. Slopes are smooth and convex.

Typically the surface layer is dark brown silt loam about 8 inches thick. The subsoil is 30 inches thick. The upper 12 inches of the subsoil is friable, yellowish brown light silty clay loam and silty clay loam. The middle 8 inches is friable, brown silty clay mottled with pinkish gray and reddish brown. The lower 10 inches is firm, brown, strong brown, and pinkish gray silty clay. The substratum is firm, pinkish gray and strong brown silty clay to a depth of 53 inches and firm, brown and pinkish gray clay at a depth of more than 53 inches.

Included with this soil in mapping are a few small areas of Allegheny and Monongahela soils. Also included are small areas of gently sloping soils, moderately steep soils, and somewhat poorly drained soils. Included soils make up 20 percent of this map unit.

Available water capacity in this soil is moderate to high. Permeability is moderately slow or slow in the subsoil. Runoff is rapid, and natural fertility is low to moderate. The soil has a seasonal high water table about 1-1/2 to 3 feet below the surface which restricts the root zone of some plants. Where unlimed, the soil is strongly

acid or very strongly acid throughout. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to pasture and hay. Most of the acreage is farmed. The hazard of erosion is severe in unprotected areas and is a major management concern. Minimum tillage, growing crops in contour strips, using a rotation that includes hay crops, maintaining shallow drainageways in sod, and returning crop residue to the soil are farming practices that help to control erosion and maintain fertility and tilth. The use of proper stocking rates to maintain desirable grasses and legumes, deferment of grazing until soil is firm in spring, and rotational grazing are major pasture management needs.

The soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a hazard that can be controlled by placing the roads and trails on the contour. The use of equipment is restricted during wet seasons because the soil is soft.

Slope, a slip hazard, the shallow depth to the seasonal high water table, and the moderately slow or slow permeability limit this soil for most types of urban use. Maintaining the plant cover at construction sites, establishing a plant cover in unprotected areas, and providing for the proper disposal or diversion of surface water help to control erosion and sedimentation. Building roads and streets on the contour, for example, helps to divert runoff.

This soil is in capability subclass IIIe.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, for woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

Frank W. Glover, Jr., state resource conservationist, Soil Conservation Service, Morgantown, West Virginia, assisted in preparing this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, 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 presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

Some general principles of management apply throughout the survey area to all soils suitable for farm crops and pasture, though individual soils or groups of soils require different kinds of management. The general principles of management are described in the following paragraphs.

Most of the soils in Marion and Monongalia Counties have a moderate or low supply of basic plant nutrients, making the application of lime and fertilizer necessary. The amounts to be applied depend on the type of soil,

cropping history, the type of crop grown, the level of desired yield, and the results of laboratory analysis of soil samples.

The organic matter content is low in most soils in the survey area, and it is not feasible to build it to a higher level. It is important, however, to maintain the current level by adding farm manure, by returning crop residue to the soil, and by growing sod crops, cover crops, and green-manure crops.

Tillage tends to break down soil structure and should be kept to the minimum necessary to prepare the seedbed and control weeds. Maintaining the organic matter content of the plow layer also helps to protect the structure.

The Holly soils in this survey area need artificial drainage to make them suitable for cultivated crops, hay, and pasture. Soils that have a subsoil with a firm layer, such as Buchanan soils, or a clayey texture, such as Wharton soils, are difficult to drain with tile. Such soils generally respond better to open-ditch drainage.

Runoff and erosion occur mainly while a cultivated crop is growing or soon after it has been harvested. All of the gently sloping and steeper soils in the survey area that are cultivated are subject to erosion and thus require a suitable cropping system for erosion control. The main management needs of such a system include the proper rotation of crops, minimum tillage, mulch planting, using crop residue, growing cover crops and green-manure crops, and using lime and fertilizer. Other major erosion-control practices are contour cultivation, contour stripcropping, and using grassed waterways. The effectiveness of a particular combination of these measures differs from one soil to another, but different combinations can be equally effective on the same soil.

Using the soils for pasture is effective in controlling erosion in most areas. A high level of pasture management, including fertilization, control of grazing, and careful selection of pasture mixtures, is needed on some soils to provide enough ground cover to prevent erosion. Grazing is controlled by rotating the livestock from one pasture field to another and by providing idle periods for the pasture to allow for regrowth of the plants. Some soils need pasture mixtures that require the least renovation to maintain good ground cover and forage for grazing.

The local representative of the Soil Conservation Service can provide information and assistance in choosing suitable practices for the management of the soils for crops and pasture.

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. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; 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 residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

The estimated yields reflect the productive capacity of the soils 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 included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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 landforms 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 too cold or too 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, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 6. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability class and subclass are identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Woodland management and productivity

John L. Gorman, woodland conservationist, Soil Conservation Service, assisted in the preparation of this section.

Table 7 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland 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 *w* indicates excessive water in or on the soil; *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 insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: w, c, s, f, and r.

In table 7 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

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 some 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 equipment; *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 that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade or grow

if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

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. It is listed for tree species that woodland managers generally favor for woodcrop production; such species are the most important in regard to growth rate, quality, value, and marketability. The site index is also given for some tree species that commonly occur on the soil, regardless of value or growth potential.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

Paul S. Dunn, assistant state conservation engineer, Soil Conservation Service, assisted in the preparation of this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

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

Building site development

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 are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Lawns and landscaping require soils that are suitable for the establishment and maintenance of turf for lawns and ornamental trees and shrubs for landscaping. The best soils are firm after rains, are not dusty when dry, and absorb water readily and hold sufficient moisture for plant growth. The surface layer should be free of stones. If shaping is required, the soils should be thick enough over bedrock or hardpan to allow for necessary grading. In rating the soils, the availability of water for sprinkling is assumed.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seep-

age and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold 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. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the surface and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and

have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the surface layer greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for

recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the 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 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

Camp areas require such site preparation as shaping and leveling for 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 for this use have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as 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 will 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 or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have 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 should have a surface that is free of stones and boulders and have moderate slopes. Suitability of the soil for traps, tees, or greens was not considered in rating the soils. Irrigation is an assumed management practice.

Wildlife habitat

Thomas C. Crebbs, biologist, Soil Conservation Service, assisted with the preparation of this section.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 13, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and 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* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties 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 that are planted for wildlife food and cover. Major soil properties 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, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties 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, and wheatgrass.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties 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, saltgrass, and cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat 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 kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of 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.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features.

Engineering properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 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 soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified soil classification system (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging 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. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. 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 that have a layer that impedes the downward movement of water or soils that have 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 clay soils 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.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground

installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation are also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from corrosion. Uncoated steel intersecting soil boundaries or soil layers is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil layer.

Soil series

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

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*5*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Allegheny series

The soils of the Allegheny series are fine-loamy, mixed, mesic Typic Hapludults. These deep, well drained soils formed in acid alluvial material washed from soils on uplands. The Allegheny soils are on terraces mostly along the Cheat, Monongahela, Tygart Valley, and West Fork Rivers and Dunkard Creek. Slopes range from 3 to 15 percent but are dominantly 8 to 15 percent.

Allegheny soils are on the landscape with moderately well drained Monongahela and Zoar soils. The Allegheny soils do not have the fragipan of the Monongahela soils and are less clayey than the Zoar soils.

Typical pedon of Allegheny silt loam, 3 to 8 percent slopes, in an idle field about 0.3 mile northwest of the junction of Routes 58 and 73, near Eldora, Marion County:

Ap—0 to 7 inches, dark grayish brown (10YR 4/2) silt loam; weak fine and medium granular structure; very friable; many roots; 5 percent coarse fragments; medium acid; abrupt smooth boundary.

B1—7 to 12 inches, yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; many roots; 5 percent coarse fragments; medium acid; clear wavy boundary.

B21t—12 to 20 inches, yellowish brown (10YR 5/6) clay loam; weak and moderate medium subangular blocky structure; friable; many roots; few discontinuous clay films on ped faces; medium acid; clear wavy boundary.

B22t—20 to 33 inches, yellowish brown (10YR 5/8) clay loam; moderate medium and coarse subangular blocky structure; friable; common roots; common discontinuous clay films on ped faces; strongly acid; clear wavy boundary.

B3t—33 to 40 inches, yellowish brown (10YR 5/6) clay loam; few fine light brownish gray (10YR 6/2) mottles in lower part; weak and moderate coarse subangular blocky structure; friable; common roots; common discontinuous clay films on ped faces; very strongly acid; clear wavy boundary.

C—40 to 60 inches, yellowish brown (10YR 5/6) sandy loam; common fine light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) mottles; massive; friable; few roots; very strongly acid.

The solum thickness ranges from 30 to 50 inches, and the depth to bedrock is more than 60 inches. Coarse fragments of gravel make up 0 to 15 percent of the upper part of the solum and 0 to 30 percent of the B3 and C horizons. In unlimed areas the soils are strongly acid or very strongly acid throughout.

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

The B horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is silt loam, loam, clay loam, and sandy clay loam, and in some areas the B3 horizon has their gravelly or cobbly counterparts. The B horizon has weak or moderate, fine to coarse, subangular blocky structure and friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. It is sandy loam, sandy clay loam, and clay loam or their gravelly or cobbly counterparts. It has friable consistence.

Belmont series

The soils of the Belmont series are fine-loamy, mixed, mesic Typic Hapludalfs. These deep, well drained soils formed in material weathered mostly from shale and limestone. The soils are mainly on uplands in the eastern part of Monongalia County. Slopes range from 35 to 65 percent.

Belmont soils are on the landscape with moderately deep Dekalb soils and deep Upshur soils. Belmont soils are deeper and have fewer coarse fragments than Dekalb soils and are less clayey than Upshur soils.

Typical pedon of Belmont silt loam, in an area of Upshur-Belmont deep, very stony silt loams, 35 to 65 percent slopes, in a wooded area about 100 feet north of Route 7, about 2 miles west of Greer, Monongalia County:

O1—2 inches to 1 inch, hardwood leaf litter.
O2—1 inch to 0, decomposed hardwood leaf litter.
A1—0 to 4 inches, very dark grayish brown (10YR 3/2) light silt loam; weak fine granular structure; very friable; many roots; 15 percent coarse fragments; mildly alkaline; abrupt wavy boundary.
A2—4 to 11 inches, brown (7.5YR 5/4) light silt loam; weak fine granular structure; very friable; many roots; 15 percent coarse fragments; slightly acid; clear wavy boundary.
B1—11 to 17 inches, strong brown (7.5YR 5/6) light silt loam; weak medium subangular blocky structure; friable; many roots; 10 percent coarse fragments; medium acid; clear wavy boundary.
B21t—17 to 32 inches, reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; many roots; continuous clay films on ped faces; 5 percent coarse fragments; neutral; clear wavy boundary.
B22t—32 to 44 inches, reddish brown (5YR 4/4) light silty clay loam; moderate medium subangular blocky structure; friable; common roots; continuous clay films on ped faces; 5 percent coarse fragments; medium acid; abrupt wavy boundary.
C1—44 to 65 inches, mixed strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) sandy clay loam; pockets of sandy loam; few medium grayish brown (2.5YR 5/2) mottles; massive; very friable; common roots; 5 percent coarse fragments; slightly acid; clear wavy boundary.
C2—65 to 80 inches, light olive brown (2.5YR 5/4) silty clay loam; massive; friable; few roots; 5 percent coarse fragments; neutral; abrupt wavy boundary.
R—80 inches, limestone.

The solum thickness ranges from 29 to 44 inches, and the depth to bedrock ranges from 60 to 80 inches. Coarse fragments of shale, siltstone, sandstone, and limestone make up 5 to 15 percent of the solum and 5 to 50 percent of the C horizon. In unlimed areas the soils are slightly acid or medium acid in the solum and medium acid to neutral in the C horizon.

The A horizon has hue of 10YR or 7.5YR, value of 2 through 5, and chroma of 2 through 4.

The B horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 3 through 6. It is silt loam or silty clay loam. The B2 horizon has moderate or strong, medium, subangular blocky structure. It has friable consistence.

The C horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 3 through 6. It is silty clay loam, clay loam, or sandy clay loam. Consistence is friable or very friable.

Buchanan series

The soils of the Buchanan series are fine-loamy, mixed, mesic Aquic Fragiudults. These deep, moderately well drained soils formed in acid colluvial material that moved downslope mostly from Dekalb soils on uplands. The Buchanan soils are at the base of steeper slopes and around the head of drainageways. Slopes range from 8 to 25 percent but are dominantly 15 to 25 percent.

Buchanan soils are on the landscape with moderately deep, well drained Dekalb, Gilpin, and Lily soils; deep, well drained Pope Variant soils; and moderately well drained Ernest soils. Buchanan soils have a fragipan that is not in the Dekalb, Gilpin, Lily, or Pope Variant soils. They do not have the flood hazard of the Pope Variant soils and are more sandy than the Ernest soils.

Typical pedon of Buchanan loam, in an area of Buchanan and Ernest very stony soils, 15 to 25 percent slopes, in a wooded area north of Blaney Hollow Road (Route 69/9), about 0.4 mile east of its junction with Fairchance Road (Route 69), Monongalia County:

O1—1-1/2 inches to 1/2 inch, hardwood leaf litter.
O2—1/2 inch to 0, decomposed leaf litter.
A1—0 to 2 inches, very dark gray (10YR 3/1) loam; weak fine granular structure; very friable; many roots; 5 percent coarse fragments; strongly acid; abrupt wavy boundary.
A2—2 to 4 inches, yellowish brown (10YR 5/4) loam; weak fine granular structure; very friable; many roots; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B1—4 to 10 inches, strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; many roots; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B21t—10 to 16 inches, yellowish brown (10YR 5/6) channery loam; weak to moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; 15 percent

coarse fragments; very strongly acid; clear wavy boundary.

B22t—16 to 21 inches, yellowish brown (10YR 5/6) channery light sandy clay loam; common medium strong brown (7.5YR 5/6) mottles and few fine gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx1—21 to 27 inches, yellowish brown (10YR 5/6) channery loam; common medium yellowish red (5YR 4/6) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; firm and brittle; few discontinuous clay films on ped faces; few roots; few black concretions; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx2—27 to 40 inches, strong brown (7.5YR 5/6) channery loam; many medium and fine yellowish red (5YR 4/6) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; very firm and brittle; few discontinuous clay films on ped faces; common black concretions; 30 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx3—40 to 60 inches, strong brown (7.5YR 5/6) channery loam; many coarse light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; very firm and brittle; few discontinuous clay films on ped faces; common black concretions; 30 percent coarse fragments; very strongly acid; clear wavy boundary.

C—60 to 68 inches, brown (7.5YR 4/4) channery heavy sandy loam; many medium and coarse light brownish gray (10YR 6/2) mottles; massive; firm; common black concretions; 35 percent coarse fragments; very strongly acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 60 inches. Coarse fragments of siltstone and sandstone make up 5 to 30 percent of the profile above the fragipan and 20 to 60 percent of the fragipan and the C horizon. In unlimed areas the soils are strongly acid to extremely acid throughout.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 1 through 4.

The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 through 6. It is loam, sandy clay loam, and clay loam or their channery counterparts. The B horizon has weak or moderate, fine to coarse, subangular blocky structure above the fragipan and weak, very coarse, prismatic structure commonly parting to weak, subangular blocky in the fragipan. Consistence is friable above the fragipan and firm or very firm in the fragipan.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6. It is channery or very channery counterparts of sandy loam, loam, sandy clay loam, or clay loam. It has firm consistence.

Chagrin series

The soils of the Chagrin series are fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts. These deep, well drained soils formed in lime-influenced alluvial material washed from soils on uplands. The Chagrin soils are on flood plains along streams in the central and western parts of the survey area. Slopes range from 0 to 3 percent.

Chagrin soils are on the landscape with well drained Kanawha soils, moderately well drained Lobdell soils, and poorly drained Holly soils. The Chagrin soils are flooded more frequently than the Kanawha soils.

Typical pedon of Chagrin silt loam in a meadow about 20 yards north of Buffalo Creek, about 600 yards east of Mannington Memorial Cemetery, and about 160 yards south of Route 1, Marion County:

Ap1—0 to 3 inches, dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many roots; slightly acid; clear wavy boundary.

Ap2—3 to 10 inches, dark brown (10YR 4/3) silt loam; weak medium granular structure; friable; many roots; medium acid; clear wavy boundary.

B2—10 to 38 inches, dark yellowish brown (10YR 4/4) silt loam; weak medium and coarse subangular blocky structure; friable; common roots; medium acid; clear wavy boundary.

C—38 to 60 inches, dark yellowish brown (10YR 4/4) loam; massive; very friable; few roots; medium acid.

The solum thickness ranges from 34 to 41 inches, and the depth to bedrock is more than 60 inches. These soils are generally free of coarse fragments. Reaction throughout the soil ranges from strongly acid to neutral.

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

The B horizon has hue of 10YR, value of 4, and chroma of 3 or 4. It is silt loam or loam and has weak, medium and coarse, subangular blocky structure and friable or very friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 through 4. It is loam or silt loam. It has friable or very friable consistence.

Clarksburg series

The soils of the Clarksburg series are fine-loamy, mixed, mesic Typic Fragiudalfs. These deep, moderately well drained soils formed in lime-influenced colluvial material that moved downslope mostly from Culleoka and Westmoreland soils on uplands. The Clarksburg soils are at the base of steeper slopes and at the head of drain-

ageways. Slopes range from 3 to 25 percent but are dominantly 15 to 25 percent.

Clarksburg soils are on the landscape with well drained Culleoka, Gilpin, Upshur, and Westmoreland soils and moderately well drained Dormont and Guernsey soils. Clarksburg soils have a fragipan that is not in any of these soils, and they are deeper than the Culleoka or Gilpin soils.

Typical pedon of Clarksburg silt loam, 15 to 25 percent slopes, in a pasture about 200 feet southwest of West Run, about one-half mile southwest of the junction of West Run and Route 73 and U.S. 119, at Easton, Monongalia County:

Ap1—0 to 2 inches, very dark grayish brown (10YR 3/2) silt loam; moderate fine and medium granular structure; very friable; many roots; 5 percent coarse fragments; strongly acid; clear wavy boundary.

Ap2—2 to 10 inches, dark brown (10YR 3/3) silt loam; weak fine and medium granular structure; friable; many roots; 10 percent coarse fragments; medium acid; abrupt wavy boundary.

B21t—10 to 21 inches, strong brown (7.5YR 5/6) heavy silt loam; few fine dark brown (10YR 3/3) mottles; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on ped faces; 10 percent coarse fragments; medium acid; clear wavy boundary.

B22t—21 to 27 inches, yellowish brown (10YR 5/6) channery heavy silt loam; moderate medium subangular blocky structure; friable; few roots; common discontinuous clay films on ped faces; 15 percent coarse fragments; medium acid; clear wavy boundary.

B23t—27 to 34 inches, yellowish brown (10YR 5/6) channery heavy loam; common fine light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; few roots; common discontinuous clay films on ped faces; common black concretions; 20 percent coarse fragments; medium acid; clear wavy boundary.

Bx—34 to 61 inches, yellowish brown (10YR 5/4) channery heavy loam; many fine and medium light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure; very firm and brittle; common discontinuous clay films on ped faces; many black concretions; 30 percent coarse fragments; strongly acid; clear wavy boundary.

C—61 to 80 inches, dark yellowish brown (10YR 4/4) very channery heavy loam; grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; massive; very firm; many black concretions; 55 percent coarse fragments; medium acid.

The solum thickness ranges from 40 to 70 inches, and the depth to bedrock is more than 60 inches. Coarse fragments of shale, siltstone, and sandstone make up 0 to 20 percent of the profile above the fragipan, 10 to 30 percent of the fragipan, and 10 to 60 percent of the C horizon. In unlimed areas the soils are strongly acid to slightly acid throughout.

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

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. It is silt loam, loam, silty clay loam, and clay loam or their channery counterparts. The B horizon has weak or moderate, medium, subangular blocky structure above the fragipan and weak, very coarse, prismatic structure in the fragipan. Consistence is friable or firm above the fragipan and very firm in the fragipan.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. It is silt loam, loam, clay loam, or silty clay loam or their channery or very channery counterparts. It has firm or very firm consistence.

Culleoka series

The soils of the Culleoka series are fine-loamy, mixed, mesic Ultic Hapludalfs. These moderately deep, well drained soils formed in lime-influenced material weathered from shale, siltstone, sandstone, and some limestone. The Culleoka soils are on uplands. Slopes range from 3 to 65 percent but are dominantly 25 to 35 percent.

Culleoka soils are on the landscape with well drained Gilpin, Upshur, and Westmoreland soils and moderately well drained Clarksburg, Dormont, and Guernsey soils. The Culleoka soils are shallower than any of these except the Gilpin soils. They are less clayey than the Guernsey or Upshur soils, and they do not have the fragipan of the Clarksburg soils. Culleoka soils have a higher base saturation than Gilpin soils.

Typical pedon of Culleoka silt loam, in an area of Culleoka-Westmoreland silt loams, 25 to 35 percent slopes, in a wooded area about 0.4 mile northeast of Route 76, about 0.7 mile southeast of the intersection of Route 76 and Route 73, Marion County:

O1—3 inches to 1/2 inch, hardwood leaf litter.

O2—1/2 inch to 0, partially decomposed leaf litter.

A1—0 to 3 inches, dark brown (7.5YR 3/2) silt loam; moderate fine and medium granular structure; very friable; many roots; 5 percent coarse fragments; medium acid; abrupt wavy boundary.

A3—3 to 6 inches, brown (7.5YR 4/4) silt loam; weak fine and medium granular structure; very friable; many roots; 5 percent coarse fragments; medium acid; clear wavy boundary.

B1—6 to 11 inches, brown (7.5YR 5/4) heavy silt loam; weak medium subangular blocky structure; friable; many roots; few discontinuous clay films on ped faces; 10 percent coarse fragments; medium acid; clear wavy boundary.
B21t—11 to 19 inches, brown (7.5YR 5/4) shaly light silty clay loam; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on ped faces; 15 percent coarse fragments; medium acid; clear wavy boundary.
B22t—19 to 23 inches, strong brown (7.5YR 5/6) shaly silty clay loam; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on ped faces; 20 percent coarse fragments; medium acid; clear wavy boundary.
B3—23 to 27 inches, brown (7.5YR 5/4) shaly silty clay loam; weak medium subangular blocky structure; friable; few roots; few discontinuous clay films on ped faces; 35 percent coarse fragments; medium acid; clear wavy bundary.
C—27 to 34 inches, brown (7.5YR 5/4) very shaly light silty clay loam; massive; friable to firm; 55 percent coarse fragments; medium acid; gradual wavy boundary.
R—34 inches, fractured siltstone and shale.

The solum thickness and depth to bedrock range from 20 to 40 inches. Coarse fragments of shale, siltstone, and sandstone make up 5 to 40 percent in the individual subhorizons of the solum and 40 to 80 percent of the C horizon. In unlimed areas the soils are medium acid or strongly acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 2 through 4.

The B horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 through 8. It is silt loam, loam, silty clay loam, or their channery or shaly counterparts. The B horizon has weak or moderate, fine to coarse, subangular blocky structure and friable or firm consistence.

The C horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 4 or 6. It is shaly, very shaly, channery, or very channery counterparts of silt loam, loam, or silty clay loam. It has friable or firm consistence.

Dekalb series

The soils of the Dekalb series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. These moderately deep, well drained soils formed in acid material weathered from sandstone. The Dekalb soils are on uplands mostly in the extreme eastern part of the survey area. Slopes range from 3 to 65 percent but are dominantly 35 to 65 percent.

Dekalb soils are on the landscape with well drained Belmont, Gilpin, and Lily soils and moderately well drained Buchanan, Ernest, and Tilsit soils. Dekalb soils are shallower than any of these soils except the Gilpin and Lily soils, and they do not have the fragipan of the Buchanan, Ernest, and Tilsit soils. Dekalb soils are more sandy and contain more coarse fragments than Gilpin or Lily soils.

Typical pedon of Dekalb channery loam, in an area of Dekalb very stony loam, 35 to 65 percent slopes, in a wooded area about 200 feet south of Goodspeed Trail, about 0.8 mile east of its junction with Johnson Hollow Trail, near Quarry Run Road at Coopers Rock State Forest, Monongalia County:

O1—4 to 3 inches, hardwood leaf litter.
O2—3 inches to 0, decomposed leaf litter.
A1—0 to 2 inches, black (10YR 2/1) channery loam; weak fine granular structure; very friable; many roots; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.
A2—2 to 4 inches, grayish brown (10YR 5/2) channery loam; weak fine granular structure; very friable; many roots; 20 percent coarse fragments; very strongly acid; clear wavy boundary.
B1—4 to 9 inches, yellowish brown (10YR 5/4) channery loam; weak fine and medium subangular blocky structure; very friable; common roots; 20 percent coarse fragments; very strongly acid; clear wavy boundary.
B2—9 to 16 inches, yellowish brown (10YR 5/6) channery loam; weak to moderate medium subangular blocky structure; very friable; common roots; 25 percent coarse fragments; very strongly acid; clear wavy boundary.
B3—16 to 22 inches, yellowish brown (10YR 5/6) very channery loam; weak medium subangular blocky structure; very friable; few roots; 60 percent coarse fragments; extremely acid; clear wavy boundary.
C—22 to 25 inches, yellowish brown (10YR 5/4) very channery sandy loam; massive; friable; few roots; 70 percent coarse fragments; extremely acid; abrupt wavy boundary.
R—25 inches, thin bedded sandstone.

The solum thickness ranges from 20 to 36 inches, and the depth to bedrock ranges from 20 to 40 inches. Coarse fragments of sandstone make up 10 to 60 percent of the solum and 50 to 90 percent of the C horizon. In unlimed areas the soils are strongly acid to extremely acid throughout.

The A horizon has hue of 10YR, value of 2 through 5, and chroma of 1 through 4.

The B horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 3 through 6. It is loam or sandy loam or their channery or very channery counterparts. The B horizon has weak or moderate, fine or medium, subangular blocky structure and friable or very friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 or 6. It is very channery sandy loam. It has friable or very friable consistence.

Dormont series

The soils of the Dormont series are fine-loamy, mixed, mesic Ultic Hapludalfs. These deep, moderately well drained soils formed in lime-influenced material weathered mostly from shale and thin beds of limestone. The Dormont soils are on uplands. Slopes range from 3 to 25 percent but are dominantly 15 to 25 percent.

Dormont soils are on the landscape with well drained Culleoka, Gilpin, Westmoreland, and Upshur soils and moderately well drained Clarksburg and Guernsey soils. Dormont soils are deeper than the Culleoka or Gilpin soils, they are less clayey than the Upshur or Guernsey soils, and they do not have the fragipan of the Clarksburg soils.

Typical pedon of Dormont silt loam, in an area of Dormont and Guernsey silt loams, 8 to 15 percent slopes, in a meadow about 225 yards west of Route 43, about 0.7 mile south of the Pennsylvania State line, Monongalia County:

Ap1—0 to 5 inches, dark brown (10YR 3/3) silt loam; weak fine granular structure; friable; many roots; slightly acid; abrupt wavy boundary.

Ap2—5 to 8 inches, dark yellowish brown (10YR 3/4) silt loam; weak fine and medium granular structure; friable; many roots; neutral; abrupt wavy boundary.

B1t—8 to 13 inches, strong brown (7.5YR 5/6) heavy silt loam; weak medium subangular blocky structure; friable; many roots; few discontinuous clay films on ped faces; 5 percent coarse fragments; medium acid; clear wavy boundary.

B21t—13 to 22 inches, yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable to firm; common roots; common discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; clear wavy boundary.

B22t—22 to 33 inches, yellowish brown (10YR 5/6) heavy silty clay loam; common medium gray (10YR 6/1) mottles; moderate medium and coarse prismatic structure parting to strong and moderate medium subangular blocky; firm; few roots; continuous light yellowish brown (10YR 6/4) clay films on ped faces; few black concretions; 5 percent coarse fragments; very strongly acid; clear wavy boundary.

B3tg—33 to 43 inches, gray (10YR 6/1) heavy silty clay loam; common medium strong brown (7.5YR 5/8) mottles; weak and moderate coarse prismatic structure; firm; few roots; continuous pale brown (10YR 6/3) clay films on ped faces; few black concretions; 5 percent coarse fragments; strongly acid; clear wavy boundary.

C1g—43 to 50 inches, gray (10YR 6/1) light silty clay; common medium strong brown (7.5YR 5/8) mottles; massive; firm; few black concretions; 5 percent coarse fragments; strongly acid; abrupt wavy boundary.

C2—50 to 62 inches, dark brown (10YR 4/4) shaly silt loam; many medium gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; massive; firm; 40 percent coarse fragments; medium acid.

The solum thickness ranges from 36 to 50 inches, and the depth to bedrock ranges from 48 to 72 inches or more. Coarse fragments of shale, siltstone, and sandstone make up 5 to 25 percent of the solum and 5 to 40 percent of the C horizon. In unlimed areas the soils are medium acid to very strongly acid in the upper part of the solum and strongly acid or medium acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 2 through 4.

The B1 and B21 horizons have hue of 10YR or 7.5YR, value of 5, and chroma of 4 or 6. The B22 and B3 horizons have hue of 10YR and 7.5YR, value of 5 or 6, and chroma of 1 through 6. The B horizon is silt loam, silty clay loam, or their channery or shaly counterparts. The B horizon has weak or moderate, fine to coarse, subangular blocky structure, or it has weak or moderate, medium or coarse, prismatic structure parting to weak, subangular blocky. It has friable to firm consistence.

The C horizon has hue of 10YR and 7.5YR, value of 4 through 6, and chroma of 1 through 6. It is silt loam, silty clay loam, silty clay, or their shaly or channery counterparts. It has firm consistence.

Ernest series

The soils of the Ernest series are fine-loamy, mixed, mesic Aquic Fragiudults. These deep, moderately well drained soils formed in acid colluvial material that moved downslope mostly from Gilpin soils on uplands. The Ernest soils are at the base of steeper slopes and around the head of drainageways. Slopes range from 3 to 25 percent but are dominantly 8 to 15 percent.

Ernest soils are on the landscape with well drained Dekalb, Gilpin, Lily, and Pope Variant soils and moderately well drained Buchanan soils. Ernest soils are deeper than and have a fragipan that is not in the Dekalb, Gilpin, or Lily soils. They have a fragipan that is not in the Pope Variant soils and do not have the flood hazard of the Pope Variant soils. Ernest soils are less sandy than the Buchanan soils.

Typical pedon of Ernest silt loam, in an area of Buchanan and Ernest very stony soils, 8 to 15 percent slopes, in a wooded area about 1.2 miles downstream from Strawn Lake, near Mountaineer Boy Sout Camp, Monongalia County:

O1—1-1/2 inches to 1/2 inch, hardwood leaf litter.
O2—1/2 inch to 0, decomposed leaf litter.
A1—0 to 3 inches, very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; very friable; many roots; 5 percent coarse fragments; very strongly acid; abrupt smooth boundary.
A2—3 to 6 inches, dark brown (10YR 4/3) silt loam; weak fine and medium granular structure; friable; many roots; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B1—6 to 10 inches, yellowish brown (10YR 5/6) silt loam; weak fine and medium subangular blocky structure; friable; many roots; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B21t—10 to 17 inches, yellowish brown (10YR 5/6) heavy silt loam; weak and moderate medium subangular blocky structure; friable; many roots; few discontinuous clay films on ped faces; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B22t—17 to 22 inches, yellowish brown (10YR 5/6) light silty clay loam; common medium strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on ped faces; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
Bx1—22 to 35 inches, yellowish brown (10YR 5/6) heavy loam; common medium and coarse strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to weak medium and thick platy; very firm and brittle; few discontinuous clay films on ped faces; few roots; 15 percent coarse fragments; very strongly acid; gradual wavy boundary.
Bx2—35 to 55 inches, yellowish brown (10YR 5/6) channery heavy loam; common medium and coarse strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; firm and brittle; few discontinuous clay films on ped faces; 20 percent coarse fragments; very strongly acid; clear wavy boundary.
C—55 to 64 inches, strong brown (7.5YR 5/6) channery heavy silt loam; common strong brown (7.5YR 5/8) mottles; common gray (10YR 6/1) streaks and coatings on coarse fragments; massive; firm; 25 percent coarse fragments; very strongly acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 60 inches. Coarse fragments of shale, siltstone, and sandstone make up 5 to 20 percent of the profile above the fragipan and 10 to 30 percent of the fragipan and the C horizon. In unlimed areas the soils are strongly acid or very strongly acid throughout.

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

The B horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 or 6. The B1 and B2 horizons are silt loam, silty clay loam, or their channery or shaly counterparts. The Bx horizon is silt loam, silty clay loam, loam, clay loam, or their channery or shaly counterparts. The B horizon above the fragipan has weak or moderate, fine or medium, subangular blocky structure and friable or firm consistence. The fragipan has weak, very coarse, prismatic structure commonly parting to weak, platy, or subangular blocky. The consistence in the fragipan is firm or very firm.

The C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 6. It is silt loam, silty clay loam, or their shaly or channery counterparts. It has firm consistence.

Gilpin series

The soils of the Gilpin series are fine-loamy, mixed, mesic Typic Hapludults. These moderately deep, well drained soils formed in acid material weathered from siltstone, shale, and sandstone. The Gilpin soils are on uplands. Slopes range from 3 to 65 percent but are dominantly 25 to 35 percent.

Gilpin soils are on the landscape with well drained Culleoka, Dekalb, Lily, Upshur, and Westmoreland soils and moderately well drained Buchanan, Clarksburg, Dormont, Ernest, Guernsey, Wharton, and Tilsit soils. Gilpin soils are shallower than all but the Culleoka, Dekalb, and Lily soils; they are less clayey than the Upshur, Guernsey, or Wharton soils; and they do not have the fragipan of the Buchanan, Ernest, or Tilsit soils. Gilpin soils have a lower base saturation than the Clarksburg, Culleoka, Dormont, Guernsey, or Upshur soils. They are less sandy than the Dekalb or Lily soils, and they contain fewer coarse fragments than the Dekalb soils.

Typical pedon of Gilpin silt loam, 25 to 35 percent slopes, in a pasture about 200 yards east of Route 76/10, about 0.4 mile from its junction with Route 76, Monongalia County:

Ap—0 to 6 inches, dark brown (10YR 4/3) silt loam; weak medium granular structure; very friable; many roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.
B21t—6 to 16 inches, yellowish brown (10YR 5/6) heavy silt loam; moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; 10 percent coarse fragments; strongly acid; clear wavy boundary.
B22t—16 to 24 inches, yellowish brown (10YR 5/6) channery light silty clay loam; weak and moderate medium subangular blocky structure; friable; few roots; common discontinuous clay films on ped faces; 25 percent coarse fragments; strongly acid; clear wavy boundary.

C—24 to 35 inches, strong brown (7.5YR 5/6) channery heavy loam; massive; friable; few black concretions; 40 percent coarse fragments; strongly acid; clear wavy boundary.
R—35 inches, siltstone and shale.

The solum thickness and depth to bedrock range from 20 to 40 inches. Coarse fragments of shale, siltstone, and sandstone make up 5 to 30 percent of the solum and 30 to 70 percent of the C horizon. In unlimed areas the soils are strongly acid or very strongly acid throughout.

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

The B horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is silt loam, silty clay loam, or their channery counterparts. The B horizon has weak or moderate, fine and medium, subangular blocky structure and friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is shaly, very shaly, channery, or very channery counterparts of silt loam, loam, or silty clay loam. It has friable or firm consistence.

Guernsey series

The soils of the Guernsey series are fine, mixed, mesic Aquic Hapludalfs. These deep, moderately well drained soils formed in lime-influenced material weathered mostly from shale and thin beds of limestone. The Guernsey soils are on uplands. Slopes range from 3 to 25 percent but are dominantly 8 to 15 percent.

Guernsey soils are on the landscape with well drained Culleoka, Gilpin, Upshur, and Westmoreland soils and moderately well drained Clarksburg and Dormont soils. Guernsey soils are deeper than the Culleoka or Gilpin soils, they are more clayey than all but the Upshur soils, and they do not have the fragipan of the Clarksburg soils. Guernsey soils are less acid than the Gilpin soils.

Typical pedon of Guernsey silt loam, in an area of Dormont and Guernsey silt loams, 8 to 15 percent slopes, in a pasture about 400 yards southeast of the junction of Route 19/5 and Route 19/6, in the Crafts Run area, Monongalia County:

Ap1—0 to 3 inches, very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; many roots; medium acid; abrupt wavy boundary.
Ap2—3 to 7 inches, dark brown (10YR 4/3) silt loam; weak medium granular structure; friable; many roots; neutral; abrupt smooth boundary.
B1—7 to 12 inches, strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable; many roots; 5 percent coarse fragments; neutral; clear wavy boundary.
B21t—12 to 20 inches, yellowish brown (10YR 5/6) silty clay loam; common fine gray (10YR 6/1) mottles in the lower part; moderate medium subangular blocky structure; friable; common roots; common light yellowish brown (10YR 6/4) discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; abrupt wavy boundary.
B22tg—20 to 31 inches, gray (10YR 6/1) silty clay; many medium yellowish red (5YR 5/6) mottles; moderate medium and coarse subangular blocky structure; firm, sticky and plastic; common roots; continuous clay films on ped faces; 5 percent coarse fragments; medium acid; clear wavy boundary.
B3tg—31 to 42 inches, gray (10YR 6/1) heavy silty clay; common medium light yellowish brown (10YR 6/4) mottles and few fine yellowish red (5YR 5/6) mottles; pockets of very dark gray (10YR 3/1) weathered remnants of coal; weak medium and coarse subangular blocky structure; firm, sticky and plastic; few roots; continuous clay films on ped faces; 5 percent coarse fragments; medium acid; gradual wavy boundary.
C—42 to 53 inches, mixed gray (10YR 6/1), brownish yellow (10YR 6/6), and yellowish brown (10YR 5/6) heavy silty clay; pockets of very dark gray (10YR 3/1) weathered remnants of coal; massive; firm, sticky and plastic; few roots; 10 percent coarse fragments; medium acid; clear wavy boundary.
R—53 inches, siltstone and shale.

The solum thickness ranges from 36 to 52 inches, and the depth to bedrock is 48 inches or more. Coarse fragments of shale make up 0 to 15 percent in the solum and 0 to 35 percent of the C horizon. In unlimed areas the soils are strongly acid or medium acid in the upper part of the solum and medium acid or slightly acid in the lower part of the solum and in the C horizon.

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

The B1 and B21 horizons have hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8. They are silt loam or silty clay loam. The B22 and B3 horizons have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 through 6. They are silty clay loam or silty clay. The B horizon has weak or moderate, medium or coarse, subangular and angular blocky structure and friable or firm consistence.

The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 through 6. It is heavy silty clay loam, silty clay, clay, or their shaly counterparts. It has firm consistence.

Holly series

The soils of the Holly series are fine-loamy, mixed, nonacid, mesic Typic Fluvaquents. These deep, poorly drained soils formed in lime-influenced alluvial material

washed from soils on uplands. The Holly soils are on flood plains along streams in the central and western parts of the survey area. Slopes range from 0 to 3 percent.

Holly soils are on the landscape with well drained Chagrin and Kanawha soils and moderately well drained Lobdell soils. Holly soils are flooded more frequently than Kanawha soils.

Typical pedon of Holly silt loam, in a pasture 100 feet east of Plum Run, 4.0 miles north of the junction of Plum Run Road with U.S. 250, Marion County:

Ap1—0 to 3 inches, mixed dark grayish brown (10YR 4/2) and dark brown (10YR 3/3) silt loam; common fine yellowish red (5YR 4/8) mottles; moderate medium and fine granular structure; friable; many roots; strongly acid; abrupt wavy boundary.

Ap2—3 to 7 inches, mixed dark grayish brown (10YR 4/2) and dark brown (10YR 4/3) silt loam; many fine and medium strong brown (7.5YR 5/6) mottles; weak medium granular structure; friable; many roots; strongly acid; abrupt wavy boundary.

B1g—7 to 11 inches, gray (10YR 5/1) loam; common fine and medium strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common roots; strongly acid; clear wavy boundary.

B2g—11 to 22 inches, gray (10YR 5/1) heavy loam; common fine and medium strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; common roots; strongly acid; clear wavy boundary.

B3g—22 to 36 inches, gray (N 6/0) heavy loam; many fine and medium strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak very coarse subangular blocky; friable; few roots; few black concretions; medium acid; gradual wavy boundary.

C1g—36 to 52 inches, gray (N 5/0) heavy loam; many fine and medium strong brown (7.5YR 5/6) mottles; massive; friable; few roots; few black concretions; medium acid; clear wavy boundary.

IIC2g—52 to 60 inches, gray (N 5/0) stratified loam, sandy loam, and gravel; many fine and medium strong brown (7.5YR 5/6) and olive (5Y 5/4) mottles; massive; friable; slightly acid.

The solum thickness ranges from 20 to 40 inches, and the depth to bedrock is more than 60 inches. Coarse fragments make up 0 to 5 percent of the control section. In unlimed areas the soils are slightly acid to strongly acid throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 1 through 3.

The B horizon has hue of 10YR, 2.5Y, or N; value of 4 through 6, and chroma of 0 through 2. It is dominantly silt loam or loam but is sandy loam in some pedons. Structure is weak, fine or medium, subangular blocky or medium to very coarse, prismatic parting to weak, subangular blocky. Consistence of the B horizon is friable.

The C horizon is gleyed and is usually stratified with a variety of textures. Consistence is friable.

Kanawha series

The soils of the Kanawha series are fine-loamy, mixed, mesic Typic Hapludalfs. These deep, well drained soils formed in lime-influenced alluvial material washed from soils on uplands. Kanawha soils are on high flood plains mostly along the West Fork and Monongahela Rivers, Buffalo Creek, and Dunkard Creek. Slopes range from 0 to 3 percent.

Kanawha soils are on the landscape with well drained Chagrin soils, moderately well drained Lobdell soils, and poorly drained Holly soils. Kanawha soils are flooded less frequently than the Chagrin, Lobdell, or Holly soils.

Typical pedon of Kanawha loam, in an idle field west of the Monongahela River, about 100 yards east of the Monongahela Railroad, and about 350 yards north of its junction with Route 53, Monongalia County:

Ap—0 to 7 inches, dark brown (10YR 4/3) loam; weak fine granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

B1—7 to 13 inches, dark brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; common roots; neutral; clear wavy boundary.

B21t—13 to 22 inches, dark brown (7.5YR 4/4) loam; coatings of dark brown (7.5YR 3/2) in root channels; weak medium and coarse prismatic structure parting to moderate medium subangular blocky; friable; common roots; common discontinuous clay films on ped faces; neutral; clear wavy boundary.

B22t—22 to 34 inches, dark brown (7.5YR 4/4) heavy loam; coatings of dark brown (7.5YR 3/2) in root channels; weak medium and coarse prismatic structure parting to moderate medium subangular blocky; friable; common roots; common discontinuous clay films on ped faces; medium acid; gradual wavy boundary.

B23t—34 to 46 inches, dark brown (7.5YR 4/4) heavy loam; dark brown (7.5YR 3/2) coatings in root channels; weak medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; friable; few roots; common discontinuous clay films on ped faces; slightly acid; gradual wavy boundary.

B3—46 to 63 inches, dark brown (7.5YR 4/4) heavy loam; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; few roots; few discontinuous clay films on ped faces; neutral; gradual wavy boundary.

C—63 to 74 inches, dark brown (7.5YR 4/4) loam; weak very coarse prismatic structure; friable; neutral.

The solum thickness ranges from 42 to 70 inches, and the depth to bedrock is more than 60 inches. Coarse fragments of gravel make up 0 to 10 percent of the solum and 0 to 15 percent of the C horizon. In unlimed areas the soils are strongly acid or medium acid in the upper part of the solum and medium acid to neutral in the lower part of the solum and in the C horizon.

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

The B horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 through 6. It is loam, light clay loam, or sandy clay loam. The B horizon has weak or moderate, medium or coarse, subangular blocky structure, or it has weak, medium or coarse, prismatic structure parting to weak, subangular blocky. It has friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. It is loam or fine sandy loam. It has friable consistence.

Lily series

The soils of the Lily series are fine-loamy, siliceous, mesic Typic Hapludults. These moderately deep, well drained soils formed in acid material weathered mostly from sandstone. The Lily soils are on uplands. Slopes range from 3 to 25 percent but are dominantly 8 to 15 percent.

Lily soils are on the landscape with well drained Dekalb and Gilpin soils and moderately well drained Buchanan, Ernest, Tilsit, and Wharton soils. Lily soils have fewer coarse fragments than the Dekalb soils, are sandier than the Gilpin soils, and do not have the fragipan of and are shallower than the Buchanan, Ernest, or Tilsit soils. Lily soils are shallower and less clayey than the Wharton soils.

Typical pedon of Lily loam, 3 to 8 percent slopes, in a wooded area 0.5 mile southeast of the entrance to Camp Mountaineer Boy Scout Camp, on the Chestnut Ridge anticline, Monongalia County:

O1—1-1/2 inches to 1 inch, hardwood leaf litter.
O2—1 inch to 0, partly decomposed hardwood leaf litter.
A1—0 to 2 inches, very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable; many roots; 5 percent coarse fragments; extremely acid; abrupt wavy boundary.
A2—2 to 5 inches, dark brown (10YR 4/3) loam; weak fine and medium granular structure; very friable; many roots; 5 percent coarse fragments; strongly acid; clear wavy boundary.
B1—5 to 9 inches, yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; many roots; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B21t—9 to 13 inches, yellowish brown (10YR 5/6) light sandy clay loam; weak medium subangular blocky structure; friable; many roots; common discontinuous clay films on ped faces; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B22t—13 to 22 inches, strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; many roots; common discontinuous clay films on ped faces; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B3—22 to 27 inches, yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; common roots; 10 percent coarse fragments; very strongly acid; abrupt wavy boundary.
R—27 inches, fractured sandstone.

The solum thickness ranges from 20 to 36 inches, and the depth to bedrock ranges from 20 to 40 inches. Coarse fragments of sandstone make up 5 to 20 percent of the solum and 15 to 35 percent of the C horizon. In unlimed areas the soils are strongly acid to extremely acid throughout.

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

The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 8. The B2t horizon is loam, clay loam, sandy clay loam, or their channery counterparts. The B3 horizon is loam, clay loam, sandy clay loam, sandy loam, or their channery counterparts. The B horizon has weak or moderate, fine or medium, subangular blocky structure and friable consistence.

The C horizon has hue of 10YR through 5YR, value of 5 or 6, and chroma of 6 or 8. It is loam or sandy loam or their channery counterparts. It has friable or firm consistence.

Lobdell series

The soils of the Lobdell series are fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts. These deep, moderately well drained soils formed in lime-influenced alluvial material washed from soils on uplands. The Lobdell soils are on flood plains along streams in the central and western parts of the survey area. Slopes range from 0 to 3 percent.

Lobdell soils are on the landscape with well drained Chagrin and Kanawha soils and poorly drained Holly soils. Lobdell soils are flooded more frequently than the Kanawha soils.

Typical pedon of Lobdell silt loam, in a pasture about 100 feet north of Sugar Run Creek, and about 0.4 mile northwest of Fairview High School, Marion County:

Ap—0 to 7 inches, dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many roots; 5 percent coarse fragments; slightly acid; clear wavy boundary.
B21—7 to 12 inches, brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable;

common roots; 5 percent coarse fragments; slightly acid; clear wavy boundary.

B22—12 to 21 inches, dark yellowish brown (10YR 4/4) heavy silt loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; common roots; slightly acid; gradual wavy boundary.

B3—21 to 34 inches, dark yellowish brown (10YR 4/4) loam; common fine strong brown (7.5YR 5/6) and grayish brown (2.5Y 5/2) mottles; weak medium subangular blocky structure; friable; few roots; common black concretions; slightly acid; gradual wavy boundary.

C1—34 to 53 inches, dark yellowish brown (10YR 4/4) loam; common fine strong brown (7.5YR 5/6) and grayish brown (2.5Y 5/2) mottles; massive; friable; neutral; gradual wavy boundary.

C2—53 to 60 inches, dark yellowish brown (10YR 4/4) sandy loam; common fine and medium strong brown (7.5YR 5/6) and grayish brown (2.5Y 5/2) mottles; massive; friable; neutral.

The solum thickness ranges from 24 to 40 inches, and the depth to bedrock is more than 60 inches. Coarse fragments of gravel make up 0 to 15 percent of the solum and of the C horizon above a depth of 40 inches. In unlimed areas the soils are strongly acid to slightly acid in the upper part of the solum and medium acid to neutral in the lower part of the solum and in the C horizon.

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

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is loam, silt loam, silty clay loam, or fine sandy loam. The B horizon has weak, fine to coarse, subangular blocky structure, or it has weak, medium, prismatic structure parting to weak, subangular blocky. Consistence is friable.

The C horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 1 through 4. It is silt loam, loam, or sandy loam. Some pedons are gravelly below a depth of 40 inches. The horizon has friable or very friable consistence.

Monongahela series

The soils of the Monongahela series are fine-loamy, mixed, mesic Typic Fragiudults. These deep, moderately well drained soils formed in acid alluvial material washed from soils on uplands. The Monongahela soils are on terraces mostly along the Cheat, Monongahela, Tygart Valley, and West Fork Rivers and Dunkard Creek. Slopes range from 3 to 15 percent but are dominantly 3 to 8 percent.

Monongahela soils are on the landscape with well drained Allegheny soils and moderately well drained Zoar soils. Monongahela soils have a fragipan that is not in the Allegheny or Zoar soils, and they are less clayey than the Zoar soils.

Typical pedon of Monongahela silt loam, 3 to 8 percent slopes, in a meadow about 200 feet west of Route 58, about 0.8 mile north of the intersection of Route 58 and Route 73, Marion County:

Ap—0 to 7 inches, dark brown (10YR 4/3) silt loam; weak fine granular structure; friable; many roots; neutral; abrupt smooth boundary.

B1—7 to 10 inches, yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; many roots; slightly acid; clear wavy boundary.

B21t—10 to 16 inches, yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; medium acid; clear wavy boundary.

B22t—16 to 22 inches, yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; few roots; common discontinuous clay films on ped faces; strongly acid; abrupt wavy boundary.

Bx1—22 to 26 inches, yellowish brown (10YR 5/6) heavy loam; few fine light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to weak medium platy; firm and brittle; few roots; few discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; clear wavy boundary.

Bx2—26 to 33 inches, strong brown (7.5YR 5/6) light clay loam; common medium light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to weak medium platy; firm and brittle; few discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx3—33 to 46 inches, strong brown (7.5YR 5/6) light clay loam; many coarse light grayish brown (10YR 6/2) and reddish yellow (7.5YR 6/8) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; firm to very firm and brittle; few discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx4—46 to 61 inches, mixed strong brown (7.5YR 5/6), reddish yellow (7.5YR 6/8), and light grayish brown (10YR 6/2) light clay loam; weak very coarse prismatic structure; firm to very firm and brittle; few discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; clear wavy boundary.

C—61 to 66 inches, mixed reddish yellow (7.5YR 6/8) and light grayish brown (10YR 6/2) sandy clay loam; massive; friable to firm; 15 percent coarse fragments; strongly acid.

The solum thickness ranges from 40 to 72 inches, and the depth to bedrock is greater than 60 inches. Coarse fragments of gravel make up 0 to 15 percent of the profile above the fragipan, 0 to 25 percent of the fragipan, and 10 to 40 percent of the C horizon. In unlimed areas the soils are strongly acid or very strongly acid throughout.

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

The part of the B horizon above the fragipan has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is silt loam, loam, or clay loam. The Bx horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 2 through 6. It is silt loam, loam, light clay loam, or their gravelly counterparts. The part of the B horizon above the fragipan has weak or moderate, medium or fine, subangular blocky structure and friable consistence. The fragipan has weak, very coarse, prismatic structure parting to weak platy or weak subangular blocky and has firm or very firm consistence.

The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 through 8. It is sandy loam, loam, sandy clay loam, clay loam, or their gravelly counterparts. It has friable or firm consistence.

Pope Variant

The soils of the Pope Variant are sandy, siliceous, mesic Typic Udifluvents. These deep, well drained soils formed in acid alluvial material washed from soils on uplands. The Pope soils in this survey area are a variant because they contain more sand than is defined in the range for the Pope series. The soils are dominantly along Whiteday Creek on flood plains in the eastern part of the survey area. Slopes range from 0 to 3 percent.

Pope Variant soils are on the landscape with moderately well drained Buchanan and Ernest soils. Pope Variant soils are subject to flooding and do not have the fragipan of the Buchanan and Ernest soils.

Typical pedon of Pope Variant sandy loam, in a pasture east of Whiteday Creek, about 1.3 miles south of Halleck Road, and about 1 mile east of the junction of Interstate 79 and Route 73, Monongalia County:

Ap—0 to 7 inches, dark brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many roots; strongly acid; abrupt smooth boundary.

B1—7 to 12 inches, yellowish brown (10YR 5/8) loamy sand; weak medium subangular blocky structure; very friable; common roots; strongly acid; clear wavy boundary.

B2—12 to 18 inches, strong brown (7.5YR 5/6) loamy sand; weak medium and coarse subangular blocky structure; friable; common roots; strongly acid; clear wavy boundary.

B3—18 to 28 inches, yellowish brown (10YR 5/6) loamy sand; weak coarse subangular blocky structure; friable; less than 5 percent gravel up to 1 inch in diameter; strongly acid; clear wavy boundary.

C1—28 to 37 inches, brown (7.5YR 5/4) sandy loam; common coarse light yellowish brown (2.5Y 6/4) mottles; massive; friable; common black concretions; less than 5 percent gravel up to 2 inches in diameter; strongly acid; clear wavy boundary.

C2—37 to 60 inches, yellowish brown (10YR 5/4) stratified loamy sand and fine sandy loam; common coarse light yellowish brown (2.5Y 6/4) mottles; massive; very friable; less than 5 percent gravel up to 2 inches in diameter; strongly acid.

The solum thickness ranges from 20 to 40 inches, and the depth to bedrock is more than 60 inches. In unlimed areas the soils are strongly acid or very strongly acid throughout.

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

The B horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is loamy sand or sandy loam. The B horizon has weak, medium, or coarse subangular blocky structure and has friable or very friable consistence.

The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 8. It is stratified loamy sand and fine sandy loam. It has very friable or friable consistence.

Tilsit series

The soils of the Tilsit series are fine-silty, mixed, mesic Typic Fragiudults. These deep, moderately well drained soils formed in acid material weathered from siltstone, shale, and some sandstone. The Tilsit soils are on uplands. Slopes range from 3 to 15 percent but are dominantly 3 to 8 percent.

Tilsit soils are on the landscape with well drained Dekalb, Gilpin, and Lily soils. Tilsit soils are deeper than the Dekalb, Gilpin, or Lily soils. They have a fragipan that is not in those soils.

Typical pedon of Tilsit silt loam, 8 to 15 percent slopes, in a wooded area 50 yards west of U.S. 119, about 1/2 mile north of its junction with Canyon Road, Monongalia County:

O1—1-1/2 inches to 1/2 inch, hardwood leaf litter.

O2—1/2 inch to 0, decomposed hardwood leaf litter.

A1—0 to 2 inches, very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; very friable; many roots; very strongly acid; abrupt wavy boundary.

A2—2 to 7 inches, brown (10YR 5/3) silt loam; weak fine and medium granular structure; very friable; many roots; very strongly acid; clear wavy boundary.

B1t—7 to 12 inches, yellowish brown (10YR 5/4) heavy silt loam; weak medium subangular blocky structure;

friable; many roots; few discontinuous clay films on ped faces; very strongly acid; clear wavy boundary.

B21t—12 to 17 inches, yellowish brown (10YR 5/6) heavy silt loam; moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; very strongly acid; clear wavy boundary.

B22t—17 to 21 inches, yellowish brown (10YR 5/6) light silty clay loam; common medium strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; strongly acid; clear wavy boundary.

Bx1—21 to 32 inches, brownish yellow (10YR 6/6) light silty clay loam; common medium strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; firm; slightly brittle; few roots; few discontinuous clay films on ped faces; few black concretions; less than 5 percent coarse fragments; strongly acid; clear wavy boundary.

Bx2—32 to 42 inches, yellowish brown (10YR 5/6) light silty clay loam; coarse gray (10YR 6/1) mottles; moderate very coarse prismatic structure parting to moderate thick platy; very firm and brittle; few roots; few discontinuous clay films on ped faces; few black concretions; 5 percent coarse fragments; strongly acid; gradual wavy boundary.

C—42 to 56 inches, yellowish brown (10YR 5/6) channery light silty clay loam; many coarse gray (10YR 6/1) mottles; massive; firm; few roots; few black concretions; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

R—56 inches, sandstone.

The solum thickness ranges from 40 to 55 inches, and the depth to bedrock ranges from 42 to 72 inches. Coarse fragments of shale, siltstone, and sandstone make up 0 to 10 percent of the solum and 10 to 30 percent of the C horizon. In unlimed areas the soils are strongly acid to extremely acid throughout.

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

The part of the B horizon above the fragipan has hue of 10YR, value of 5, and chroma of 4 through 6. It is silt loam or silty clay loam. The fragipan has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. It is loam, silt loam, or light silty clay loam. The part of the B horizon above the fragipan has weak or moderate, medium subangular blocky structure and friable consistence. The fragipan has weak or moderate, very coarse, prismatic structure parting to platy or subangular blocky structure.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. It is silt loam, loam, silty clay loam, or their channery counterparts. It has firm consistence.

Udorthents

Udorthents are a mixture of soils and rock materials that have been drastically disturbed by man. Udorthents are cut and fill areas along highways and other construction sites, areas surface-mined for coal, and areas where mine waste has been dumped. The cut and fill areas are dominantly along highways U.S. 48 and Interstate 79. The surface-mine and mine-waste areas are dominantly in the central and eastern parts of the survey area.

Udorthents, cut and fill, are highly variable, and a typical pedon is not given. These soils consist mostly of mixed soil and rock material that has been excavated, graded, or filled. Coarse fragments vary in size, kind, and amount. In most places the soil material has been transported several hundred yards from the cut area to the fill site. The soils include cut and fill areas on uplands and terraces and fill areas on flood plains.

The surface-mine and mine-waste dumps mapped as Udorthents have resulted from the mining of coal. These soils have at least three of the following properties to constitute a surface-mine or mine-dump unit (*8*):

1. Coarse fragments constitute at least 10 percent of the volume of the control section, and they are disordered such that more than 50 percent will have their long axis at an angle of at least 10 percent relative to any plane in the profile. The test for disorder should exclude fragments with a maximum diameter of less than 3/4 inch or more than 10 inches and should be based on numbers of coarse fragments rather than on volume.
2. Mottles occur without regard to depth or spacing in the profile. The mottling involves color differences of at least two color chips in the standard Munsell soil color charts. This mottling occurs among fines as well as within coarse fragments or between fines and coarse fragments.
3. If coarse fragments are fissile, the edges are frayed or splintery rather than smooth.
4. Coarse fragments bridge across voids as a result of placement of materials, leaving discontinuous irregular pores larger than texture porosity. Such voids are consistently present but vary in frequency, prominence, and size.
5. The profile has a thin surface horizon or a horizon immediately below a surface pavement of coarse fragments that contains a higher percentage of fines than any other horizon in the profile in the control section. This horizon ranges from 1 to 4 inches thick in most minesoils, but it may be thicker in minesoils that have been "topsoiled."
6. The profile has local pockets of materials, excluding single coarse fragments, that range from 3 to 40 inches in horizontal diameter. These pockets have no lateral continuity and are the result of the original place-

ment of materials and not postdepositional processes. They may differ from surrounding material in color (two or more Munsell color chips), soil textural- or particle-size class, or dominant rock type constituting the coarse fragments.

7. Artifacts are present (paper, wire, logs, cans, glass, etc.).

8. Carbolitlic coarse fragments occur in noncarbolithic spoils.

9. Oxidizable carbon is irregularly distributed with depth and not associated with stratification (laboratory determination).

Sandstone coarse fragments make up more than 65 percent of the total coarse fragment content in the control section of Udorthents, sandstone, low base (pH 4.0 to 5.5), and Udorthents, sandstone, very low base (pH less than 4.0).

Reference pedon of Udorthents, sandstone, low base, about 0.7 mile east of Opekiska and 2.5 miles north of Smithtown, Monongalia County:

Layer 1—0 to 7 inches, dark brown (10YR 3/3) channery sandy loam; many medium brownish yellow (10YR 6/6), very dark gray (10YR 3/1), light brownish gray (10YR 6/2), and brown (10YR 5/3) lithochromic mottles; massive; very friable; 30 percent coarse fragments (80 percent sandstone, 10 percent mudstone, 10 percent coaly fragments); very strongly acid; abrupt wavy boundary.

Layer 2—7 to 25 inches, yellowish brown (10YR 5/4) very channery sandy loam; common medium brownish yellow (10YR 6/6), gray (10YR 6/1), and dark brown (10YR 3/3) lithochromic mottles; massive; friable; 80 percent coarse fragments (90 percent sandstone, 5 percent mudstone, 5 percent coaly fragments); very strongly acid; gradual irregular boundary.

Layer 3—25 to 35 inches, yellowish brown (10YR 5/4) very channery sandy loam with pockets of loam around mudstone coarse fragments; common medium brownish yellow (10YR 6/6), gray (10YR 6/1), and dark brown (10YR 3/3) lithochromic mottles; massive; friable, very friable in places; 80 percent coarse fragments (85 percent sandstone, 10 percent mudstone, 5 percent coaly fragments); very strongly acid; gradual irregular boundary.

Layer 4—35 to 55 inches, dark yellowish brown (10YR 4/4) very channery sandy loam; pockets of very channery loam; common medium brownish yellow (10YR 6/6), gray (10YR 6/1), and dark brown (10YR 3/3) lithochromic mottles; massive; friable, firm in places; 75 percent coarse fragments (90 percent sandstone, 5 percent mudstone, 5 percent coaly fragments); very strongly acid.

The soils mapped as Udorthents, mudstone and sandstone, high base (pH 5.5 to 8.0); Udorthents, mudstone and sandstone, low base (pH 4.0 to 5.5); and Udorthents, sandstone and shale, very low base (pH less than 4.0), contain a mixture of rock types, with no single type making up more than 65 percent of the total coarse fragment content of the control section.

Reference pedon of Udorthents, mudstone and sandstone, low base, about 2 miles northwest of Maidsville Post Office and 300 yards southwest of Route 100, Monongalia County:

Layer 1—0 to 2 inches, dark brown (10YR 4/3) silty clay loam; common medium yellowish brown (10YR 5/6) and few medium light gray (N 7/0) lithochromic mottles; weak fine granular structure; very friable; many roots; 20 percent coarse fragments (75 percent shale, 25 percent mudstone); strongly acid; abrupt wavy boundary.

Layer 2—2 to 14 inches, yellowish brown (10YR 5/4) channery silty clay loam; common medium gray (10YR 6/1), very dark gray (N 3/0) and light gray (N 7/0) lithochromic mottles; massive; friable; many roots; 45 percent coarse fragments (80 percent shale, 20 percent mudstone); very strongly acid; clear wavy boundary.

Layer 3—14 to 24 inches, light yellowish brown (10YR 6/4) channery silty clay loam; many medium grayish brown (10YR 5/2), common medium yellowish brown (10YR 5/8), and few medium white (N 8/0) lithochromic mottles; massive; friable; common roots; few dark reddish brown (2.5YR 3/4) coatings on coarse fragments; 35 percent coarse fragments (45 percent mudstone, 35 percent sandstone, 20 percent shale); very strongly acid; abrupt wavy boundary.

Layer 4—24 to 45 inches, dark grayish brown (10YR 4/2) very channery loam; pockets of strong brown (7.5YR 5/8) lithochromic mottles; massive; very friable; few roots; common coarse fragments bridging voids; few dark reddish brown (2.5YR 3/4) and very dark gray (N 3/0) coatings on coarse fragments; 70 percent coarse fragments (40 percent mudstone, 35 percent sandstone, 25 percent shale); very strongly acid.

The soils mapped Udorthents, dumps, low base (pH 4.0 to 5.5), and Udorthents, dumps, very low base (pH less than 4.0), have more than 50 percent of the total coarse fragment content in the control section of coal, bone coal, carbon-rich muds, and carbon-rich shale. These soils also have a thin surface pavement of coarse fragments.

Reference pedon of Udorthents, dumps, very low base, about 1 mile west of Jere and 200 yards north of Route 7, Monongalia County:

Layer 1—0 to 2 inches, black (N 2/0) loam; weak medium and thick platy structure parting to weak

fine granular; very friable; 40 percent coaly fragments; few roots; very strongly acid; abrupt smooth boundary.

Layer 2—2 to 7 inches, black (N 2/0) loam; weak medium and coarse subangular blocky structure parting to weak fine granular blocky; friable in place and very friable in hand; few fine reddish yellow (7.5YR 6/8) mottles; 40 percent coaly fragments; few vesicular pores; few bridging voids; extremely acid; clear wavy boundary.

Layer 3—7 to 12 inches, black (N 2/0) sandy loam; firm in place and friable in hand; common medium reddish yellow (7.5YR 6/8), yellowish brown (10YR 5/6), and red (10YR 4/8) mottles; 70 percent coaly fragments; few coarse fragments bridging voids less than 0.2 inch in diameter; extremely acid; abrupt wavy boundary.

Layer 4—12 to 38 inches, mixed black (N 2/0), reddish yellow (7.5YR 6/8), dark grayish brown (10YR 4/2), gray (10YR 5/1), and reddish brown (2.5YR 4/4) sandy loam; firm to very firm in place and very friable in hand; massive; 80 percent coaly fragments; gypsum crystals throughout; pockets of silty clay loam; pockets of massive extremely firm carbolithic material; many coarse fragments bridging voids; several artifacts (bottles, cans, and copper wire); extremely acid; gradual irregular boundary.

Layer 5—38 to 50 inches, mixed black (N 2/0), dark gray (10YR 4/1), yellowish red (5YR 5/8), and reddish brown (2.5YR 4/4) sandy loam; friable to firm in place and very friable in hand; massive; 90 percent coaly fragments; many coarse fragments bridging voids; several artifacts (bottles, cans, and copper wire); extremely acid.

Upshur series

The soils of the Upshur series are fine, mixed, mesic Typic Hapludalfs. The deep, well drained soils formed in lime-influenced material weathered mainly from shale. The Upshur soils are on uplands. Slopes range from 8 to 65 percent but are dominantly 35 to 65 percent.

Upshur soils are on the landscape with well drained Belmont, Culleoka, and Gilpin soils and moderately well drained Clarksburg, Dormont, and Guernsey soils. Upshur soils are deeper than the Culleoka or Gilpin soils, are more clayey than all but the Guernsey soils, and do not have the fragipan of the Clarksburg soils.

Typical pedon of Upshur silt loam, in an area of Gilpin-Culleoka-Upshur silt loams, 15 to 25 percent slopes, in a meadow about 200 yards north of the intersection of Route 18 and Route 20, between Plum Run and Little Dunkard Mill Run, Marion County:

Ap—0 to 7 inches, reddish brown (5YR 4/3) silt loam; weak fine and medium granular structure; friable; many roots; neutral; abrupt wavy boundary.

B21t—7 to 14 inches, reddish brown (2.5YR 4/4) clay; moderate medium subangular blocky structure; firm, very sticky, very plastic; common roots; continuous clay films on ped faces; strongly acid; clear wavy boundary.

B22t—14 to 23 inches, dark reddish brown (2.5YR 3/4) clay; strong medium subangular and angular blocky structure; firm, very sticky, very plastic; common roots; continuous clay films on ped faces; strongly acid; clear wavy boundary.

B3t—23 to 32 inches, dark reddish brown (2.5YR 3/4) clay; moderate medium subangular blocky structure; firm, very sticky, very plastic; few roots; continuous clay films on ped faces; 5 percent coarse fragments; medium acid; gradual wavy boundary.

C—32 to 45 inches, dark reddish brown (2.5YR 3/4) shaly silty clay; massive; firm; few roots; 20 percent coarse fragments; slightly acid; gradual wavy boundary.

Cr—45 inches, highly weathered red shale.

The solum thickness ranges from 26 to 44 inches, and the depth to highly weathered shale ranges from 40 to 60 inches. Coarse fragments of shale make up 0 to 10 percent of the solum and 20 to 60 percent of the C horizon. In unlimed areas the soils are strongly acid or medium acid in the solum and medium acid to neutral in the C horizon.

The Ap horizon has hue of 7.5YR or 5YR, value of 3 or 4, and chroma of 2 through 4.

The B horizon has hue of 5YR, 2.5YR, or 10R; value of 3 or 4; and chroma of 3 or 4. It is silty clay or clay. The B horizon has moderate or strong, fine to coarse, subangular blocky structure and firm, plastic or very plastic, and sticky or very sticky consistence.

The C horizon has hue of 5YR, 2.5YR, or 10R; value of 3 or 4; and chroma of 3 or 4. It is shaly or very shaly counterparts of silty clay loam, silty clay, or clay. It has firm consistence.

Westmoreland series

The soils of the Westmoreland series are fine-loamy, mixed, mesic Ultic Hapludalfs. These deep, well drained soils formed in lime-influenced material weathered from shale, siltstone, sandstone, and some limestone. The Westmoreland soils are on uplands. Slopes range from 3 to 65 percent but are dominantly 15 to 35 percent.

Westmoreland soils are on the landscape with well drained Culleoka and Gilpin soils and moderately well drained Clarksburg, Dormont, and Guernsey soils. Westmoreland soils are deeper than the Culleoka or Gilpin soils, do not have the fragipan of the Clarksburg soils, and are less clayey than the Guernsey soils. They are less acid than the Gilpin soils.

Typical pedon of Westmoreland silt loam, 15 to 25 percent slopes, in a pasture about 200 yards north of

Route 100, about 1.2 miles east of its junction with U.S. 19, Monongalia County:

Ap1—0 to 3 inches, dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable; many roots; 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.
Ap2—3 to 8 inches, brown (10YR 5/3) silt loam; weak fine subangular blocky and weak medium granular structure; very friable; many roots; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B1—8 to 12 inches, yellowish brown (10YR 5/8) silt loam; weak medium subangular blocky structure; friable; common roots; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B21t—12 to 22 inches, strong brown (7.5YR 5/6) heavy silt loam; weak and moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B22t—22 to 36 inches, strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on ped faces; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B3t—36 to 40 inches, strong brown (7.5YR 5/6) shaly silty clay loam; weak medium subangular blocky structure; friable; few roots; common discontinuous clay films on ped faces; 20 percent coarse fragments; very strongly acid; gradual wavy boundary.
C1—40 to 51 inches, strong brown (7.5YR 5/6) very shaly light silty clay loam; few yellowish red (5YR 5/6) coatings on shale fragments; massive; firm; few black concretions; 65 percent coarse fragments; strongly acid; clear wavy boundary.
C2—51 to 66 inches, strong brown (7.5YR 5/6) very shaly light silty clay loam; few yellowish red (5YR 5/6) coatings on shale fragments; massive; firm; few black concretions; 85 percent coarse fragments; strongly acid.
R—66 inches, shale and siltstone.

The solum thickness ranges from 24 to 40 inches, and the depth to bedrock ranges from 40 to 72 inches or more. Coarse fragments of shale, siltstone, and sandstone make up 5 to 30 percent of the solum and 50 to 85 percent of the C horizon. In unlimed areas the soils are medium acid to very strongly acid in the solum and strongly acid or medium acid in the C horizon.

The Ap horizon has hue of 10YR, value of 3 through 5, and chroma of 2 or 3.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. It is silt loam, silty clay loam, loam, or their channery or shaly counterparts. The B horizon has weak or moderate, fine or medium, subangular blocky structure and friable or firm consistence.

The C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is very shaly or very channery counterparts of silt loam, loam, or silty clay loam. It has friable or firm consistence.

Wharton series

The soils of the Wharton series are clayey, mixed, mesic Aquic Hapludults. These deep, moderately well drained soils formed in acid material weathered mostly from shale. Wharton soils in this survey area are a taxadjunct because they have a thinner B2t horizon than is defined in the range for the Wharton series. The Wharton soils are on ridgetops and benches. Slopes range from 3 to 25 percent but are dominantly 8 to 15 percent.

Wharton soils are on the landscape with well drained Gilpin and Lily soils. Wharton soils are deeper and more clayey than these soils.

Typical pedon of Wharton silt loam, 8 to 15 percent slopes, in a meadow about 100 yards north of Route 119/21, about 0.1 mile east of its junction with U.S. 119, near the Taylor County line, Monongalia County:

Ap—0 to 6 inches, dark brown (10YR 3/3) silt loam; moderate fine and medium granular structure; friable; many roots; 10 percent coarse fragments; mildly alkaline; abrupt smooth boundary.
B1t—6 to 12 inches, yellowish brown (10YR 5/4) heavy silt loam; pockets of dark brown (10YR 3/3) silt loam; weak medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; 5 percent coarse fragments; mildly alkaline; clear wavy boundary.
B21t—12 to 18 inches, yellowish brown (10YR 5/6) heavy silty clay loam; moderate medium subangular blocky structure; friable to firm; few roots; common discontinuous clay films on ped faces; 5 percent coarse fragments; medium acid; clear wavy boundary.
B22t—18 to 24 inches, yellowish brown (10YR 5/6) silty clay; common fine and medium gray (10YR 6/1) mottles; moderate medium and coarse subangular blocky structure; firm, sticky and plastic; few roots; many discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; clear wavy boundary.
B3t—24 to 31 inches, yellowish brown (10YR 5/6) silty clay; common medium gray (10YR 6/1) and red (2.5YR 4/6) mottles; weak medium and coarse subangular blocky structure; firm, sticky and plastic; few roots; few discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; abrupt wavy boundary.
Cg—31 to 60 inches, light brownish gray (10YR 6/2) clay; common fine yellowish red (5YR 5/8) and grayish brown (10YR 5/2) mottles; massive; firm, very

sticky and very plastic; 10 percent coarse fragments; strongly acid.

The solum thickness ranges from 30 to 40 inches, and the depth to bedrock ranges from 40 to 60 inches or more. Coarse fragments of shale, siltstone, and sandstone make up 5 to 15 percent of the solum and 5 to 50 percent of the C horizon. In unlimed areas the soils are strongly acid or very strongly acid throughout the solum. The reaction of the C horizon ranges from strongly acid to extremely acid.

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

The upper part of the B horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 6. The lower part of the B horizon has hue of 10YR, value of 5 or 6, and chroma of 2 through 4. The B1 horizon is silt loam or silty clay loam. The B2t and B3t horizons are silty clay loam or silty clay. The B horizon has weak or moderate, medium or coarse, subangular blocky structure and friable or firm consistence.

The C horizon has hue of 10YR, value of 4 through 6, and chroma of 2 through 6. It is silt loam through clay or their shaly counterparts. It has friable or firm consistence.

Zoar series

The soils of the Zoar series are clayey, mixed, mesic Aquic Hapludults. These deep, moderately well drained soils formed in acid slackwater deposits of old stream sediments. The Zoar soils are on terraces mostly along the Cheat, Monongahela, Tygart Valley, and West Fork Rivers and Dunkard Creek. Slopes range from 3 to 15 percent but are dominantly 8 to 15 percent.

Zoar soils are on the landscape with well drained Allegheny soils and moderately well drained Monongahela soils. Zoar soils are more clayey than the Allegheny or Monongahela soils and do not have the fragipan of the Monongahela soils.

Typical pedon of Zoar silt loam, 3 to 8 percent slopes, in a meadow about 15 yards west of Route 90/1, about 0.8 mile east of its junction with Route 90, in the South Worthington area of Marion County:

Ap—0 to 9 inches, dark brown (10YR 3/3) silt loam; weak fine and medium granular structure; friable; many roots; neutral; abrupt wavy boundary.

B1t—9 to 12 inches, yellowish brown (10YR 5/6) light silty clay loam; weak medium subangular blocky structure; friable; common roots; few discontinuous clay films on ped faces; strongly acid; clear wavy boundary.

B21t—12 to 20 inches, yellowish brown (10YR 5/8) silty clay loam; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on ped faces; strongly acid; clear wavy boundary.

B22t—20 to 28 inches, brown (7.5YR 5/6) silty clay; few fine pinkish gray (7.5YR 6/2) and reddish brown (5YR 6/4) mottles; moderate medium subangular blocky structure; friable; few roots; many discontinuous clay films on ped faces; strongly acid; clear wavy boundary.

B23t—28 to 38 inches, mixed brown (7.5YR 5/4), strong brown (7.5YR 5/8), and pinkish gray (7.5YR 6/2) silty clay; moderate medium prismatic structure parting to moderate coarse subangular blocky; firm; many discontinuous clay films on ped faces; strongly acid; clear wavy boundary.

C1—38 to 51 inches, pinkish gray (7.5YR 6/2) and strong brown (7.5YR 5/8) silty clay; massive; firm; many black concretions; 5 percent coarse fragments; strongly acid; clear wavy boundary.

C2—51 to 60 inches, brown (7.5YR 5/4) and pinkish gray (7.5YR 6/2) clay; massive; firm; strongly acid.

The solum thickness ranges from 32 to 46 inches, and the depth to bedrock is more than 60 inches. Coarse fragments make up 0 to 5 percent of the profile below a depth of 32 inches. In unlimed areas the soils are strongly acid to very strongly acid throughout.

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

The B horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. The B1 horizon is silt loam or silty clay loam. The B2t horizon is silty clay loam or silty clay. The B2t horizon has moderate or strong, medium or coarse, subangular blocky structure or weak or moderate, medium or coarse, prismatic structure parting to weak or moderate, subangular blocky. The B2t horizon has friable or firm consistence.

The C horizon has hue of 10YR, 7.5YR, or 5YR; value of 5 or 6; and chroma of 1 through 4. It is silty clay loam, silty clay, or clay. It has firm consistence.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*6*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 17, the soils of

the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to 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 expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Hapludults (*Hapl*, meaning simple horizons, plus *udult*, the suborder of Ultisols that have a udic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceeding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Formation and morphology of the soils

The origin and development of the soils in Marion and Monongalia Counties are discussed in this section. The five factors of soil formation are listed, and their influence on the soils is described. Morphology of soils is described as related to horizon nomenclature and the processes involved in horizon development.

Factors of soil formation

The soils of Marion and Monongalia Counties have resulted from the interaction of five major factors of soil formation: parent material, time, climate, living organisms, and topography. Each factor modifies the effectiveness of the other factors. Influenced by these factors, the two main processes of soil formation are the accumulation of parent material and the differentiation of horizons in the profile. Horizons are faint to distinct, depending on the gains, losses, and alterations that have taken place. Parent material, topography, and time are responsible for producing differences among the soils in the survey area. Climate and living organisms generally show their influences throughout broad areas and are relatively uniform throughout this survey area.

Parent material, time, and climate

The character of the parent material strongly influences the time required for soil formation and the nature of the soil produced. The soils of the area formed in residual, colluvial, and alluvial materials. Most formed in residual material mainly from interbedded shale, siltstone, sandstone, and some limestone.

The parent material in the western part of the survey area is mostly of the Dunkard geologic group. Gilpin, Culleoka, and Upshur soils are the dominant residual soils. The soils in the central part of the survey have been weathered mostly from parent material of the Monongahela and Conemaugh geologic groups. Culleoka and Westmoreland soils are the dominant residual soils in this area. The soils in the eastern part of the survey formed primarily from parent material of the Allegheny Formation and Pottsville Group. Dekalb and Gilpin soils are the dominant residual soils in the eastern part of the survey area and are generally more acid than the soils in the remainder of the area.

The residual materials are the oldest parent material in the survey area. The soil-forming factors have been retarded, however, by clayey material, by resistant rock, and by steepness of slopes. Consequently, some of the soils that formed under these conditions have a less developed profile than some of the soils formed in younger materials.

Colluvial materials are along the foot slopes and at the head of drainageways. These materials have moved

downslope from the acid and lime-influenced residual soils. The Clarksburg soils formed in colluvium below the Culleoka and Westmoreland soils, the Buchanan soils formed in colluvium below the Dekalb soils, and the Ernest soils formed in colluvium below the Gilpin soils.

The parent material on terraces and flood plains has washed from acid and lime-influenced soils on uplands. The soil-forming processes have had considerable time to act on the material on the terraces. Many additions, losses, and alterations have taken place. The resulting soils, such as Allegheny and Monongahela soils, are strongly leached and have a moderately well developed profile. The alluvial deposits on the flood plains are the youngest parent material in the survey area. Most of the material is physically well suited to soil formation, but the soil-forming processes have had little time to operate. The soils on flood plains usually exhibit a weakly developed profile. Chagrin, Lobdell, and Holly soils are examples of flood-plain soils.

Climate is generally relatively uniform throughout the survey area. Therefore, it is not responsible for any major differences in the soil, but it causes the development of horizons in the soil profile. A detailed description of climate is given in the section "General nature of the area."

Living organisms

Living organisms, including vegetation, animals, bacteria, and fungi, are important to soil formation. The kind and amount of vegetation is generally responsible for the amount of organic matter, color of the surface layer, and, in part, for the amount of nutrients. Earthworms and burrowing animals help keep the soil open and porous, and they mix organic matter and mineral matter by moving the soil to the surface. Bacteria and fungi decompose organic matter, thus releasing nutrients for plant food. Man has greatly influenced the surface layer by activities such as clearing the forest and plowing.

Topography

Topography affects soil formation by its effect on the amount of water moving through the soil, the amount of runoff, and erosion.

Gently sloping and strongly sloping soils have had large amounts of water moving through them. This condition favors the formation of deep soils that have a moderately well developed or well developed profile. On the steep and very steep hillsides, less water moves through the soil and more runoff occurs. In addition, the soil material is washed away almost as rapidly as it forms. It is likely that soils on the steeper hillsides will be shallower to bedrock than soils on the more gentle slopes.

In this survey area, topography is favorable for the formation of soils on flood plains and young terraces, and formation is progressing at a rapid rate.

Morphology of soils

The results of the soil-forming processes can be observed in the different layers, or soil horizons, in the soil profile. The profile extends from the soil surface downward to materials that are little changed by soil-forming processes. Most soils contain three major horizons, called the A, B, and C horizons. These horizons can be further subdivided by the use of numbers and letters to indicate changes within the major horizon.

The A horizon is the surface layer. It is the layer that has the maximum accumulation of organic matter. It is also the layer of maximum leaching, or eluviation, of clay and iron.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. The B horizon commonly has blocky structure and is generally more firm and lighter in color than the A horizon.

The C horizon is below the A and B horizons. It consists of material that is modified by weathering but is altered little by the soil-forming processes.

In the survey area, many processes are involved in the formation of soil horizons. The more important of these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation and translocation of clay minerals, and the formation of structure. Such processes are continually taking place and have been for thousands of years.

Most of the well drained and moderately well drained soils on uplands in the survey area have a yellowish brown or strong brown B horizon. These colors are caused mainly by iron oxides. The B horizon of these soils has blocky structure and generally has translocated clay minerals.

A layer called a fragipan has formed in the B horizon of most of the moderately well drained soils on uplands, foot slopes, and terraces. This layer is dense and brittle, is mottled, and has slow or very slow permeability to water and air.

Gray colors are common in soils that are moderately well drained to poorly drained. These colors are the result of intense reduction of iron during soil formation, a process called gleying.

References

(1) American Association of State Highway and Transportation Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) Janssen, Raymond E. 1973. Earth science; a handbook on the geology of West Virginia. Educational Marketers, Inc. 350 pp., illus.
(4) United States Department of Agriculture. 1965. Land resource regions and major land resource areas of the United States. Soil Conserv. Serv. U.S. Dep. Agric. Handb. 296. 82 pp.
(5) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. (Supplements replacing pp. 173-288 issued May 1962)
(6) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv. U.S. Dep. Agric. Handb. 436. 754 pp., illus.
(7) United States Department of Commerce. 1977. 1974 census of agriculture, West Virginia State and county data. Bur. of Census. Vol. 1, part 48. 544 pp.
(8) United States Environmental Protection Agency. 1976. Extensive overburden potentials for soil and water quality. Series EPA-600/2-184. 311 pp.

Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	More than 5.2

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bone coal. High carbon mudrock or impure coal.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Carbolith (*8*). Dark-colored sedimentary rocks that will make a black or very dark (Munsell value of 3 or less) streak or powder. Carbolith material includes coal not scheduled for mining, impure waste coal, bone coal, high-carbon shales, and high-carbon muds. In general, this material contains at least 25 percent carbonaceous matter oxidizable at 350 to 400 degrees C.

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.

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 coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coaly. Soil covered with coal, containing coal, or resembling coal.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

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.

Contour stripcropping (or contour farming). 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.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earth-moving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects 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 for 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, as for example in "hillpeats" and "climatic moors."

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 running 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 a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Fissile. Having a tendency to split along parallel planes into layers less than 5 mm thick.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of 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. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

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.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action. Freezing and thawing of soil moisture. Frost action can damage 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. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

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 from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

High base. Minesoils with a pH of 5.5 to 8.0 at a depth of 10 to 40 inches or at a depth of 10 inches to bedrock if bedrock is at a depth of less than 40 inches.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks 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 from which the solum is presumed to have 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.

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.

Landslide. The rapid downhill movement of a mass of soil and loose rock generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lithochromic mottles. Mottles that have inherited their color from rocks.

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 base. Minesoils with a pH of 4.0 to 5.5 at a depth of 10 to 40 inches or at a depth of 10 inches to bedrock if bedrock is at a depth of less than 40 inches.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minesoil. A young soil in recently deposited earth materials resulting from deep mining, surface mining, or other earth-moving operations.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy 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).

Mudrock. A broad term for a sedimentary rock dominated by silt-size and/or clay-size particles. The term is used when a rock cannot be definitely distinguished as either a mudstone or shale. Mudrock can be further subdivided into hard mudrock (moist hardness greater than 2.5) or normal mudrock (moist hardness less than 2.5). Mudrock contains as much as 50 percent sand-size particles if properties are judged to be dominated by silt and/or clay. Mudrock may contain any proportion of carbonates so long as properties are dominantly silt and/or clay when rubbed in water.

Mudstone. A nonfissile mudrock dominated by silt-size and/or clay-size particles. Mudstone has a moist hardness of less than 2.5 (can be scratched with fingernail) and differs from shale because of its nonfissile nature. Mudstones contain as much as 50 percent sand-size particles if proprties are judged to be dominated by silt and/or clay.

Munsell notation. A designation of color by degrees of the three single 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.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

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. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in 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 a semisolid to a plastic state.

Poorly graded. Refers to 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 outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree 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

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock. Soil scientists regard as soil only the part of the regolith that is modified by organisms and other soil-building forces. Most engineers describe the whole regolith, even to a great depth, as "soil."

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited chemically or from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; mudstone and shale, formed from silt and/or clay; and limestone, formed from chemical precipitation of calcium carbonate or carbonate fossils. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. A mudrock that appears predominantly fissle (having a tendency to split along parallel planes into layers less than 5mm thick. Shale can be further subdivided into hard shale (moist hardness greater than 2.5) and normal shale (moist hardness less than 2.5). Shale differs from mudstone because of its fissile nature.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

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.

Slip hazard. The soil mass is 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.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that 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: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature 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 other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

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 that are separated from adjoining 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).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface soil. 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 or management.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by 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, silt loam, 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. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Very low base. Minesoils with a pH less than 4.0 at a depth of 10 to 40 inches or at a depth of 10 inches to bedrock if bedrock is at a depth of less than 40 inches.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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 a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

ILLUSTRATIONS

Figure 1.—A typical landscape in the Gilpin-Culleoka-Upshur association.

Figure 2.—A typical landscape in the Gilpin-Ernest-Lily association.

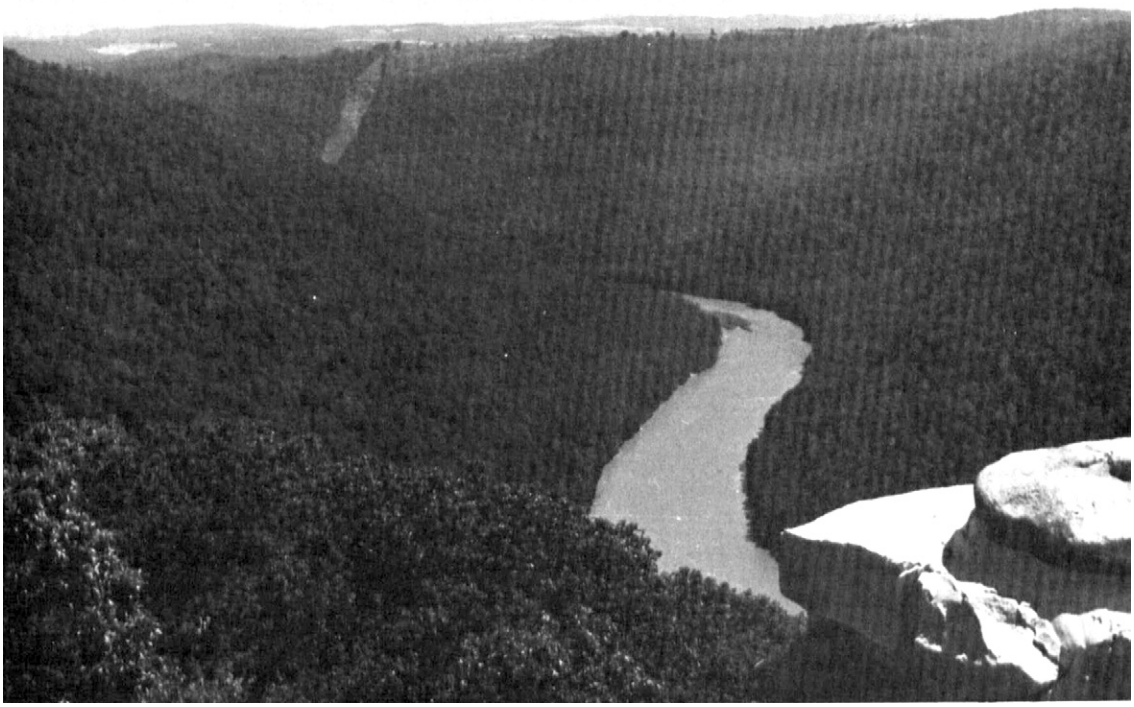


Figure 3.—A view of the landscape in the Dekalb Buchanan-Ernest assocation (Cheat Gorge).

Figure 4.—An area of Lobdell silt loam in the foreground is used for pasture.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	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[2]	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	38.7	21.6	30.2	68	-8	31	2.76	1.68	3.73	8	8.2
February	41.4	23.3	32.4	69	-5	44	2.68	1.59	3.66	7	7.9
March	50.4	30.7	40.6	81	8	153	3.61	2.13	4.93	9	6.2
April	63.5	41.2	52.4	87	21	379	3.55	2.40	4.60	9	.6
May	73.0	50.0	61.6	90	30	670	3.51	1.95	4.77	8	.0
June	81.1	58.5	69.9	95	40	897	3.74	1.95	5.21	7	.0
July	83.9	62.5	73.2	96	46	1,029	3.90	2.47	5.18	8	.0
August	82.5	60.9	71.7	95	43	983	4.11	2.58	5.49	8	.0
September	77.0	54.9	66.0	93	33	780	3.19	2.10	4.17	6	.0
October	65.9	43.9	54.9	89	23	462	2.29	1.10	3.25	5	.0
November	52.2	34.4	43.3	77	11	143	2.74	1.72	3.66	7	2.1
December	42.1	26.2	34.1	74	1	82	3.10	1.68	4.24	8	6.8
Year	62.6	42.3	52.5	98	-9	5,653	39.18	33.81	44.37	90	31.8

[1]Recorded in the period 1951-73 at Morgantown, W. Va.

[2]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

Probability	Temperature[1]		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 13	May 4	May 17
2 years in 10 later than--	April 9	April 28	May 11
5 years in 10 later than--	April 1	April 17	April 30
First freezing temperature in fall:			
1 year in 10 earlier than--	October 22	October 14	September 29
2 years in 10 earlier than--	October 27	October 19	October 4
5 years in 10 earlier than--	November 7	October 30	October 15

[1]Recorded in the period 1951-73 at Morgantown, W. Va.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24° F	Higher than 28° F	Higher than 32° f
	Days	Days	Days
9 years in 10	197	176	144
8 years in 10	205	182	152
5 years in 10	220	195	167
2 years in 10	235	207	182
1 year in 10	243	213	190

[1]Recorded in the period 1951-73 at Morgantown, W. Va.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Marion County	Monongalia County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
AgB	Allegheny silt loam, 3 to 8 percent slopes	340	400	740	0.2
AgC	Allegheny silt loam, 8 to 15 percent slopes	730	770	1,500	0.3
BeC	Buchanan and Ernest very stony soils, 8 to 15 percent slopes	460	3,640	4,100	0.9
BeD	Buchanan and Ernest very stony soils, 15 to 25 percent slopes	1,790	3,210	5,000	1.2
Cg	Chagrin silt loam	390	300	690	0.2
CkB	Clarksburg silt loam, 3 to 8 percent slopes	500	480	980	0.2
CkC	Clarksburg silt loam, 8 to 15 percent slopes	6,090	7,880	13,970	3.2
CkD	Clarksburg silt loam, 15 to 25 percent slopes	9,960	10,670	20,630	4.7
CwB	Culleoka-Westmoreland silt loams, 3 to 8 percent slopes	440	770	1,210	0.3
CwC	Culleoka-Westmoreland silt loams, 8 to 15 percent slopes	2,140	4,800	6,940	1.6
CwD	Culleoka-Westmoreland silt loams, 15 to 25 percent slopes	8,740	9,310	18,050	4.2
CwE	Culleoka-Westmoreland silt loams, 25 to 35 percent slopes	20,300	15,560	35,860	8.3
CwF	Culleoka-Westmoreland silt loams, 35 to 65 percent slopes	10,630	13,930	24,560	5.7
DaB	Dekalb channery loam, 3 to 8 percent slopes	40	530	570	0.1
DaC	Dekalb channery loam, 8 to 15 percent slopes	50	3,420	3,470	0.8
DaD	Dekalb channery loam, 15 to 25 percent slopes	30	630	660	0.2
DaE	Dekalb channery loam, 25 to 35 percent slopes	720	870	1,590	0.4
DdC	Dekalb very stony loam, 3 to 15 percent slopes	30	3,090	3,120	0.7
DdE	Dekalb very stony loam, 15 to 35 percent slopes	1,530	7,310	8,840	2.0
DdF	Dekalb very stony loam, 35 to 65 percent slopes	3,140	8,730	11,870	2.7
DgB	Dormont and Guernsey silt loams, 3 to 8 percent slopes	260	820	1,080	0.2
DgC	Dormont and Guernsey silt loams, 8 to 15 percent slopes	3,630	5,030	8,660	2.0
DgD	Dormont and Guernsey silt loams, 15 to 25 percent slopes	5,760	6,420	12,180	2.8
ErB	Ernest silt loam, 3 to 8 percent slopes	80	250	330	0.1
ErC	Ernest silt loam, 8 to 15 percent slopes	860	2,300	3,160	0.7
ErD	Ernest silt loam, 15 to 25 percent slopes	960	910	1,870	0.4
GaB	Gilpin silt loam, 3 to 8 percent slopes	290	2,000	2,290	0.5
GaC	Gilpin silt loam, 8 to 15 percent slopes	1,090	5,130	6,220	1.4
GaD	Gilpin silt loam, 15 to 25 percent slopes	3,540	3,050	6,590	1.5
GaE	Gilpin silt loam, 25 to 35 percent slopes	4,330	3,580	7,910	1.8
GaF	Gilpin silt loam, 35 to 65 percent slopes	1,620	2,200	3,820	0.9
GcC	Gilpin-Culleoka silt loams, 8 to 15 percent slopes	310	240	550	0.1
GcD	Gilpin-Culleoka silt loams, 15 to 25 percent slopes	840	640	1,480	0.3
GcE	Gilpin-Culleoka silt loams, 25 to 35 percent slopes	740	2,450	3,190	0.7
GcF	Gilpin-Culleoka silt loams, 35 to 65 percent slopes	1,370	1,900	3,270	0.8
GuC	Gilpin-Culleoka-Upshur silt loams, 8 to 15 percent slopes	2,910	550	3,460	0.8
GuD	Gilpin-Culleoka-Upshur silt loams, 15 to 25 percent slopes	11,290	4,870	16,160	3.7
GuE	Gilpin-Culleoka-Upshur silt loams, 25 to 35 percent slopes	15,455	12,245	27,700	6.3
GuF	Gilpin-Culleoka-Upshur silt loams, 35 to 65 percent slopes	41,875	34,155	76,030	17.5
GwD3	Gilpin-Culleoka-Upshur complex, 15 to 25 percent slopes, severely eroded	430	60	490	0.1
GwE3	Gilpin-Culleoka-Upshur complex, 25 to 35 percent slopes, severely eroded	360	820	1,180	0.3
Ho	Holly silt loam	360	240	600	0.1
Ka	Kanawha loam	760	620	1,380	0.3
LaB	Lily loam, 3 to 8 percent slopes	590	1,840	2,430	0.6
LaC	Lily loam, 8 to 15 percent slopes	510	2,640	3,150	0.7
LaD	Lily loam, 15 to 25 percent slopes	280	1,050	1,330	0.3
Lb	Lobdell silt loam	1,860	2,380	4,240	1.0
Lh	Lobdell-Holly silt loams	3,870	2,930	6,800	1.6
MgB	Monongahela silt loam, 3 to 8 percent slopes	990	1,000	1,990	0.5
MgC	Monongahela silt loam, 8 to 15 percent slopes	1,680	1,320	3,000	0.7
Pv	Pope Variant sandy loam	190	510	700	0.2
Qu	Quarries	40	300	340	0.1
TlB	Tilsit silt loam, 3 to 8 percent slopes	440	330	770	0.2
TlC	Tilsit silt loam, 8 to 15 percent slopes	70	470	540	0.1
U1	Udorthents, cut and fill	2,110	3,910	6,020	1.4
U2	Udorthents, dumps, low base	140	610	750	0.2
U3	Udorthents, dumps, very low base	740	640	1,380	0.3
U4	Udorthents, mudstone and sandstone, high base	750	2,320	3,070	0.7
U5	Udorthents, mudstone and sandstone, low base	360	2,240	2,600	0.6
U6	Udorthents, sandstone, low base	80	580	660	0.2
U7	Udorthents, sandstone, very low base	60	110	170	*
U8	Udorthents, sandstone and shale, very low base	10	310	320	0.1
UbF	Upshur-Belmont deep, very stony silt loams, 35 to 65 percent slopes	0	1,670	1,670	0.4
Uc	Urban land	770	600	1,370	0.3

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Marion County	Monongalia County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
UdC	Urban land-Allegheny complex, 3 to 15 percent slopes	530	300	830	0.2
UeD	Urban land-Culleoka complex, 15 to 25 percent slopes	710	890	1,600	0.4
UmC	Urban land-Monongahela complex, 3 to 15 percent slopes	220	1,010	1,230	0.3
UzC	Urban land-Zoar complex, 3 to 15 percent slopes	680	180	860	0.2
WeB	Westmoreland silt loam, 3 to 8 percent slopes	10	500	510	0.1
WeC	Westmoreland silt loam, 8 to 15 percent slopes	360	2,460	2,820	0.6
WeD	Westmoreland silt loam, 15 to 25 percent slopes	3,490	4,690	8,180	1.9
WeD3	Westmoreland silt loam, 15 to 25 percent slopes, severely eroded	120	440	560	0.1
WeE	Westmoreland silt loam, 25 to 35 percent slopes	4,880	4,540	9,420	2.2
WeF	Westmoreland silt loam, 35 to 65 percent slopes	1,340	1,140	2,480	0.6
WhB	Wharton silt loam, 3 to 8 percent slopes	240	300	540	0.1
WhC	Wharton silt loam, 8 to 15 percent slopes	810	610	1,420	0.3
WhD	Wharton silt loam, 15 to 25 percent slopes	330	170	500	0.1
ZoB	Zoar silt loam, 3 to 8 percent slopes	400	370	770	0.2
ZoC	Zoar silt loam, 8 to 15 percent slopes	820	380	1,200	0.3
	Water	1,390	3,000	4,390	1.0
	Total	199,040	235,520	434,560	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. The estimates were made in 1977. 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	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass
	Bu	Bu	Bu	Ton	Ton	AUM*
AgB---- Allegheny	115	70	45	3.5	4.5	5.5
AgC---- Allegheny	105	70	40	3.5	4.5	5.5
BeC---- Buchanan	---	---	---	---	---	3.5
BeD---- Buchanan	---	---	---	---	---	3.0
Cg---- Chagrin	125	75	45	4.5	5.0	5.5
CkB---- Clarksburg	100	70	40	3.0	3.5	4.5
CkC---- Clarksburg	90	65	40	3.0	3.5	4.5
CkD---- Clarksburg	80	60	35	3.0	3.0	4.5
CwB---- Culleoka	110	70	45	3.5	4.0	4.5
CwC---- Culleoka	100	65	40	3.5	4.0	4.5
CwD---- Culleoka	80	60	35	3.0	3.5	4.0
CwE---- Culleoka	---	---	---	---	---	3.5
CwF---- Culleoka	---	---	---	---	---	---
DaB---- Dekalb	80	60	35	3.0	3.5	4.0
DaC---- Dekalb	75	55	35	2.5	3.0	4.0
DaD---- Dekalb	70	---	30	2.0	3.0	3.0
DaE, DdC---- Dekalb	---	---	---	---	---	2.5
DdE, DdF---- Dekalb	---	---	---	---	---	---
DgB---- Dormont	100	65	40	3.0	3.5	4.5
DgC---- Dormont	90	60	35	3.0	3.5	4.5
DgD---- Dormont	80	55	35	2.5	3.0	4.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass
	Bu	Bu	Bu	Ton	Ton	AUM*
ErB---------- Ernest	100	65	40	3.0	3.5	4.5
ErC---------- Ernest	95	60	35	3.0	3.5	4.0
ErD---------- Ernest	90	55	35	2.5	3.0	3.5
GaB---------- Gilpin	90	65	40	3.0	3.5	4.5
GaC---------- Gilpin	85	60	35	3.0	3.5	4.5
GaD---------- Gilpin	80	55	30	2.5	3.0	4.0
GaE---------- Gilpin	---	---	---	---	---	3.0
GaF---------- Gilpin	---	---	---	---	---	---
GcC---------- Gilpin	90	60	35	3.0	3.5	4.5
GcD---------- Gilpin	85	55	30	2.5	3.0	4.0
GcE---------- Gilpin	---	---	---	---	---	3.0
GcF---------- Gilpin	---	---	---	---	---	---
GuC---------- Gilpin	90	60	35	3.0	3.5	4.5
GuD---------- Gilpin	85	55	30	2.5	3.0	4.0
GuE---------- Gilpin	---	---	---	---	---	3.0
GuF---------- Gilpin	---	---	---	---	---	---
GwD3---------- Gilpin	---	---	---	---	---	---
GwE3---------- Gilpin	---	---	---	---	---	---
Ho---------- Holly	100	70	---	3.5	---	4.5
Ka---------- Kanawha	135	80	50	3.5	5.0	5.5
LaB---------- Lily	95	65	40	3.5	4.0	4.5
LaC---------- Lily	85	60	35	3.0	3.5	4.5
LaD---------- Lily	70	55	30	2.5	3.0	4.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass
	Bu	Bu	Bu	Ton	Ton	AUM*
Lb---------- Lobdell	120	80	45	4.0	4.5	5.0
Lh---------- Lobdell	115	75	40	3.5	4.0	5.0
MgB---------- Monongahela	110	65	40	3.0	3.5	4.5
MgC---------- Monongahela	90	60	35	3.0	3.0	4.5
Pv---------- Pope Variant	85	60	35	3.0	3.5	4.0
Qu**. Quarries						
TlB---------- Tilsit	100	65	40	3.0	3.5	4.5
TlC---------- Tilsit	90	60	35	3.0	3.0	4.5
U1**, U2**, U3**, U4**, U5**, U6**, U7**, U8**. Udorthents						
UbF---------- Upshur	---	---	---	---	---	---
Uc** Urban land						
UdC---------- Urban land	---	---	---	---	---	---
UeD---------- Urban land	---	---	---	---	---	---
UmC---------- Urban land	---	---	---	---	---	---
UzC---------- Urban land	---	---	---	---	---	---
WeB---------- Westmoreland	110	75	45	3.5	4.5	4.5
WeC---------- Westmoreland	100	70	40	3.0	4.0	4.5
WeD---------- Westmoreland	85	65	35	3.0	4.0	4.0
WeD3---------- Westmoreland	---	---	---	---	---	3.5
WeE---------- Westmoreland	---	---	---	---	---	3.5
WeF---------- Westmoreland	---	---	---	---	---	---
WhB---------- Wharton	90	65	40	3.0	3.5	4.5

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass
	Bu	Bu	Bu	Ton	Ton	AUM*
WhC---------- Wharton	80	60	35	3.0	3.5	4.5
WhD---------- Wharton	70	55	30	2.5	3.0	4.0
ZoB---------- Zoar	90	65	40	3.0	3.5	4.5
ZoC---------- Zoar	80	60	35	3.0	3.5	4.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I:				
Marion County	760	---	---	---
Monongalia County	620	---	---	---
II:				
Marion County	10,930	4,620	6,120	190
Monongalia County	15,710	9,590	5,610	510
III:				
Marion County	22,420	22,060	360	---
Monongalia County	38,240	38,000	240	---
IV:				
Marion County	35,260	35,260	---	---
Monongalia County	42,410	42,410	---	---
V:				
Marion County	---	---	---	---
Monongalia County	---	---	---	---
VI:				
Marion County	48,825	46,975	---	1,850
Monongalia County	46,605	39,755	---	6,850
VII:				
Marion County	61,895	57,195	---	4,700
Monongalia County	74,945	55,815	---	19,130
VIII:				
Marion County	---	---	---	---
Monongalia County	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available. Ratings for "Plant competition" are for conifers]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
AgB, AgC---------- Allegheny	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Eastern white pine, yellow-poplar, black walnut, Japanese larch, Norway spruce.
						Yellow-poplar-------	90	
						Virginia pine-------	75	
						Eastern white pine--	90	
BeC*:								
Buchanan----------	3o	Slight	Slight	Slight	Severe	Northern red oak----	70	Eastern white pine, Japanese larch, Norway spruce.
						Yellow-poplar-------	90	
Ernest----------	2w	Moderate	Moderate	Slight	Severe	Northern red oak----	80	Eastern white pine, Norway spruce.
						Yellow-poplar-------	90	
						White ash----------	---	
						Black walnut--------	---	
BeD*:								
Buchanan----------	3r	Moderate	Moderate	Slight	Severe	Northern red oak----	70	Eastern white pine, Japanese larch, Norway spruce.
						Yellow-poplar-------	90	
Ernest----------	2w	Severe	Moderate	Slight	Severe	Northern red oak----	80	Eastern white pine, Norway spruce.
						Yellow-poplar-------	90	
						White ash----------	---	
						Black walnut--------	---	
Cg---------- Chagrin	1o	Slight	Slight	Slight	Severe	Northern red oak----	85	Eastern white pine, black walnut, Norway spruce.
						Yellow-poplar-------	95	
						Sugar maple---------	85	
CkB---------- Clarksburg	3w	Slight	Moderate	Moderate	Severe	Northern red oak----	75	Eastern white pine, Japanese larch, Norway spruce.
						Yellow poplar-------	85	
CkC---------- Clarksburg	3w	Moderate	Moderate	Moderate	Severe	Northern red oak----	75	Eastern white pine, Japanese larch, Norway spruce.
						Yellow-poplar-------	85	
CkD---------- Clarksburg	3r	Severe	Moderate	Moderate	Severe	Northern red oak----	75	Eastern white pine, Japanese larch, Norway spruce.
						Yellow-poplar-------	85	
CwB*, CwC*:								
Culleoka----------	2o	Slight	Slight	Slight	Severe	Yellow-poplar-------	75	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
						Northern red oak----	95	
Westmoreland------	3o	Slight	Slight	Slight	Severe	Northern red oak----	75	Eastern white pine, yellow-poplar, Virginia pine.
						Yellow-poplar-------	85	
						Eastern white pine--	70	
CwD*:								
Culleoka---------- (North aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar-------	75	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
						Northern red oak----	95	
Westmoreland------ (North aspect)	2r	Moderate	Moderate	Slight	Severe	Northern red oak----	80	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar-------	90	
						Eastern white pine--	75	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
CwD*:								
Culleoka (South aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Westmoreland (South aspect)	3r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	70 80 65	Eastern white pine, Virginia pine, Japanese larch.
CwE*:								
Culleoka (North aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Westmoreland (North aspect)	2r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	80 90 75	Black walnut, yellow-poplar, eastern white pine.
CwE*:								
Culleoka (South aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Westmoreland (South aspect)	3r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine-	70 80 45	Eastern white pine, Virginia pine, Japanese larch.
CwF*:								
Culleoka (North aspect)	2r	Severe	Severe	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Westmoreland (North aspect)	2r	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	80 90 75	Black walnut, yellow-poplar, eastern white pine.
CwF*:								
Culleoka (South aspect)	2r	Severe	Severe	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Westmoreland (South aspect)	3r	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	70 80 65	Eastern white pine, Virginia pine, Japanese larch.
DaB, DaC Dekalb	3f	Slight	Slight	Slight	Moderate	Northern red oak Black cherry White ash	70 90 80	Norway spruce, yellow-poplar, black cherry.
DaD Dekalb (North aspect)	2f	Slight	Moderate	Slight	Severe	Northern red oak Black cherry Yellow-poplar	75 95 95	Norway spruce, yellow-poplar, black cherry.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
DaD---- Dekalb (South aspect)	3f	Slight	Moderate	Moderate	Moderate	Northern red oak----	65	Eastern white pine,
						Black cherry----	80	red pine,
						Yellow-poplar----	75	Virginia pine.
DaE---- Dekalb (North aspect)	2f	Slight	Moderate	Slight	Severe	Northern red oak----	75	Norway spruce,
						Black cherry----	95	yellow-poplar,
						Yellow-poplar----	95	black cherry.
DaE---- Dekalb (South aspect)	3f	Slight	Moderate	Moderate	Moderate	Northern red oak----	65	Eastern white pine,
						Black cherry----	80	red pine,
						Yellow-poplar----	75	Virginia pine.
DdC---- Dekalb	3f	Slight	Slight	Slight	Moderate	Northern red oak----	70	Norway spruce,
						Black cherry----	90	yellow-poplar,
						White ash----	80	black cherry.
DdE---- Dekalb (North asepct)	2f	Slight	Moderate	Slight	Severe	Northern red oak----	75	Norway spruce,
						Black cherry----	95	yellow-poplar,
						Yellow-poplar----	95	black cherry.
DdE---- Dekalb (South aspect)	3f	Slight	Moderate	Moderate	Moderate	Northern red oak----	65	Eastern white pine,
						Black cherry----	80	red pine,
						Yellow-poplar----	75	Virginia pine
DdF---- Dekalb (North aspect)	2f	Moderate	Severe	Slight	Severe	Northern red oak----	75	Norway spruce,
						Black cherry----	95	yellow-poplar,
						Yellow-poplar----	95	black cherry.
DdF---- Dekalb (South aspect)	3f	Moderate	Severe	Moderate	Moderate	Northern red oak----	65	Eastern white pine,
						Black cherry----	80	red pine,
						Yellow-poplar----	75	Virginia pine.
DgB*, DgC*: Dormont----	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Eastern white pine,
						Yellow-poplar----	80	Norway spruce,
						White ash----	80	yellow-poplar,
						Sugar maple----	80	Japanese larch,
								white spruce.
Guernsey----	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Eastern white pine,
						Yellow-poplar----	80	yellow-poplar,
						Sugar maple----	80	black walnut.
						Black walnut----	80	
DgD*: Dormont----	2r	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	Eastern white pine,
						Yellow-poplar----	80	Norway spruce,
						White ash----	80	yellow-poplar,
						Sugar maple----	80	Japanese larch,
								white spruce.
Guernsey----	2r	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	Eastern white pine,
						Yellow-poplar----	80	yellow-poplar,
						Sugar maple----	80	black walnut.
						Black walnut----	80	
ErB---- Ernest	2w	Slight	Moderate	Slight	Severe	Northern red oak----	80	Eastern white pine,
						Yellow-poplar----	90	Norway spruce,
						Black walnut----	---	Japanese larch,
						White ash----	---	
ErC---- Ernest	2w	Moderate	Moderate	Slight	Severe	Northern red oak----	80	Eastern white pine,
						Yellow-poplar----	90	Norway spruce,
						Black walnut----	---	Japanese larch.
						White ash----	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
ErD---------- Ernest	2w	Severe	Moderate	Slight	Severe	Northern red oak---- Yellow poplar------- Black walnut-------- White ash-----------	80 90 --- ---	Eastern white pine, Norway spruce, Japanese larch.
GaB, GaC---------- Gilpin	3o	Slight	Slight	Moderate	Severe	Northern red oak---- Yellow-poplar-------	75 95	Japanese larch, Virginina pine, eastern white pine, black cherry, yellow-poplar.
GaD---------- Gilpin (North aspect)	2r	Moderate	Moderate	Moderate	Severe	Northern red oak---- Yellow-poplar-------	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
GaD---------- Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Yellow-poplar-------	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
GaE---------- Gilpin (North aspect)	2r	Moderate	Moderate	Moderate	Severe	Northern red oak---- Yellow-poplar-------	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
GaE---------- Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Yellow-poplar-------	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
GaF---------- Gilpin (North aspect)	2r	Severe	Severe	Moderate	Severe	Northern red oak---- Yellow-poplar-------	80 95	Japanese larch, Virginia pine, eastern white pine. black cherry, yellow-poplar.
GaF---------- Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak---- Yellow-poplar-------	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
GcC*: Gilpin----------	3o	Slight	Slight	Moderate	Severe	Northern red oak---- Yellow-poplar-------	75 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka----------	2o	Slight	Slight	Slight	Severe	Yellow-poplar------- Northern red oak----	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
GcD*: Gilpin---------- (North aspect)	2r	Moderate	Moderate	Moderate	Severe	Northern red oak---- Yellow-poplar-------	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
GcD*:								
Culleoka (North aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
GcD*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (South aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
GcE*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Moderate	Severe	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (North aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
GcE*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (South aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
GcF*:								
Gilpin (North aspect)	2r	Severe	Severe	Moderate	Severe	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (North aspect)	2r	Severe	Severe	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
GcF*:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (South aspect)	2r	Severe	Severe	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
GuC*:								
Gilpin	3o	Slight	Slight	Moderate	Severe	Northern red oak Yellow-poplar	75 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka	2o	Slight	Slight	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Upshur	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	65 80 80 65	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GuD*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Moderate	Severe	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (North aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GuD*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (South aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
GuD*:								
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GuE*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Moderate	Severe	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (North aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GuE*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (South aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GuF*:								
Gilpin (North aspect)	2r	Severe	Severe	Moderate	Severe	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (North aspect)	2r	Severe	Severe	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, shortleaf pine, Virginia pine, black locust.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
GuF*:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (South aspect)	2r	Severe	Severe	Slight	Severe	Yellow-poplar Northern red oak	75 94	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GwD3*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Moderate	Severe	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (North aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, Virginia pine, black locust.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GwD3*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (South aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GwE3*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Moderate	Severe	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
GwE3*:								
Culleoka (North aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GwE3*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Culleoka (South aspect)	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, Virginia pine, black locust.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
Ho Holly	2w	Slight	Severe	Severe	Severe	Pin oak Swamp white oak Red maple White ash	90 --- --- ---	Red maple, white ash, eastern cottonwood.
Ka Kanawha	2o	Slight	Slight	Slight	Severe	Northern red oak Black oak White oak Yellow-poplar White ash Black walnut Black locust	80 80 80 90 80 --- ---	Eastern white pine, yellow-poplar, black walnut, Norway spruce, black locust.
LaB, LaC Lily	2o	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar	80 90	Yellow-poplar, black walnut, black locust, eastern white pine, loblolly pine, shortleaf pine, Virginia pine.
LaD Lily	2r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar	80 90	Yellow-poplar, black walnut, black locust, eastern white pine, loblolly pine, shortleaf pine, Virginia pine.
Lb Lobdell	1o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Sugar maple Black walnut	85 95 --- ---	Eastern white pine, black walnut, yellow-poplar, white ash, Norway spruce.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
Lh*:								
Lobdell	1o	Slight	Slight	Slight	Moderate	Northern red oak	85	Eastern white pine, black walnut, yellow-poplar, white ash, Norway spruce.
						Yellow-poplar	95	
						Sugar maple	---	
						Black walnut	---	
Holly	2w	Slight	Severe	Severe	Severe	Pin oak	90	Red maple, eastern cottonwood.
						Red maple	---	
						White ash	---	
MgB	3w	Slight	Moderate	Slight	Moderate	Northern red oak	70	Eastern white pine, loblolly pine, Virginia pine, yellow-poplar, black cherry, Japanese larch.
Monongahela						Yellow-poplar	85	
						Eastern white pine	70	
						Virginia pine	75	
MgC	3w	Moderate	Moderate	Slight	Moderate	Northern red oak	70	Eastern white pine, loblolly pine, Virginia pine, yellow-poplar, black cherry, Japanese larch.
Monongahela						Yellow-poplar	85	
						Eastern white pine	70	
						Virginia pine	75	
Pv	3s	Slight	Slight	Moderate	Moderate	Northern red oak	70	Eastern white pine, Norway spruce.
Pope Variant						Yellow-poplar	80	
						White ash	---	
						American sycamore	---	
						Black walnut	---	
TlB, TlC	3o	Slight	Slight	Slight	Moderate	Northern red oak	70	Eastern white pine, Virginia pine, shortleaf pine.
Tilsit						Yellow-poplar	90	
						Eastern white pine	80	
						Virginia pine	70	
UbF*:								
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak	70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
						Yellow-poplar	90	
						Eastern white pine	90	
						Virginia pine	70	
Belmont (North aspect)	2r	Severe	Severe	Slight	Severe	Northern red oak	80	Eastern white pine, yellow-poplar, black walnut.
						White oak	80	
						White ash	80	
						Yellow-poplar	90	
						Sugar maple	80	
UbF*:								
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak	65	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
						Eastern white pine	75	
						Virginia pine	60	
Belmont (South aspect)	3r	Severe	Severe	Slight	Moderate	Northern red oak	70	Eastern white pine, yellow-poplar, black walnut.
						White oak	70	
						White ash	70	
						Yellow-poplar	80	
						Sugar maple	70	
UdC*:								
Urban land.								

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
UdC*:								
Allegheny	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Virginia pine Eastern white pine	80 90 75 90	Eastern white pine, Austrian pine, yellow-poplar, black walnut, Japanese larch, red pine, Norway spruce.
UeD*:								
Urban land.								
Culleoka	2r	Moderate	Moderate	Slight	Severe	Yellow-poplar Northern red oak	75 95	Eastern white pine, black walnut, yellow-poplar, shortleaf pine, Virginia pine, black locust.
UmC*:								
Urban land.								
Monongahela	3w	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 85 70 75	Eastern white pine, loblolly pine, Virginia pine, yellow-poplar, black cherry, Japanese larch.
UzC*:								
Urban land.								
Zoar	3w	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Virginia pine Eastern white pine Black oak White oak Red maple	70 80 70 80 70 70 ---	Eastern white pine, shortleaf pine, Virginia pine, yellow-poplar.
WeB, WeC	3o	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	75 85 70	Eastern white pine, yellow-poplar, Virginia pine.
WeD Westmoreland (North aspect)	2r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	80 90 75	Black walnut, yellow-poplar, eastern white pine.
WeD Westmoreland (South aspect)	3r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	70 80 65	Eastern white pine, Virginia pine, Japanese larch.
WeD3 Westmoreland (North aspect)	2r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	80 90 75	Black walnut, yellow-poplar, eastern white pine.
WeD3 Westmoreland (South aspect)	3r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	70 80 65	Eastern white pine, Virginia pine, Japanese larch.
WeE Westmoreland (North aspect)	2r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	80 90 75	Black walnut, yellow-poplar, eastern white pine.
WeE Westmoreland (South aspect)	3r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine	70 80 65	Eastern white pine, Virginia pine, Japanese larch.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
WeF---------- Westmoreland (North aspect)	2r	Severe	Severe	Slight	Severe	Northern red oak----	80	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar-------	90	
						Eastern white pine--	75	
WeF---------- Westmoreland (South aspect)	3r	Severe	Severe	Slight	Severe	Northern red oak----	70	Eastern white pine, Virginia pine, Japanese larch.
						Yellow-poplar-------	80	
						Eastern white pine--	65	
WhB---------- Wharton	2o	Slight	Slight	Slight	Severe	Northern red oak----	75	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	90	
WhC---------- Wharton	2r	Moderate	Slight	Slight	Severe	Northern red oak----	75	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	90	
WhD---------- Wharton	2r	Severe	Moderate	Slight	Severe	Northern red oak----	75	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	90	
ZoB---------- Zoar	3w	Slight	Moderate	Slight	Severe	Northern red oak----	70	Eastern white pine, shortleaf pine, Virginia pine, yellow-poplar.
						Yellow-poplar-------	80	
						Virginia pine-------	70	
						Eastern white pine--	80	
						Black oak-----------	70	
						White oak-----------	70	
						Red maple-----------	---	
ZoC---------- Zoar	3w	Moderate	Moderate	Slight	Severe	Northern red oak----	70	Eastern white pine, shortleaf pine, Virginia pine, yellow-poplar.
						Yellow-poplar-------	80	
						Virginia pine-------	70	
						Eastern white pine--	80	
						Black oak-----------	70	
						White oak-----------	70	
						Red maple-----------	---	

* See the description of the map unit for the composition and behavior characteristics of the map unit.

TABLE 8.--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
AgB Allegheny	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
AgC Allegheny	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
BeC*: Buchanan	Moderate: slope, wetness, large stones.	Moderate: slope, wetness, large stones.	Moderate: slope, wetness, large stones.	Severe: slope.	Moderate: slope, wetness, large stones.	Moderate: slope, large stones.
Ernest	Moderate: slope, wetness, large stones, slip hazard.	Moderate: slope, wetness, large stones, slip hazard.	Moderate: slope, wetness, large stones, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, wetness, large stones, slip hazard.	Severe: large stones.
BeD*: Buchanan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ernest	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, large stones.
Cg Chagrin	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	
CkB Clarksburg	Moderate: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: low strength, frost action.	Slight.
CkC Clarksburg	Moderate: slope, wetness, slip hazard.	Moderate: frost action, slip hazard.	Moderate: slope, wetness, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, frost action, low strength, slip hazard.	Moderate: slope.
CkD Clarksburg	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope.
CwB*: Culleoka	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength.	Moderate: depth to rock, small stones.
Westmoreland	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
CwC*: Culleoka	Moderate: slope, depth to rock, slip hazard.	Moderate: slope, slip hazard.	Moderate: slope, depth to rock, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, low strength, slip hazard.	Moderate: slope, depth to rock, small stones.
Westmoreland	Moderate: slope, slip hazard.	Moderate: slope, slip hazard.	Moderate: slope, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, low strength, slip hazard.	Moderate: slope.

See footnote at end of table.

TABLE 8.--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
CwD*, CwE*, CwF*: Culleoka	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope.
Westmoreland	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope.
DaB Dekalb	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Severe: small stones.
DaC Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.	Severe: small stones.
DaD, DaE Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
DdC Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock, large stones.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: large stones.
DdE, DdF Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock, large stones.	Severe: slope.	Severe: slope.	Severe: slope, large stones.
DgB*: Dormont	Moderate: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: low strength, frost action.	Slight.
Guernsey	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Moderate: wetness, small stones.
DgC*: Dormont	Moderate: slope, wetness, slip hazard.	Moderate: slope, frost action, slip hazard.	Moderate: slope, wetness, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, frost action, slip hazard.	Moderate: slope.
Guernsey	Severe: too clayey, slip hazard.	Severe: low strength, slip hazard.	Severe: low strength, slip hazard.	Severe: slope, low strength, slip hazard.	Severe: low strength, slip hazard.	Moderate: wetness, small stones, slope.
DgD*: Dormont	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope.
Guernsey	Severe: too clayey, slope, slip hazard.	Severe: slope, low strength, slip hazard.	Severe: slope, low strength, slip hazard.	Severe: slope, low strength, slip hazard.	Severe: low strength, slope, slip hazard.	Severe: slope, slip hazard.
ErB Ernest	Moderate: wetness.	Moderate: wetness, low strength, frost action.	Moderate: wetness, low strength.	Moderate: slope, wetness, frost action.	Moderate: wetness, low strength, frost action.	Slight.

See footnote at end of table.

TABLE 8.--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
ErC---------- Ernest	Moderate: slope, wetness, slip hazard.	Moderate: slope, wetness, frost action, slip hazard.	Moderate: slope, wetness, low strength, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, wetness, frost action, slip hazard.	Moderate: slope.
ErD---------- Ernest	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope.
GaB---------- Gilpin	Severe: depth to rock.	Moderate: depth to rock, frost action.	Severe: depth to rock.	Moderate: depth to rock, slope, frost action.	Moderate: depth to rock, frost action.	Moderate: depth to rock.
GaC---------- Gilpin	Severe: depth to rock.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: slope, depth to rock.
GaD, GaE, GaF----- Gilpin	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
GcC*:						
Gilpin----------	Severe: depth to rock.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: slope, depth to rock.
Culleoka---------	Moderate: slope, depth to rock, slip hazard.	Moderate: slope, slip hazard.	Moderate: slope, depth to rock, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, low strength, slip hazard.	Moderate: slope, depth to rock, small stones.
GcD*, GcE*, GcF*:						
Gilpin----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Culleoka---------	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope.
GuC*:						
Gilpin----------	Severe: depth to rock.	Moderate: depth to rock, slope, frost action.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: slope, depth to rock.
Culleoka---------	Moderate: slope, depth to rock, slip hazard.	Moderate: slope, slip hazard.	Moderate: slope, depth to rock, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, low strength, slip hazard.	Moderate: slope, depth to rock, small stones.
Upshur----------	Severe: too clayey, cutbanks cave, slip hazard.	Severe: shrink-swell, low strength, frost action, slip hazard.	Severe: shrink-swell, low strength, slip hazard.	Severe: shrink-swell, low strength, frost action, slip hazard.	Severe: shrink-swell, low strength, frost action, slip hazard.	Moderate: slope.
GuD*, GuE*, GuF*, GwD3*, GwE3*:						
Gilpin----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--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
GuD*, GuE*, GuF*, GwD3*, GwE3*: Culleoka	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope.
Upshur	Severe: slope, too clayey, slip hazard.	Severe: slope, shrink-swell, low strength, slip hazard.	Severe: slope, shrink-swell, low strength, slip hazard.	Severe: slope, shrink-swell, low strength, slip hazard.	Severe: slope, shrink-swell, low strength, slip hazard.	Severe: slope.
Ho Holly	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: wetness, floods.
Ka Kanawha	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength, floods, frost action.	Slight.
LaB Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
LaC Lily	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.	Moderate: slope, depth to rock.
LaD Lily	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Lb Lobdell	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods, frost action.	
Lh*: Lobdell	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods, frost action.	
Holly	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: wetness, floods.
MgB Monongahela	Moderate: wetness.	Severe: frost action.	Moderate: wetness.	Severe: frost action.	Severe: frost action.	Slight.
MgC Monongahela	Moderate: slope, wetness.	Severe: frost action.	Moderate: slope, wetness.	Severe: slope, frost action.	Severe: frost action.	Moderate: slope.
Pv Pope Variant	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, too sandy.
Qu*. Quarries						
TlB Tilsit	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: low strength.	Slight.
TlC Tilsit	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.

See footnote at end of table.

TABLE 8.--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
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*. Udorthents						
UbF*:						
Upshur	Severe: slope, too clayey, slip hazard.	Severe: slope, shrink-swell, low strength, slip hazard.	Severe: slope, shrink-swell, low strength, slip hazard.	Severe: slope, shrink-swell, low strength, slip hazard.	Severe: slope, shrink-swell, low strength, slip hazard.	Severe: slope.
Belmont	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Uc*. Urban land						
UdC*:						
Urban land.						
Allegheny	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
UeD*:						
Urban land.						
Culleoka	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.
UmC*:						
Urban land.						
Monongahela	Moderate: slope, wetness.	Severe: frost action.	Moderate: slope, wetness.	Severe: slope, frost action.	Severe: frost action.	Moderate: slope.
UzC*:						
Urban land.						
Zoar	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: slope, low strength.	Severe: low strength.	Moderate: slope.
WeB Westmoreland	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action, low strength.	Slight.
WeC Westmoreland	Moderate: slope, slip hazard.	Moderate: slope, slip hazard.	Moderate: slope, slip hazard.	Severe: slope, slip hazard.	Moderate: slope, frost action, low strength, slip hazard.	Moderate: slope.
WeD, WeD3, WeE, WeF Westmoreland	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.	Severe: slope, slip hazard.
WhB Wharton	Severe: too clayey.	Severe: frost action, low strength.	Severe: low strength.	Severe: frost action, low strength.	Severe: frost action, low strength.	Slight.

See footnote at end of table.

TABLE 8.--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
WhC---------- Wharton	Severe: too clayey, slip hazard.	Severe: frost action, low strength, slip hazard.	Severe: low strength, slip hazard.	Severe: slope, frost action, low strength, slip hazard.	Severe: frost action, low strength, slip hazard.	Moderate: slope.
WhD---------- Wharton	Severe: slope, too clayey, slip hazard.	Severe: slope, frost action, low strength, slip hazard.	Severe: slope, low strength, slip hazard.	Severe: slope, frost action, low strength, slip hazard.	Severe: slope, frost action, low strength, slip hazard.	Severe: slope.
ZoB---------- Zoar	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Slight.
ZoC---------- Zoar	Severe: too clayey, slip hazard.	Severe: low strength, slip hazard.	Severe: low strength, slip hazard.	Severe: slope, low strength, slip hazard.	Severe: low strength, slip hazard.	Moderate: slope.

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 9.--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
AgB Allegheny	Slight	Moderate: slope, seepage.	Slight	Slight	Good.
AgC Allegheny	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
BeC*: Buchanan	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, large stones.	Moderate: slope, wetness.	Fair: slope, large stones.
Ernest	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness, large stones.	Moderate: slope, wetness.	Fair: slope, thin layer, large stones.
BeD*: Buchanan	Severe: slope, wetness, percs slowly.	Severe: slope.	Moderate: slope, wetness, large stones.	Severe: slope.	Poor: slope.
Ernest	Severe: slope, percs slowly, wetness.	Severe: slope.	Moderate: slope, wetness, large stones.	Severe: slope.	Poor: slope.
Cg Chagrin	Severe: floods.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Good.
CkB Clarksburg	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Fair: thin layer.
CkC Clarksburg	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope, thin layer.
CkD Clarksburg	Severe: slope, percs slowly, wetness.	Severe: slope.	Moderate: slope, wetness.	Severe: slope.	Poor: slope.
CwB*: Culleoka	Severe: depth to rock.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Slight	Fair: thin layer.
Westmoreland	Moderate: depth to rock.	Moderate: slope, seepage.	Moderate: depth to rock.	Slight	Fair: thin layer.
CwC*: Culleoka	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
Westmoreland	Moderate: slope, depth to rock.	Severe: slope.	Moderate: depth to rock.	Moderate: slope.	Fair: slope, thin layer.

See footnote at end of table.

TABLE 9.--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
CwD*:					
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Westmoreland	Severe: slope.	Severe: slope.	Moderate: slope, depth to rock.	Severe: slope.	Poor: slope.
CwE*, CwF*:					
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
DaB Dekalb	Severe: depth to rock.	Severe: depth to rock, small stones, seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
DaC Dekalb	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
DaD Dekalb	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.
DaE Dekalb	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.
DdC Dekalb	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: small stones.
DdE, DdF Dekalb	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
DgB*:					
Dormont	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Fair: too clayey.
Guernsey	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
DgC*:					
Dormont	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope, too clayey.
Guernsey	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: slope, wetness.	Poor: too clayey.

See footnote at end of table.

TABLE 9.--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
DgD*:					
Dormont	Severe: slope, percs slowly, wetness.	Severe: slope.	Moderate: slope, wetness.	Severe: slope.	Poor: slope.
Guernsey	Severe: percs slowly, wetness, slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: too clayey, slope.
ErB	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: wetness.	Moderate: wetness.	Fair: thin layer.
ErC	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope, thin layer.
ErD	Severe: slope, percs slowly, wetness.	Severe: slope.	Moderate: slope, wetness.	Severe: slope.	Poor: slope.
GaB	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer.
GaC	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer.
GaD	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
GaE, GaF	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
GcC*:					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer.
Culleoka	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
GcD*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
GcE*, GcF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 9.--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
GuC*:					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer, slope.
Culleoka	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
Upshur	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
GuD*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Upshur	Severe: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
GuE*, GuF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Upshur	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.
GwD3*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Upshur	Severe: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
GwE3*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Upshur	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.

See footnote at end of table.

TABLE 9.--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
Ho Holly	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: wetness.
Ka Kanawha	Moderate: floods.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
LaB Lily	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: thin layer.
LaC Lily	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: slope, thin layer.
LaD Lily	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope.
Lb Lobdell	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Good:
Lh*: Lobdell	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Good:
Holly	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: wetness.
MgB Monongahela	Severe: percs slowly, wetness.	Moderate: slope, seepage.	Moderate: wetness.	Moderate: wetness.	Good.
MgC Monongahela	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope.
Pv Pope Variant	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Fair: too sandy.
Qu*. Quarries					
TlB Tilsit	Severe: percs slowly, wetness.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: wetness.	Fair: too clayey.
TlC Tilsit	Severe: percs slowly, wetness.	Severe: slope.	Severe: depth to rock.	Severe: wetness, slope.	Fair: too clayey.
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*. Udorthents					
UbF*: Upshur	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.

See footnote at end of table.

TABLE 9.--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
UbF*:					
Belmont	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Uc*.					
Urban land					
UdC*:					
Urban land.					
Allegheny	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
UeD*:					
Urban land.					
Culleoka	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
UmC*:					
Urban land.					
Monongahela	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness.	Fair: slope.
UzC*:					
Urban land.					
Zoar	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: slope, wetness.	Poor: too clayey.
WeB	Moderate: depth to rock.	Moderate: slope, seepage.	Moderate: depth to rock.	Slight	Fair: thin layer.
WeC	Moderate: slope, depth to rock.	Severe: slope.	Moderate: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
WeD, WeD3	Severe: slope.	Severe: slope.	Moderate: slope, depth to rock.	Severe: slope.	Poor: slope.
WeE, WeF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
WhB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
WhC	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: slope, wetness.	Poor: too clayey.
WhD	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.
ZoB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.

See footnote at end of table.

TABLE 9.--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
ZoC---------- Zoar	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: slope, wetness.	Poor: too clayey.

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AgB Allegheny	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
AgC Allegheny	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
BeC*: Buchanan	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Ernest	Fair: low strength, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
BeD*: Buchanan	Fair: slope, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Ernest	Fair: slope, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Cg Chagrin	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
CkB Clarksburg	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
CkC Clarksburg	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
CkD Clarksburg	Fair: slope, frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
CwB*: Culleoka	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Westmoreland	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
CwC*: Culleoka	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Westmoreland	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
CwD*: Culleoka	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Westmoreland	Fair: slope, frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CwE*, CwF*:				
Culleoka	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Westmoreland	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
DaB, DaC Dekalb	Poor: thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
DaD Dekalb	Poor: thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
DaE Dekalb	Poor: slope, thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
DdC Dekalb	Poor: thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: small stones, large stones, area reclaim.
DdE, DdF Dekalb	Poor: slope, thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones, area reclaim.
DgB*:				
Dormont	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Guernsey	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
DgC*:				
Dormont	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
Guernsey	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones, slope.
DgD*:				
Dormont	Fair: slope, low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Guernsey	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
ErB Ernest	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, small stones.
ErC Ernest	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, small stones.
ErD Ernest	Fair: slope, low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GaB---------- Gilpin	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, small stones.
GaC---------- Gilpin	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, small stones.
GaD---------- Gilpin	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
GaE, GaF---------- Gilpin	Poor: thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
GcC*: Gilpin----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, small stones.
Culleoka----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
GcD*: Gilpin----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Culleoka----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
GcE*, GcF*: Gilpin----------	Poor: thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Culleoka----------	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
GuC*: Gilpin----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, small stones.
Culleoka----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Upshur----------	Poor: shrink-swell, low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
GuD*: Gilpin----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Culleoka----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Upshur----------	Poor: shrink-swell, low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GuE*, GuF*:				
Gilpin	Poor: thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Culleoka	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Upshur	Poor: slope, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
GwD3*:				
Gilpin	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Culleoka	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Upshur	Poor: shrink-swell, low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
GwE3*:				
Gilpin	Poor: thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Culleoka	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Upshur	Poor: slope, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
Ho Holly	Poor: wetness.	Poor: excess fines.	Poor: excess fines.	Poor: wetness.
Ka Kanawha	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
LaB Lily	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
LaC Lily	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
LaD Lily	Fair: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Lb Lobdell	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Lh*:				
Lobdell	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Lh*: Holly	Poor: wetness.	Poor: excess fines.	Poor: excess fines.	Poor: wetness.
MgB--- Monongahela	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
MgC--- Monongahela	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
Pv--- Pope Variant	Good---	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy.
Qu*. Quarries				
TlB, TlC--- Tilsit	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*. Udorthents				
UbF*: Upshur	Poor: slope, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
Belmont	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Uc*. Urban land				
UdC*: Urban land.				
Allegheny	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
UeD*: Urban land.				
Culleoka	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
UmC*: Urban land.				
Monongahela	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
UzC*: Urban land.				
Zoar	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
WeB--- Westmoreland	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WeC---------- Westmoreland	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
WeD, WeD3---------- Westmoreland	Fair: slope, frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
WeE, WeF---------- Westmoreland	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
WhB---------- Wharton	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
WhC---------- Wharton	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
WhD---------- Wharton	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
ZoB---------- Zoar	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
ZoC---------- Zoar	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 11.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
AgB, AgC---------- Allegheny	Slope, seepage.	Piping, low strength.	Not needed--------	Slope, piping.	Slope.
BeC*, BeD*: Buchanan---------	Slope----------	Large stones, piping, low strength.	Slope, percs slowly.	Slope, large stones, percs slowly.	Slope, large stones, percs slowly.
Ernest----------	Slope----------	Large stones, low strength.	Slope, percs slowly.	Slope, large stones, percs slowly.	Slope, large stones, percs slowly.
Cg---------- Chagrin	Seepage----------	Piping, seepage.	Not needed--------	Not needed--------	Favorable.
CkB, CkC, CkD----- Clarksburg	Slope----------	Low strength-----	Slope, percs slowly.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
CwB*, CwC*, CwD*, CwE*, CwF*: Culleoka--------	Depth to rock, seepage.	Thin layer-------	Not needed--------	Large stones, small stones, slope.	Large stones, slope.
Westmoreland----	Slope, seepage.	Low strength-----	Not needed--------	Slope----------	Slope, erodes easily.
DaB, DaC, DaD, DaE---------- Dekalb	Depth to rock, seepage.	Piping, seepage.	Not needed--------	Slope, depth to rock.	Slope, droughty, rooting depth.
DdC, DdE, DdF----- Dekalb	Depth to rock, seepage.	Piping, seepage, large stones.	Not needed--------	Slope, depth to rock, large stones.	Slope, rooting depth, large stones.
DgB*: Dormont----------	Slope----------	Low strength, piping.	Slope, percs slowly.	Slope, percs slowly, erodes easily.	Slope, erodes easily, percs slowly.
Guernsey---------	Favorable--------	Hard to pack, wetness.	Percs slowly------	Erodes easily, wetness.	Erodes easily, percs slowly.
DgC*: Dormont----------	Slope----------	Low strength, piping.	Slope, percs slowly.	Slope, percs slowly, erodes easily.	Slope, erodes easily, percs slowly.
Guernsey---------	Slope----------	Hard to pack, wetness.	Slope, percs slowly.	Erodes easily, wetness.	Erodes easily, slope, percs slowly.
DgD*: Dormont----------	Slope----------	Low strength, piping.	Slope, percs slowly.	Slope, percs slowly, erodes easily.	Slope, erodes easily, percs slowly.
Guernsey---------	Slope----------	Hard to pack, wetness.	Slope, percs slowly.	Slope, erodes easily, wetness.	Erodes easily, slope, percs slowly.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
ErB, ErC, ErD---- Ernest	Slope----------	Low strength-----	Slope, percs slowly.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
GaB, GaC, GaD, GaE, GaF---------- Gilpin	Slope, depth to rock, seepage.	Thin layer--------	Not needed--------	Slope, depth to rock.	Slope, depth to rock.
GcC*, GcD*, GcE*, GcF*: Gilpin----------	Slope, depth to rock, seepage.	Thin layer--------	Not needed--------	Slope, depth to rock.	Slope, depth to rock.
Culleoka--------	Depth to rock, seepage.	Thin layer--------	Not needed--------	Large stones, small stones, slope.	Large stones, slope.
GuC*, GuD*, GuE*, GuF*, GwD3*, GwE3*: Gilpin----------	Slope, depth to rock, seepage.	Thin layer--------	Not needed--------	Slope, depth to rock.	Slope, depth to rock.
Culleoka--------	Depth to rock, seepage.	Thin layer--------	Not needed--------	Large stones, small stones, slope.	Large stones, slope.
Upshur----------	Slope----------	Low strength, compressible.	Not needed, cutbanks cave.	Erodes easily, slope.	Erodes easily, slope.
Ho---------- Holly	Seepage----------	Piping, wetness, seepage.	Floods, frost action.	Not needed--------	Wetness.
Ka---------- Kanawha	Slope, seepage.	Low strength, piping, hard to pack.	Not needed--------	Slope, piping.	Slope.
LaB, LaC, LaD----- Lily	Depth to rock, seepage, slope.	Thin layer, piping.	Not needed--------	Depth to rock, slope.	Rooting depth, slope.
Lb---------- Lobdell	Seepage----------	Piping, wetness, seepage.	Floods, frost action.	Not needed--------	Favorable.
Lh*: Lobdell----------	Seepage----------	Piping, wetness, seepage.	Floods, frost action.	Not needed--------	Favorable.
Holly----------	Seepage----------	Piping, wetness, seepage.	Floods, frost action.	Not needed--------	Wetness.
MgB, MgC---------- Monongahela	Slope, seepage.	Low strength, piping.	Slope, percs slowly.	Percs slowly, piping, rooting depth.	Slope, percs slowly, erodes easily.
Pv---------- Pope Variant	Seepage----------	Piping, seepage.	Not needed--------	Not needed--------	Not needed.
Qu*. Quarries					

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
TlB, TlC---------- Tilsit	Slope----------	Hard to pack, piping.	Percs slowly, slope.	Slope, percs slowly.	Slope, erodes easily, percs slowly.
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*. Udorthents					
UbF*: Upshur----------	Slope----------	Low strength, compressible.	Not needed, cutbanks cave.	Erodes easily, slope.	Erodes easily, slope.
Belmont----------	Slope, seepage, depth to rock.	Large stones, low strength, thin layer.	Not needed--------	Slope, large stones.	Slope, large stones, erodes easily.
Uc*. Urban land					
UdC*: Urban land.					
Allegheny--------	Slope, seepage.	Piping, low strength.	Not needed--------	Slope, piping.	Slope.
UeD*: Urban land.					
Culleoka---------	Depth to rock, seepage.	Thin layer-------	Not needed--------	Large stones, small stones, slope.	Large stones, slope.
UmC*: Urban land.					
Monongahela------	Slope, seepage.	Low strength, piping.	Slope, percs slowly.	Percs slowly, piping, rooting depth.	Slope, percs slowly, erodes easily.
UzC*: Urban land.					
Zoar----------	Slope----------	Low strength, hard to pack.	Percs slowly, slope.	Percs slowly, wetness, erodes easily.	Erodes easily, percs slowly, wetness.
WeB, WeC, WeD, WeD3, WeE, WeF--- Westmoreland	Slope, seepage.	Low strength-----	Not needed--------	Slope----------	Slope, erodes easily.
WhB, WhC, WhD----- Wharton	Slope----------	Low strength, hard to pack.	Slope, percs slowly.	Slope, percs slowly, erodes easily.	Slope, percs slowly, erodes easily.
ZoB, ZoC---------- Zoar	Slope----------	Low strength, hard to pack.	Percs slowly, slope.	Percs slowly, wetness, erodes easily.	Erodes easily, percs slowly, wetness.

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 12.--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
AgB Allegheny	Slight	Slight	Moderate: slope.	Slight	Slight.
AgC Allegheny	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
BeC*: Buchanan	Moderate: slope, wetness, large stones.	Moderate: slope.	Severe: slope.	Moderate: large stones.	Moderate: slope, large stones.
Ernest	Moderate: slope, wetness, large stones.	Moderate: slope.	Severe: slope.	Moderate: large stones.	Moderate: slope, large stones.
BeD*: Buchanan	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Severe: slope.
Ernest	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, large stones.	Severe: slope, large stones.
Cg Chagrin	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight	Moderate: floods.
CkB Clarksburg	Moderate: percs slowly, wetness.	Slight	Moderate: slope, percs slowly, wetness.	Slight	Slight.
CkC Clarksburg	Moderate: slope, wetness.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CkD Clarksburg	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CwB*: Culleoka	Slight	Slight	Moderate: small stones, slope.	Slight	Moderate: depth to rock, small stones.
Westmoreland	Slight	Slight	Moderate: slope.	Slight	Slight.
CwC*: Culleoka	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock, small stones.
Westmoreland	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CwD*: Culleoka	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CwE*, CwF*:					
Culleoka	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
DaB Dekalb	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.	Severe: small stones.
DaC Dekalb	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.	Severe: small stones.
DaD Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.
DaE Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
DdC Dekalb	Moderate: slope, large stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones, large stones.	Severe: large stones.
DdE, DdF Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, large stones.
DgB*:					
Dormont	Moderate: percs slowly, wetness.	Slight	Moderate: slope, percs slowly, wetness.	Slight	Slight.
Guernsey	Moderate: wetness, percs slowly.	Slight	Moderate: slope, percs slowly, wetness.	Slight	Slight.
DgC*:					
Dormont	Moderate: slope, percs slowly, wetness.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Guernsey	Moderate: slope, wetness, percs slowly.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
DgD*:					
Dormont	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Guernsey	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ErB Ernest	Moderate: percs slowly, wetness.	Slight	Moderate: slope, percs slowly, wetness.	Slight	Slight.
ErC Ernest	Moderate: slope, wetness, percs slowly.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ErD---------- Ernest	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GaB---------- Gilpin	Slight----------	Slight----------	Moderate: small stones, slope.	Slight----------	Moderate: depth to rock.
GaC---------- Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, depth to rock.
GaD---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GaE, GaF---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GcC*: Gilpin----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, depth to rock.
Culleoka----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, depth to rock, small stones.
GcD*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Culleoka----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GcE*, GcF*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Culleoka----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GuC*: Gilpin----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, depth to rock.
Culleoka----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, depth to rock, small stones.
Upshur----------	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
GuD*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Culleoka----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GuE*, GuF*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GuE*, GuF*:					
Culleoka	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GwD3*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Culleoka	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.
GwE3*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Culleoka	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ho Holly	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
Ka Kanawha	Moderate: floods.	Slight	Slight	Slight	Slight.
LaB Lily	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
LaC Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
LaD Lily	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Lb Lobdell	Severe: floods.	Moderate: floods.	Moderate: floods, wetness.	Slight	Moderate: floods.
Lh*:					
Lobdell	Severe: floods.	Moderate: floods.	Moderate: floods, wetness.	Slight	Moderate: floods.
Holly	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
MgB Monongahela	Moderate: wetness, percs slowly.	Slight	Moderate: slope, wetness, percs slowly.	Slight	Slight.
MgC Monongahela	Moderate: wetness, slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pv---------- Pope Variant	Severe: floods.	Moderate: floods, too sandy.	Moderate: floods, too sandy.	Moderate: too sandy.	Moderate: floods, too sandy.
Qu*. Quarries					
TlB---------- Tilsit	Moderate: percs slowly, wetness.	Slight----------	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
TlC---------- Tilsit	Moderate: slope, percs slowly, wetness.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*. Udorthents					
UbF*:					
Upshur----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Belmont----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Uc*. Urban land					
UdC*: Urban land.					
Allegheny----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
UeD*: Urban land.					
Culleoka----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
UmC*: Urban land.					
Monongahela----------	Moderate: wetness, slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
UzC*: Urban land.					
Zoar----------	Moderate: slope, percs slowly, wetness.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
WeB---------- Westmoreland	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
WeC---------- Westmoreland	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
WeD, WeD3---------- Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WeE, WeF---------- Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WhB---------- Wharton	Moderate: percs slowly, wetness.	Slight----------	Moderate: slope, percs slowly, wetness.	Slight----------	Slight.
WhC---------- Wharton	Moderate: slope, percs slowly, wetness.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
WhD---------- Wharton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ZoB---------- Zoar	Moderate: wetness, percs slowly.	Slight----------	Moderate: slope, percs slowly, wetness.	Slight----------	Slight.
ZoC---------- Zoar	Moderate: slope, percs slowly, wetness.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AgB---- Allegheny	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AgC---- Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BeC*, BeD*:										
Buchanan----	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Ernest----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Cg---- Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CkB---- Clarksburg	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CkC---- Clarksburg	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CkD---- Clarksburg	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CwB*:										
Culleoka----	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Westmoreland----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CwC*:										
Culleoka----	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Westmoreland----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CwD*:										
Culleoka----	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Westmoreland----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CwE*:										
Culleoka----	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Westmoreland----	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CwF*:										
Culleoka----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Westmoreland----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
DaB---- Dekalb	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
DaC---- Dekalb	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
DaD---- Dekalb	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
DaE---- Dekalb	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
DdC---- Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DdE, DdF---- Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DgB*:										
Dormont----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Guernsey----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DgC*:										
Dormont----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Guernsey----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DgD*:										
Dormont----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Guernsey----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ErB---- Ernest	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ErC---- Ernest	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ErD---- Ernest	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GaB---- Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
GaC---- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GaD---- Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GaE---- Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GaF---- Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GcC*:										
Gilpin----	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Culleoka----	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
GcD*:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Culleoka	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GcE*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Culleoka	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GcF*:										
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Culleoka	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GuC*:										
Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Culleoka	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Upshur	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuD*:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Culleoka	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuE*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Culleoka	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GuF*:										
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Culleoka	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Upshur	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
GwD3*:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
GwD3*:										
Culleoka	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GwE3*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Culleoka	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ho Holly	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ka Kanawha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LaB Lily	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LaC Lily	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LaD Lily	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lb Lobdell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Lh*:										
Lobdell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Holly	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
MgB Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MgC Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Pv Pope Variant	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Qu*. Quarries										
TlB Tilsit	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TlC Tilsit	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*. Udorthents										
UbF*:										
Upshur	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
UbF*:										
Belmont	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Uc*.										
Urban land										
UdC*:										
Urban land.										
Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
UeD*:										
Urban land.										
Culleoka	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UmC*:										
Urban land.										
Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
UzC*:										
Urban land.										
Zoar	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Westmoreland										
WeC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Westmoreland										
WeD, WeD3	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Westmoreland										
WeE	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Westmoreland										
WeF	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Westmoreland										
WhB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Wharton										
WhC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Wharton										
WhD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wharton										
ZoB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Zoar										
ZoC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Zoar										

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. NP means nonplastic]

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	
AgB, AgC---------- Allegheny	0-12	Silt loam-------	ML, CL, CL-ML	A-4	0	90-100	85-100	65-100	55-95	<35	NP-10
	12-40	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	85-100	65-95	35-80	<35	NP-15
	40-60	Clay loam, sandy loam, gravelly sandy loam.	SM, SC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
BeC*, BeD*: Buchanan----------	0-4	Very stony loam	GM, ML, CL	A-2, A-4	3-20	50-90	45-75	40-75	30-65	---	---
	4-21	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL	A-2, A-4, A-6	0-20	50-100	45-90	40-90	20-80	20-35	NP-11
	21-68	Gravelly loam, loam, channery clay loam.	GM, ML, CL	A-2, A-4, A-6	0-20	50-100	30-80	30-75	20-60	18-35	NP-12
Ernest----------	0-6	Very stony silt loam.	ML, CL	A-4, A-6	3-20	65-80	60-80	55-75	55-70	15-40	2-15
	6-22	Silty clay loam, silt loam, channery silt loam.	ML, CL	A-4, A-6, A-7	0-15	75-95	70-95	65-90	55-90	25-50	2-25
	22-55	Channery silt loam, channery loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	55-95	55-90	45-90	20-45	2-25
	55-64	Channery silt loam, silt loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	45-95	45-90	40-90	25-50	2-25
Cg---------- Chagrin	0-10	Silt loam-------	ML	A-4	0	95-100	90-100	80-100	70-90	20-35	2-10
	10-38	Silt loam, loam, sandy loam.	ML, SM, CL, SC	A-4	0	90-100	85-100	75-90	45-85	20-40	NP-10
	38-60	Stratified silt loam to fine sand.	ML, SM, SC, CL	A-4, A-2	0	85-100	80-100	55-85	30-80	20-40	NP-10
CkB, CkC, CkD------ Clarksburg	0-10	Silt loam-------	ML, CL	A-4	0-5	90-100	85-100	80-95	75-90	---	---
	10-34	Loam, channery silty clay loam, gravelly silt loam.	ML, CL	A-4, A-6, A-7	0-15	80-100	65-100	60-95	55-85	25-45	6-16
	34-61	Silty clay loam, channery loam, gravelly silt loam.	ML, CL, SM-SC, SC	A-4, A-6, A-7	0-15	75-100	55-100	50-95	45-90	20-50	4-20
	61-80	Clay, channery loam, silty clay loam.	CL, GM, CH, SM-SC	A-4, A-6, A-7, A-2	0-20	50-100	20-100	15-95	15-90	20-52	4-25

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
CwB*, CwC*, CwD*, CwE*, CwF*:											
Culleoka	0-6	Silt loam	ML, CL, CL-ML	A-4	0-10	90-100	85-100	70-100	55-95	<35	NP-10
	6-27	Channery silt loam, flaggy loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4	5-25	80-95	75-95	65-95	55-90	20-40	2-20
	27-34	Very flaggy silty clay loam, flaggy loam.	ML, CL, GC, SM	A-6, A-4, A-2	10-50	60-95	50-90	40-90	30-85	20-40	2-20
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Westmoreland	0-8	Silt loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	---	---
	8-40	Silty clay loam, channery loam, shaly silt loam.	CL, ML, GM, GC	A-4, A-6, A-7, A-2	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	40-66	Very channery loam, very channery silt loam, very shaly silty clay loam.	GM, GC, SM, SC, CL, ML	A-2, A-1, A-4, A-6	0-20	25-95	20-95	15-90	15-80	20-40	2-20
	66	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
DaB, DaC, DaD, DaE Dekalb	0-4	Channery loam	SM, GM, ML, CL-ML	A-2, A-4	0-30	50-90	45-80	40-75	20-55	15-32	NP-7
	4-16	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4	5-40	50-85	40-80	40-75	20-55	15-32	NP-7
	16-25	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4	10-50	45-85	35-75	25-65	15-40	15-32	NP-9
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
DdC, DdE, DdF Dekalb	0-4	Very stony loam	SM, GM, ML, CL-ML	A-2, A-4	10-30	50-90	45-80	40-75	20-55	15-32	NP-7
	4-16	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML	A-2, A-4	5-40	50-85	40-80	40-75	20-55	15-32	NP-7
	16-25	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4	10-50	45-85	35-75	25-65	15-40	15-32	NP-9
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
DgB*, DgC*, DgD*: Dormont	0-8	Silt loam	ML, CL	A-4, A-6	0	80-100	75-100	75-95	70-85	---	---
	8-33	Silt loam, silty clay loam, clay.	ML, CL	A-4, A-6	0	80-100	75-95	75-90	70-85	30-39	9-15
	33-50	Silt loam, shaly silty clay loam, clay.	ML, CL, MH, CH	A-6, A-7	0	70-100	60-90	55-85	55-80	35-55	12-25
	50-62	Silt loam, shaly silty clay loam, clay.	ML, CL, MH, GM	A-2, A-4, A-6, A-7	0-5	60-100	35-90	35-80	30-80	30-55	9-25
Guernsey	0-7	Silt loam	ML, CL-ML, CL	A-4, A-6	0-2	90-100	80-100	75-95	70-90	25-40	4-14
	7-20	Silt loam, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0-2	80-100	70-100	65-100	60-95	35-60	11-30
	20-42	Silty clay, clay, silty clay loam.	CH, CL, ML, MH	A-7	0-10	75-100	65-100	60-100	55-95	45-65	18-35
	42-53	Clay, silty clay, shaly clay.	CH, MH, ML, CL	A-7	2-20	70-100	60-90	55-85	55-80	40-70	15-35
	53	Weathered bedrock.	---	---	---	---	---	---	---	---	---
ErB, ErC, ErD--- Ernest	0-6	Silt loam	ML, CL	A-4, A-5	0-15	85-100	80-100	70-95	60-95	25-40	2-15
	6-22	Silty clay loam, silt loam, channery silt loam.	ML, CL	A-4, A-6, A-7	0-15	75-95	70-95	65-90	55-90	25-50	2-25
	22-55	Channery silt loam, channery loam, silty clay loam.	ML, CL, GM, SM	A-4, A-6, A-7	0-20	70-95	55-95	55-90	45-90	20-45	2-25
	55-64	Channery silt loam, silt loam, silty clay loam.	ML, CL, GM, SM	A-4, A-6, A-7	0-20	70-95	45-95	45-90	40-90	25-50	2-25
GaB, GaC, GaD, GaE, GaF--- Gilpin	0-6	Silt loam	ML, CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-24	Channery loam, shaly silt loam, silty clay loam.	GM, ML, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	24-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GM, GC, GM-GC	A-1, A-2, A-4	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
GcC*, GcD*, GcE*, GcF*:											
Gilpin	0-6	Silt loam	ML, CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-24	Channery loam, shaly silt loam, silty clay loam.	GM, ML, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	24-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GM, GC, GM-GC	A-1, A-2, A-4	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Culleoka	0-6	Silt loam	ML, CL, CL-ML	A-4	0-10	90-100	85-100	70-100	55-95	<35	NP-10
	6-27	Channery silt loam, flaggy loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4	5-25	80-95	75-95	65-95	55-90	20-40	2-20
	27-34	Very flaggy silty clay loam, flaggy loam.	ML, CL, GC, SM	A-6, A-4, A-2	10-50	60-95	50-90	40-90	30-85	20-40	2-20
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GuC*, GuD*, GuE*, GuF*:											
Gilpin	0-6	Silt loam	ML, CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-24	Channery loam, shaly silt loam, silty clay loam.	GM, ML, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	24-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GM, GC, GM-GC	A-1, A-2, A-4	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Culleoka	0-6	Silt loam	ML, CL, CL-ML	A-4	0-10	90-100	85-100	70-100	55-95	<35	NP-10
	6-27	Channery silt loam, flaggy loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4	5-25	80-95	75-95	65-95	55-90	20-40	2-20
	27-34	Very flaggy silty clay loam, flaggy loam.	ML, CL, GC, SM	A-6, A-4, A-2	10-50	60-95	50-90	40-90	30-85	20-40	2-20
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur	0-7	Silt loam	CL-ML, ML,	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	7-32	Silty clay, clay	MH, CH, CL, ML	A-7	0	95-100	95-100	95-100	95-100	45-70	18-40
	32-45	Silty clay loam, silty clay, clay.	MH-CH, CL-ML	A-6, A-7,	0	80-100	65-100	60-100	55-95	35-55	11-25
	45	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
GwD3*, GwE3*:											
Gilpin	0-6	Silt loam	ML, CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-24	Channery loam, shaly silt loam, silty clay loam.	GM, ML, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	24-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GM, GC, GM-GC	A-1, A-2, A-4	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Culleoka	0-6	Silt loam	ML, CL, CL-ML	A-4	0-10	90-100	85-100	70-100	55-95	<35	NP-10
	6-27	Channery silt loam, flaggy loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4	5-25	80-95	75-95	65-95	55-90	20-40	2-20
	27-34	Very flaggy silty clay loam, flaggy loam.	ML, CL, GC, SM	A-6, A-4, A-2	10-50	60-95	50-90	40-90	30-85	20-40	2-20
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-32	Silty clay, clay	MH, CH, CL, ML	A-7	0	95-100	95-100	95-100	95-100	45-70	18-40
	32-45	Silty clay loam, silty clay, clay.	MH-CH, CL-ML	A-6, A-7,	0	80-100	65-100	60-100	55-95	35-55	11-25
	45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Ho	0-7	Silt loam	ML	A-4	0	90-100	85-100	80-100	70-90	25-35	NP-10
Holly	7-52	Silt loam, loam, silty clay loam.	ML, SM	A-4, A-6	0	85-100	80-100	75-95	45-85	20-40	NP-14
	52-60	Stratified silt loam to gravelly sand.	ML, SM, GM	A-4	0-5	70-100	65-100	55-90	35-70	20-40	NP-10
Ka	0-13	Loam	ML, CL	A-4, A-6	0	80-100	75-100	65-100	50-90	25-40	2-15
Kanawha	13-63	Fine sandy loam, silt loam.	ML, CL, SM, SC	A-4, A-6, A-2	0	80-100	75-100	50-100	30-90	<40	NP-15
	63-74	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	25-40	2-15
LaB, LaC, LaD	0-5	Loam	ML, CL-ML	A-4	0-5	90-100	85-100	70-95	55-75	<35	NP-7
Lily	5-22	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	22-27	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	0-10	65-100	50-100	40-95	20-75	<35	3-15
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
Lb---------- Lobdell	0-7	Silt loam-------	ML, CL-ML, CL	A-4	0	95-100	95-100	80-100	65-90	20-30	NP-8
	7-34	Loam, silt loam	ML	A-4	0	90-100	90-100	80-95	60-85	20-35	NP-10
	34-60	Stratified sandy loam to silt loam.	ML, SM, CL-ML, CL	A-4	0	90-100	85-100	65-85	40-80	15-35	NP-10
Lh*: Lobdell----------	0-7	Silt loam-------	ML, CL-ML, CL	A-4	0	95-100	95-100	80-100	65-90	20-30	NP-8
	7-34	Loam, silt loam	ML	A-4	0	90-100	90-100	80-95	60-85	20-35	NP-10
	34-60	Stratified sandy loam to silt loam.	ML, SM, CL-ML, CL	A-4	0	90-100	85-100	65-85	40-80	15-35	NP-10
Holly----------	0-7	Silt loam-------	ML	A-4	0	90-100	85-100	80-100	70-90	25-35	NP-10
	7-52	Silt loam, loam, silty clay loam.	ML, SM	A-4, A-6	0	85-100	80-100	75-95	45-85	20-40	NP-14
	52-60	Stratified silt loam to gravelly sand.	ML, SM, GM	A-4	0-5	70-100	65-100	55-90	35-70	20-40	NP-10
MgB, MgC---------- Monongahela	0-10	Silt loam-------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	10-22	Loam, silt loam, clay loam.	ML, CL	A-4, A-6	0-10	90-100	90-100	80-100	70-90	20-40	5-15
	22-61	Loam, silt loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	75-100	70-95	45-95	20-40	1-15
	61-66	Stratified sandy loam to clay loam.	ML, CL, SM, SC	A-4, A-6	5-20	75-100	60-100	60-95	40-95	20-40	1-15
Pv---------- Pope Variant	0-7	Sandy loam------	SM, SM-SC	A-1, A-2, A-4	0-5	95-100	90-100	50-70	20-40	<20	NP-7
	7-28	Loamy sand, sandy loam.	SM, SM-SC	A-1, A-2	0-5	95-100	90-100	50-75	15-35	<20	NP-7
	28-60	Sandy loam, loamy sand.	SM, SM-SC	A-1, A-2	0-5	85-100	80-100	45-70	10-30	<20	NP-7
Qu*. Quarries											
TlB, TlC---------- Tilsit	0-7	Silt loam-------	ML, CL, CL-ML	A-4	0	90-100	85-100	75-100	60-100	20-35	NP-10
	7-21	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	65-100	25-40	5-20
	21-42	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	90-100	85-100	75-100	65-100	25-45	5-25
	42-56	Silt loam, silty clay loam, silty clay.	ML, CL, MH, CH	A-4, A-6, A-7	0-10	75-100	65-85	60-85	55-80	25-60	5-35
	56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*. Udorthents											

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
UbF*:											
Upshur	0-7	Silt loam	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	7-32	Silty clay, clay	MH, CH, CL,	A-7	0	95-100	95-100	95-100	95-100	45-70	18-40
	32-45	Silty clay loam, silty clay, clay.	MH-CH, CL-ML	A-6, A-7,	0	80-100	65-100	60-100	55-95	35-55	11-25
	45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Belmont	0-11	Very stony silt loam.	CL, ML, CL-ML	A-4, A-6, A-7	0-7	80-100	75-100	70-100	50-90	25-50	5-25
	11-44	Silty clay loam, silt loam, clay loam.	CL, ML, CL-ML	A-4, A-6, A-7	0-5	80-100	75-100	70-100	50-90	25-50	5-25
	44-80	Channery clay loam, channery silty clay loam, channery sandy clay loam.	CL, SC	A-2, A-6, A-7	0-20	40-75	35-70	25-70	15-65	25-50	11-25
	80	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Uc*. Urban land											
UdC*: Urban land.											
Allegheny	0-12	Silt loam	ML, CL, CL-ML	A-4	0	90-100	85-100	65-100	55-95	<35	NP-10
	12-40	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	85-100	65-95	35-80	<35	NP-15
	40-60	Clay loam, sandy loam, gravelly sandy loam.	SM, SC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
UeD*: Urban land.											
Culleoka	0-6	Silt loam	ML, CL, CL-ML	A-4	0-10	90-100	85-100	70-100	55-95	<35	NP-10
	6-27	Channery silt loam, flaggy loam, silty clay loam.	ML, CL, CL-ML	A-6, A-4	5-25	80-95	75-95	65-95	55-90	20-40	2-20
	27-34	Very flaggy silty clay loam, flaggy loam.	ML, CL, GC, SM	A-6, A-4, A-2	10-50	60-95	50-90	40-90	30-85	20-40	2-20
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UmC*: Urban land.											

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--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	
UmC*:											
Monongahela	0-10	Silt loam	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	10-22	Loam, silt loam, clay loam.	ML, CL	A-4, A-6	0-10	90-100	90-100	80-100	70-90	20-40	5-15
	22-61	Loam, silt loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	75-100	70-95	45-95	20-40	1-15
	61-66	Stratified sandy loam to clay loam.	ML, CL, SM, SC	A-4, A-6	5-20	75-100	60-100	60-95	40-95	20-40	1-15
UzC*:											
Urban land.											
Zoar	0-9	Silt loam	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	25-40	2-25
	9-38	Silty clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	85-100	35-60	11-32
	38-60	Clay loam, silty clay loam, clay.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	75-95	30-70	11-45
WeB, WeC, WeD, WeD3, WeE, WeF----											
Westmoreland	0-8	Silt loam	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	---	---
	8-40	Silty clay loam, channery loam, shaly silt loam.	CL, ML, GM, GC	A-4, A-6, A-7, A-2	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	40-66	Very channery loam, very channery silt loam, very shaly silty clay loam.	GM, GC, SM, SC, CL, ML	A-2, A-1, A-4, A-6	0-20	25-95	20-95	15-90	15-80	20-40	2-20
	66	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WhB, WhC, WhD------	0-6	Silt loam	ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	70-90	---	---
Wharton	6-31	Clay loam, shaly silty clay loam, shaly clay.	ML, CL, CH	A-7, A-6, A-4	0-10	75-100	70-100	65-95	60-90	35-55	10-30
	31-60	Silt loam, shaly clay, very shaly silt loam.	ML, GM, SM	A-4, A-6, A-7, A-2	0-50	45-100	30-100	25-95	25-90	30-45	5-15
ZoB, ZoC----------	0-9	Silt loam	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	25-40	2-25
Zoar	9-38	Silty clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	85-100	35-60	11-32
	38-60	Clay loam, silty clay loam, clay.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	75-95	30-70	11-45

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
AgB, AgC--------- Allegheny	0-12 12-40 40-60	0.6-2.0 0.6-2.0 0.6-2.0	0.12-0.22 0.13-0.18 0.08-0.17	4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low----------	0.32 0.28 0.28	4
BeC*, BeD*: Buchanan-------- Ernest---------- Cg---------- Chagrin CkB, CkC, CkD---- Clarksburg CwB*, CwC*, CwD*, CwE*, CwF*: Culleoka------- Westmoreland--- DaB, DaC, DaD, DaE, DdC, DdE, DdF---------- Dekalb DgB*, DgC*, DgD*: Dormont--------- Guernsey-------- ErB, ErC, ErD---- Ernest	0-4 4-21 21-68 0-6 6-22 22-55 55-64 0-10 10-38 38-60 0-10 10-34 34-61 61-80 0-6 6-27 27-34 34 0-8 8-40 40-66 66 0-4 4-16 16-25 25 0-8 8-33 33-50 50-62 0-7 7-20 20-42 42-53 53 0-6 6-22 22-55 55-64	0.6-2.0 0.6-2.0 0.06-0.2 0.6-2.0 0.6-2.0 0.06-0.6 0.06-0.6 0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0 0.06-0.6 0.06-0.6 0.6-2.0 0.6-2.0 0.6-2.0 --- 0.6-2.0 0.6-2.0 0.6-2.0 --- 2.0-20 2.0-20 2.0-20 --- 0.6-2.0 0.2-2.0 0.06-0.6 0.06-2.0 0.6-2.0 0.2-2.0 0.06-0.6 0.06-0.6 --- 0.6-2.0 0.6-2.0 0.06-0.6 0.06-0.6	0.12-0.18 0.10-0.16 0.06-0.10 0.12-0.18 0.12-0.16 0.08-0.12 0.08-0.12 0.20-0.24 0.14-0.20 0.08-0.20 0.14-0.20 0.12-0.18 0.06-0.12 0.06-0.16 0.14-0.20 0.12-0.20 0.05-0.14 --- 0.16-0.20 0.12-0.18 0.06-0.10 --- 0.08-0.12 0.06-0.12 0.05-0.10 --- 0.16-0.20 0.14-0.18 0.12-0.18 0.08-0.12 0.19-0.24 0.15-0.21 0.10-0.15 0.06-0.10 --- 0.14-0.20 0.12-0.16 0.08-0.12 0.08-0.12	3.6-5.5 3.6-5.5 3.6-5.5 4.5-5.5 4.5-5.5 4.5-5.5 4.5-5.5 5.1-7.3 5.1-7.3 5.1-7.3 5.1-6.5 5.1-6.5 5.1-6.5 5.1-6.5 5.1-6.0 5.1-6.0 5.1-6.0 --- 4.5-6.0 4.5-6.0 5.1-6.0 --- 3.6-5.5 3.6-5.5 3.6-5.5 --- 4.5-6.0 4.5-6.0 5.1-6.0 5.1-6.0 5.1-6.0 5.1-6.0 5.6-6.5 5.6-6.5 --- 4.5-5.5 4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low---------- Low---------- Moderate------- Low---------- Moderate------- Low---------- Low---------- Low---------- Low---------- Moderate------- Moderate------- Moderate------- Low---------- Low---------- Low---------- --- Low---------- Low---------- Low---------- --- Low---------- Low---------- Low---------- --- Low---------- Moderate------- Moderate------- Moderate------- Low---------- Low---------- Moderate------- Moderate------- --- Low---------- Moderate------- Low---------- Moderate-------	0.32 0.28 0.17 0.32 0.28 0.28 0.28 0.28 0.28 0.28 0.37 0.28 0.28 0.28 0.32 0.28 0.17 --- 0.37 0.28 0.17 --- 0.24 0.17 0.17 --- 0.43 0.43 0.32 0.17 0.43 0.43 0.32 0.32 --- 0.43 0.28 0.28 0.28	3 3 5 3 3 3 3 5 3

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/In	pH			
GaB, GaC, GaD, GaE, GaF--------- Gilpin	0-6 6-24 24-35 35	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.12-0.18 0.10-0.16 0.06-0.10 ---	4.5-5.5 4.5-5.5 4.5-5.5 ---	Low---------- Low---------- Low---------- ----------	0.32 0.28 0.28 ---	3
GcC*, GcD*, GcE*, GcF*: Gilpin--------- Culleoka--------	0-6 6-24 24-35 35 0-6 6-27 27-34 34	0.6-2.0 0.6-2.0 0.6-2.0 --- 0.6-2.0 0.6-2.0 0.6-2.0 ---	0.12-0.18 0.10-0.16 0.06-0.10 --- 0.14-0.20 0.12-0.20 0.05-0.14 ---	4.5-5.5 4.5-5.5 4.5-5.5 --- 5.1-6.0 5.1-6.0 5.1-6.0 ---	Low---------- Low---------- Low---------- ---------- Low---------- Low---------- Low---------- ----------	0.32 0.28 0.28 --- 0.32 0.28 0.17 ---	3 3
GuC*, GuD*, GuE*, GuF*: Gilpin--------- Culleoka-------- Upshur---------	0-6 6-24 24-35 35 0-6 6-27 27-34 34 0-7 7-32 32-45 45	0.6-2.0 0.6-2.0 0.6-2.0 --- 0.6-2.0 0.6-2.0 0.6-2.0 --- 0.6-2.0 0.06-0.2 0.06-0.2 ---	0.12-0.18 0.10-0.16 0.06-0.10 --- 0.14-0.20 0.12-0.20 0.05-0.14 --- 0.12-0.16 0.10-0.14 0.08-0.12 ---	4.5-5.5 4.5-5.5 4.5-5.5 --- 5.1-6.0 5.1-6.0 5.1-6.0 --- 5.1-6.0 5.1-6.0 5.6-7.3 ---	Low---------- Low---------- Low---------- ---------- Low---------- Low---------- Low---------- ---------- Moderate------- High---------- Moderate------- ----------	0.32 0.28 0.28 --- 0.32 0.28 0.17 --- 0.43 0.28 0.28 ---	3 3 3
GwD3*, GwE3*: Gilpin----------	0-6 6-24 24-35 35	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.12-0.18 0.10-0.16 0.06-0.10 ---	4.5-5.5 4.5-5.5 4.5-5.5 ---	Low---------- Low---------- Low---------- ----------	0.32 0.28 0.28 ---	3
Culleoka-------- Upshur---------	0-6 6-27 27-34 34 0-7 7-32 32-45 45	0.6-6.0 0.6-6.0 0.6-6.0 --- 0.2-0.6 0.06-0.2 0.06-0.2 ---	0.14-0.20 0.12-0.20 0.05-0.14 --- 0.12-0.16 0.10-0.14 0.08-0.12 ---	5.1-6.0 5.1-6.0 5.1-6.0 --- 5.1-6.0 5.1-6.0 5.6-7.3 ---	Low---------- Low---------- Low---------- ---------- Moderate------- High---------- Moderate------- ----------	0.32 0.28 0.17 --- 0.43 0.28 0.28 ---	3 3
Ho---------- Holly	0-7 7-52 52-60	0.6-2.0 0.2-2.0 0.6-6.0	0.20-0.24 0.17-0.21 0.07-0.18	5.1-6.5 5.1-6.5 5.1-6.5	Low---------- Low---------- Low----------	0.28 0.28 0.28	5
Ka---------- Kanawha	0-13 13-63 63-74	0.6-2.0 0.6-2.0 0.6-2.0	0.16-0.22 0.12-0.20 0.14-0.18	5.1-6.0 5.1-6.0 5.1-7.3	Low---------- Low---------- Low----------	0.32 0.32 0.32	4
LaB, LaC, LaD---- Lily	0-5 5-22 22-27 27	0.6-6.0 2.0-6.0 2.0-6.0 ---	0.13-0.18 0.12-0.18 0.08-0.17 ---	3.6-5.5 3.6-5.5 3.6-5.5 ---	Low---------- Low---------- Low---------- ----------	0.28 0.28 0.17 ---	3
Lb---------- Lobdell	0-7 7-34 34-60	0.6-2.0 0.6-2.0 0.6-6.0	0.20-0.24 0.17-0.22 0.12-0.18	5.1-6.5 5.1-7.3 5.6-7.3	Low---------- Low---------- Low----------	0.32 0.32 0.32	5

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
Lh*:							
Lobdell	0-7	0.6-2.0	0.20-0.24	5.1-6.5	Low	0.32	5
	7-34	0.6-2.0	0.17-0.22	5.1-7.3	Low	0.32	
	34-60	0.6-6.0	0.12-0.18	5.6-7.3	Low	0.32	
Holly	0-7	0.6-2.0	0.20-0.24	5.1-6.5	Low	0.28	5
	7-52	0.2-2.0	0.17-0.21	5.1-6.5	Low	0.28	
	52-60	0.6-6.0	0.07-0.18	5.1-6.5	Low	0.28	
MgB, MgC	0-10	0.6-2.0	0.18-0.24	4.5-5.5	Low	0.43	3
Monongahela	10-22	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.43	
	22-61	0.06-0.6	0.08-0.12	4.5-5.5	Low	0.43	
	61-66	0.2-0.6	0.08-0.12	4.5-5.5	Low	0.43	
Pv	0-7	6.0-20	0.04-0.10	4.5-5.5	Low	0.20	5
Pope Variant	7-28	6.0-20	0.04-0.08	4.5-5.5	Low	0.17	
	28-60	6.0-20	0.04-0.08	4.5-5.5	Low	0.17	
Qu*.							
Quarries							
TlB, TlC	0-7	0.6-2.0	0.16-0.22	3.6-5.5	Low	0.43	3
Tilsit	7-21	0.6-2.0	0.16-0.22	3.6-5.5	Low	0.43	
	21-42	0.06-0.2	0.08-0.12	3.6-5.5	Low	0.43	
	42-56	0.06-0.6	0.08-0.12	3.6-5.5	Low	0.43	
	56	---	---	---	---	---	
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*.							
Udorthents							
UbF*:							
Upshur	0-7	0.6-2.0	0.12-0.16	5.1-6.0	Moderate	0.43	3
	7-32	0.06-0.2	0.10-0.14	5.1-6.0	High	0.28	
	32-45	0.06-0.2	0.08-0.12	5.6-7.3	Moderate	0.28	
	45	---	---	---	---	---	
Belmont	0-11	2.0-6.0	0.16-0.20	5.6-6.5	Moderate	0.37	3
	11-44	0.6-2.0	0.14-0.18	5.6-6.5	Moderate	0.28	
	44-80	0.6-2.0	0.12-0.16	5.6-7.3	Moderate	0.28	
	80	---	---	---	---	---	
Uc*.							
Urban land							
UdC*:							
Urban land.							
Allegheny	0-12	0.6-2.0	0.12-0.22	3.6-5.5	Low	0.32	4
	12-40	0.6-2.0	0.13-0.18	3.6-5.5	Low	0.28	
	40-60	0.6-2.0	0.08-0.17	3.6-5.5	Low	0.28	
UeD*:							
Urban land.							
Culleoka	0-6	0.6-6.0	0.14-0.20	5.1-6.0	Low	0.32	3
	6-27	0.6-6.0	0.12-0.20	5.1-6.0	Low	0.28	
	27-34	0.6-6.0	0.05-0.14	5.1-6.0	Low	0.17	
	34	---	---	---	---	---	
UmC*:							
Urban land.							
Monongahela	0-10	0.6-2.0	0.18-0.24	4.5-5.5	Low	0.43	3
	10-22	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.43	
	22-61	0.06-0.6	0.08-0.12	4.5-5.5	Low	0.43	
	61-66	0.2-0.6	0.08-0.12	4.5-5.5	Low	0.43	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
UzC*:							
Urban land.							
Zoar----------	0-9	0.6-2.0	0.15-0.18	4.5-5.5	Low----------	0.43	3
	9-38	0.06-0.6	0.12-0.15	4.5-5.5	Moderate-------	0.28	
	38-60	0.06-0.2	0.08-0.12	4.5-5.5	Moderate-------	0.28	
WeB, WeC, WeD,							
WeD3, WeE, WeF--	0-8	0.6-2.0	0.16-0.20	4.5-6.0	Low----------	0.37	3
Westmoreland	8-40	0.6-2.0	0.12-0.18	4.5-6.0	Low----------	0.28	
	40-66	0.6-2.0	0.06-0.10	5.1-6.0	Low----------	0.17	
	66	---	---	---	----------	---	
WhB, WhC, WhD----	0-6	0.6-2.0	0.16-0.20	4.5-5.5	Low----------	0.43	3
Wharton	6-31	0.06-0.6	0.12-0.16	4.5-5.5	Moderate-------	0.28	
	31-60	0.06-0.6	0.08-0.12	3.6-5.5	Moderate-------	0.17	
ZoB, ZoC---------	0-9	0.6-2.0	0.15-0.18	4.5-5.5	Low----------	0.43	3
Zoar	9-38	0.06-0.6	0.12-0.15	4.5-5.5	Moderate-------	0.28	
	38-60	0.06-0.2	0.08-0.12	4.5-5.5	Moderate-------	0.28	

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." 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		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
AgB, AgC---------- Allegheny	B	None--------	---	---	>6.0	---	---	>60	---	Low-------	High.
BeC*, BeD*: Buchanan---------	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High------	High.
Ernest----------	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	Moderate.
Cg---------- Chagrin	B	Common------	Brief-----	Nov-May	4.0-6.0	Apparent	Feb-Mar	>60	---	Low-------	Moderate.
CkB, CkC, CkD----- Clarksburg	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate.
CwB*, CwC*, CwD*, CwE*, CwF*: Culleoka--------	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Low-------	Moderate.
Westmoreland----	B	None--------	---	---	>6.0	---	---	>40	Hard	Low-------	High.
DaB, DaC, DaD, DaE, DdC, DdE, DdF---------- Dekalb	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low-------	High.
DgB*, DgC*, DgD*: Dormont----------	C	None--------	---	---	1.5-3.0	Perched	Feb-Mar	>48	Rippable	High------	Moderate.
Guernsey---------	C	None--------	---	---	1.5-3.0	Perched	Jan-Apr	>48	Rippable	High------	Moderate.
ErB, ErC, ErD----- Ernest	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	Moderate.
GaB, GaC, GaD, GaE, GaF---------- Gilpin	C	None--------	---	---	>6.0	---	---	20-40	Rippable	Low-------	High.
GcC*, GcD*, GcE*, GcF*: Gilpin----------	C	None--------	---	---	>6.0	---	---	20-40	Rippable	Low-------	High.
Culleoka--------	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Low-------	Moderate.
GuC*, GuD*, GuE*, GuF*, GwD3*, GwE3*: Gilpin----------	C	None--------	---	---	>6.0	---	---	20-40	Rippable	Low-------	High.
Culleoka--------	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Low-------	Moderate.
Upshur----------	C	None--------	---	---	>6.0	---	---	>40	Rippable	High------	Moderate.
Ho---------- Holly	B/D	Frequent----	Brief-----	Nov-May	0-0.5	Apparent	Dec-May	>60	---	High------	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
Ka---------- Kanawha	B	Rare--------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
LaB, LaC, LaD----- Lily	B	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
Lb---------- Lobdell	B	Common------	Brief-----	Jan-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	Low------	Moderate.
Lh*: Lobdell----------	B	Common------	Brief-----	Jan-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	Low------	Moderate.
Holly----------	B/D	Frequent----	Brief-----	Nov-May	0-0.5	Apparent	Dec-May	>60	---	High-----	Moderate.
MgB, MgC---------- Monongahela	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	High-----	High.
Pv---------- Pope Variant	A	Common------	Very brief	Jan-Jun	4.0-6.0	Apparent	Jan-Mar	>60	---	Low------	High.
Qu*. Quarries											
TlB, TlC---------- Tilsit	C	None--------	---	---	1.5-2.5	Perched	Jan-Apr	>40	Hard	High-----	High.
U1*, U2*, U3*, U4*, U5*, U6*, U7*, U8*. Udorthents											
UbF*: Upshur----------	C	None--------	---	---	>6.0	---	---	>40	Rippable	High-----	Moderate.
Belmont----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Uc*. Urban land											
UdC*: Urban land.											
Allegheny--------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High.
UeD*: Urban land.											
Culleoka---------	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Low------	Moderate.
UmC*: Urban land.											
Monongahela------	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	High-----	High.
UzC*: Urban land.											
Zoar----------	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	High-----	High.
WeB, WeC, WeD, WeD3, WeE, WeF--- Westmoreland	B	None--------	---	---	>6.0	---	---	>40	Hard	Low------	High.
WhB, WhC, WhD----- Wharton	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>40	Rippable	High-----	High.
ZoB, ZoC---------- Zoar	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	High-----	High.

* See the description of the map unit for the composition and behavior characteristics of the unit.

TABLE 17.--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
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Belmont	Fine-loamy, mixed, mesic Typic Hapludalfs
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Clarksburg	Fine-loamy, mixed, mesic Typic Fragiudalfs
Culleoka	Fine-loamy, mixed, mesic Ultic Hapludalfs
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Dormont	Fine-loamy, mixed, mesic Ultic Hapludalfs
Ernest	Fine-loamy, mixed, mesic Aquic Fragiudults
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Guernsey	Fine, mixed, mesic Aquic Hapludalfs
Holly	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Kanawha	Fine-loamy, mixed, mesic Typic Hapludalfs
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Lobdell	Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Pope Variant	Sandy, siliceous, mesic. Typic Udifluvents
Tilsit	Fine-silty, mixed, mesic Typic Fragiudults
Upshur	Fine, mixed, mesic Typic Hapludalfs
Westmoreland	Fine-loamy, mixed, mesic Ultic Hapludalfs
*Wharton	Clayey, mixed, mesic Aquic Hapludults
Zoar	Clayey, mixed, mesic Aquic Hapludults

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