United States
Department of
Agriculture

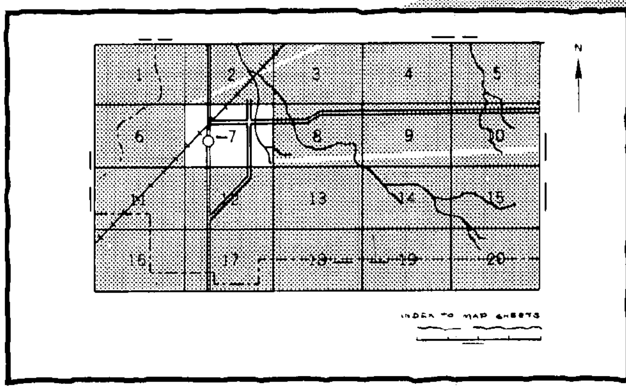
Soil
Conservation
Service

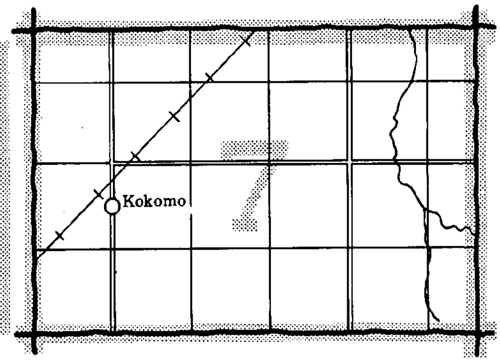
In cooperation with
West Virginia
Agricultural and Forestry
Experiment Station

Soil Survey of Wyoming County West Virginia

HOW TO USE

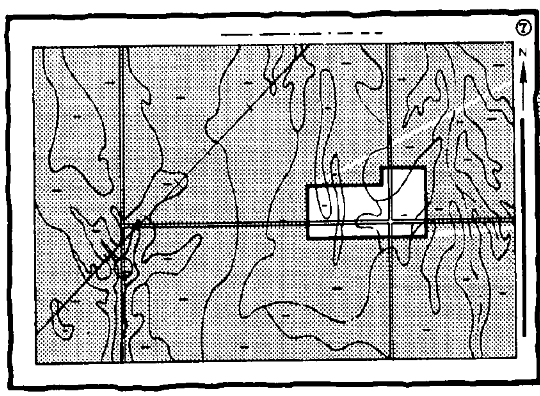
1. Locate your area of interest on the "Index to Map Sheets"

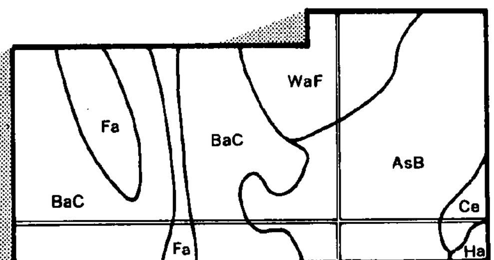




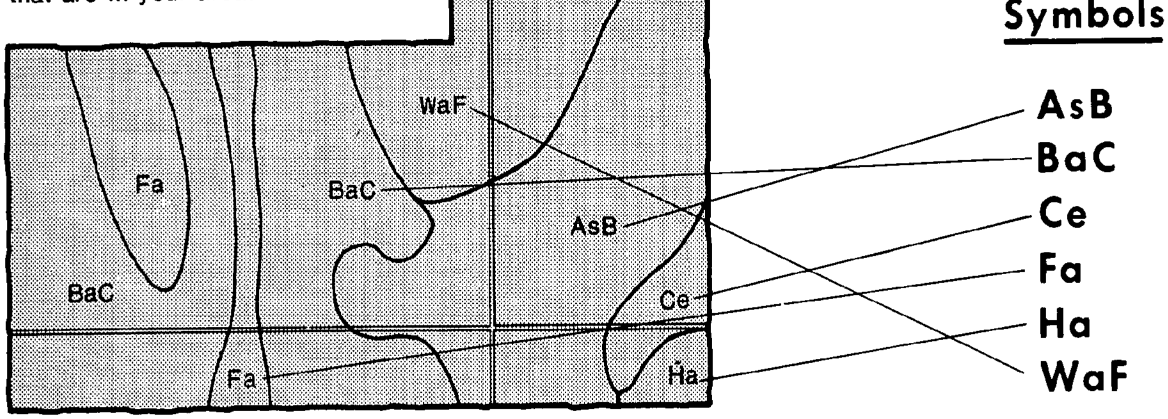
2. Note the number of the map sheet and turn to that sheet.

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



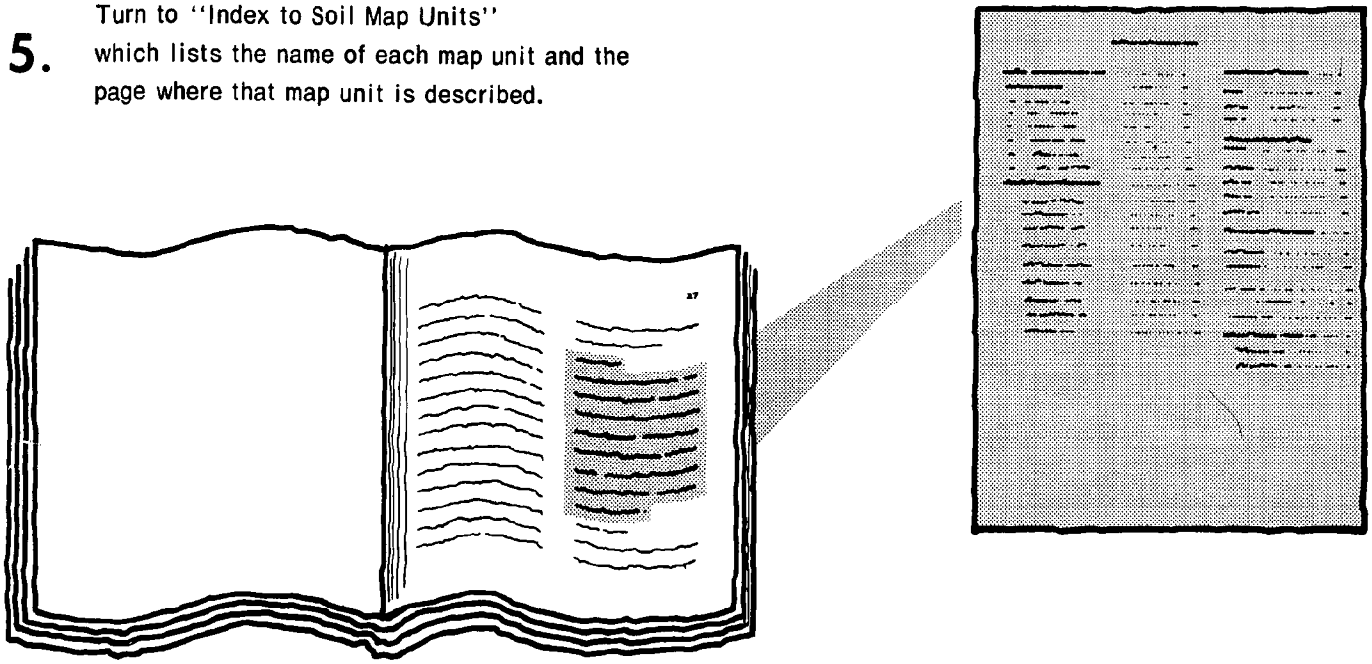


4. List the map unit symbols that are in your area.

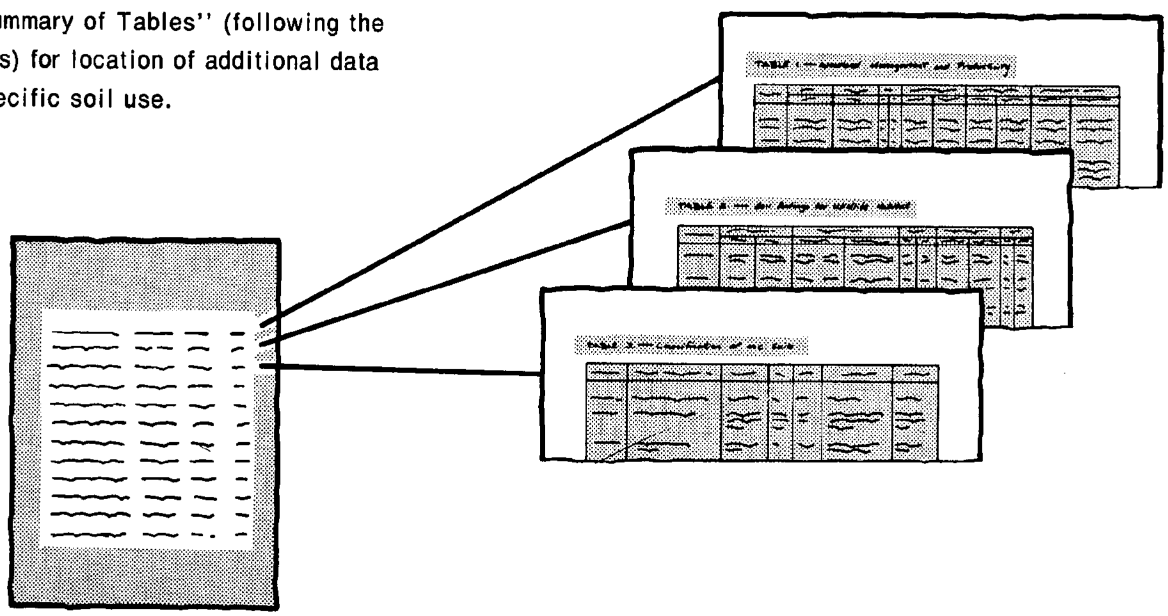


THIS SOIL SURVEY

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

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service and the West Virginia Agricultural and Forestry Experiment Station. The survey is part of the technical assistance furnished to the Southern Soil Conservation District.

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

Cover: Timber harvesting in an area of Gilpin and Lily soils, 3 to 15 percent slopes.

Contents

Soil Series

Issued September 1988

Index to map units

Summary of Tables

Foreword

The Soil Survey of Wyoming County contains much information useful in any land-planning program. It contains predictions of soil behavior for selected land uses. This survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

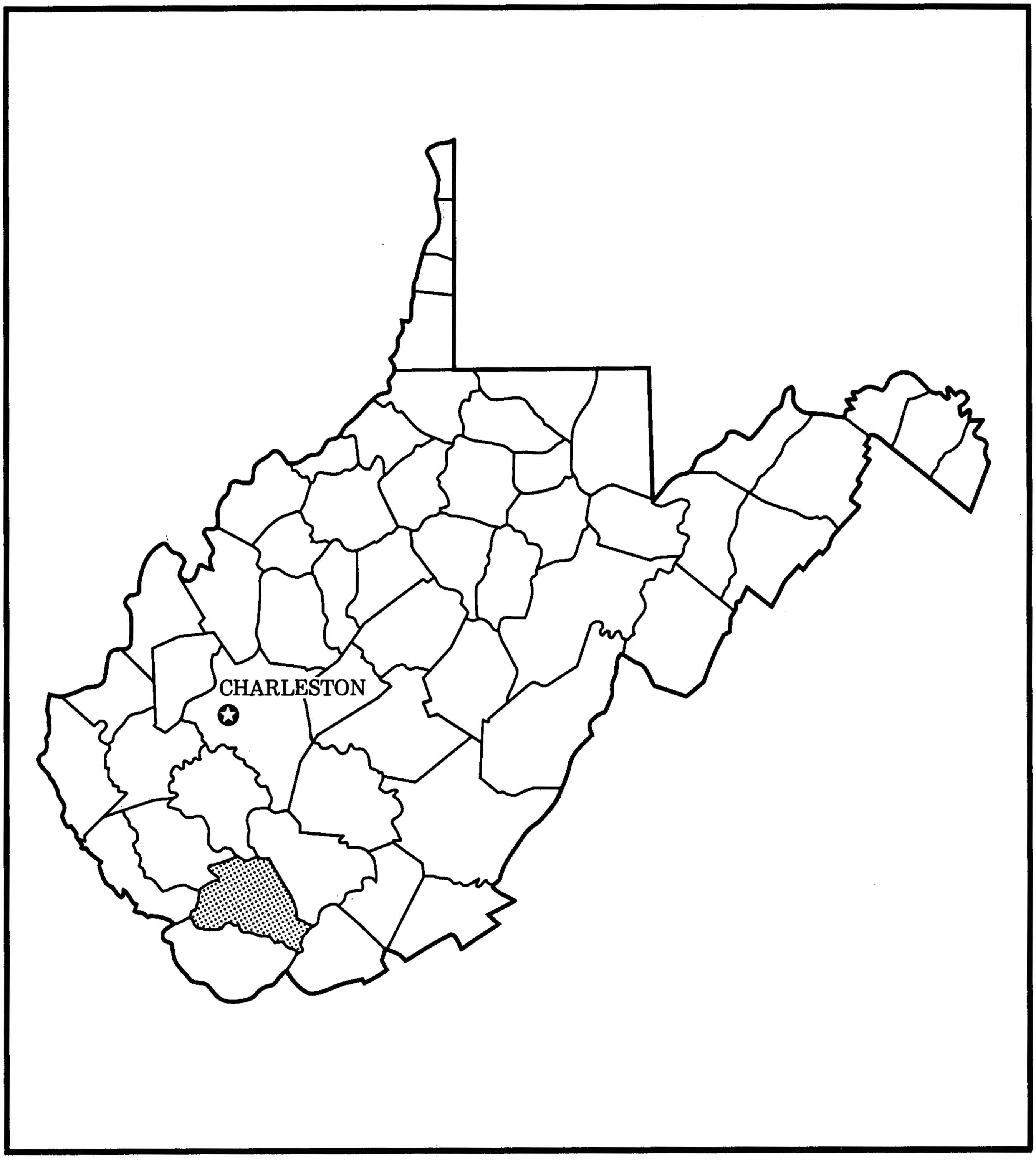
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use the survey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

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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described, 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.

Rollin N. Swank
State Conservationist
Soil Conservation Service



Location of Wyoming County in West Virginia.

Soil Survey of Wyoming County, West Virginia

By Barrie L. Wolf, Soil Conservation Service

Soils surveyed by Barrie L. Wolf, James W. Bell, Frank A. Doonan, and Kelley N. Sponaugle, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with
West Virginia Agricultural and Forestry Experiment Station

WYOMING COUNTY is in the south-central part of West Virginia. Its area is 504 square miles, or 322,560 acres.

The county is the center of major coalfields in the state. In 1980 the population of the county was 35,993. The population of Pineville, the county seat, was 1,140, and that of Mullens, the largest town, 2,919 (*10*). The main enterprises are coal mining, timber production, natural gas production, and small-scale farming. Employment in the county consists of mining and related industries, the railroad, gas drilling, and logging.

The first settler, John Cooke, arrived in what is now Wyoming County and settled near the present town of Oceana in 1799 (*3*). The county was formed in 1850 from Logan County, West Virginia. The name of the county derives from the Delaware Indian word meaning "large plains" (*10*).

Transportation in the county consists of highways, railroads, and an airport. The network of highways includes West Virginia Routes 10, 16, 54, 85, 97, 99, and 971 and U.S. 52. Two railroads have extensive track systems through the county to haul coal from the mines. An airport for small private aircraft is located near Pineville.

General Nature of the County

This section provides information about the physiography, relief, and drainage, farming, and climate of the county.

Physiography, relief, and drainage

The landforms in Wyoming County resulted from geologic erosion.

The elevation of the survey area ranges from about 910 feet above sea level at the confluence of Little Huff Creek and the Guyandotte River to about 3,581 feet at the fire tower on Ivy Knob, in the northeast part of the county.

The Guyandotte River and its tributaries drain the entire county. The Gyandotte River meanders westward through the center of the county. Clear Fork, Slab Fork, Laurel Fork, and Huff Creek drain the northern parts of the county. Barkers Creek, Indian Creek, Little Huff Creek, and Pinnacle Creek drain the southern parts of the county.

Farming

The 1982 Census of Agriculture reports 61 farms in Wyoming County and a total of 7,864 acres of farmland (*9*). Between 1978 and 1982, the number of farms in the county had increased by 21, and the size of an average farm had increased from 96 to 129 acres. The main farm enterprises in the county are raising beef cattle and sheep, which provide the most farm income, and producing pasture and hay.

Climate

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

Winters are cold and snowy at the higher elevations in the county. The valleys are also frequently cold, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm on the mountain slopes and are very warm and have 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. Normal annual precipitation is adequate for all crops, although the summer temperature and the growing season length, particulary at the higher elevations, may be inadequate.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Pineville, West Virginia, in the period 1951 to 1980. 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 34 degrees F, and the average daily minimum temperature is 22 degrees. The lowest temperature on record, which occurred at Pineville on January 23, 1970, is -13 degrees. In summer the average temperature is 72 degrees, and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred on September 2, 1953, is 102 degrees.

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

The total annual precipitation is 45 inches. Of this, 25 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 3.65 inches at Pineville on July 21, 1954. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 27 inches. The greatest snow depth at any one time during the period of record was 14 inches. On the average, 16 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 12 miles per hour, in spring.

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

How This Survey Was Made

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

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

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

A soil survey of McDowell and Wyoming Counties, West Virginia, was published in 1916 (*6*). The present survey updates the earlier one, provides additional information, and contains larger scale maps that show the soils in greater detail.

Map Unit Composition

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

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

Map unit descriptions of associations discuss minor soils rather than inclusions. These minor soils are in areas larger than inclusions and could have been separated at the scale used for mapping. They are large enough to manage differently for uses other than forestry or mining, but they make up a small part of the total map unit composition.

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

General Soil Map Units

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

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

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

Areas of the general soil map are joined with areas of the general soil maps for Mercer and Raleigh Counties, West Virginia. The differences in map unit names and proportions of component soils were caused by differences in map scale and in degree of generalization.

Soil descriptions

1. Dekalb-Pineville-Guyandotte

Moderately deep and very deep, very steep, well drained soils; formed mostly in sandstone; on uplands

This map unit consists of soils on uplands, on foot slopes, and in mountain coves in the northwest part of the county (fig. 1). Stones cover 3 to 15 percent of the surface of most of the acreage, and some areas have exposed bedrock.

This map unit makes up about 16 percent of the survey area. It is about 30 percent Dekalb soils, 25 percent Pineville soils, 15 percent Guyandotte soils, and 30 percent soils of minor extent.

Dekalb soils are moderately deep. They are on ridgetops and side slopes. They formed in material weathered from sandstone and some interbedded siltstone and shale. The surface layer is very dark grayish brown channery sandy loam. The subsoil is yellowish brown, very channery sandy loam.

Pineville soils are very deep. They are on foot slopes, on side slopes, and in coves. They formed in mixed colluvial material from sandstone, siltstone, and shale. The surface layer is dark brown channery loam. The subsoil is brownish yellow and yellowish brown channery loam.

Guyandotte soils are very deep. They are on the north-facing side slopes and in coves. They formed in mixed colluvial material from sandstone and some siltstone. The surface layer is thick, black, very dark grayish brown, and dark brown channery and very channery sandy loam. The subsoil is dark yellowish brown and yellowish brown very channery and extremely channery sandy loam.

The soils of minor extent are the somewhat excessively drained Fiveblock soils and the well drained Kaymine soils in surface-mined areas, the somewhat excessively drained Itmann soils in mine refuse areas, the moderately well drained Buchanan soils on foot slopes, and the somewhat excessively drained Potomac soils and the well drained Chagrin soils on narrow flood plains.

Most areas of this map unit are wooded. Some cleared areas in the narrow valleys are in urban uses, are farmed, or are used for garden crops. Erosion is a severe hazard.

The main limitations to most uses are slope, stones on the surface, and depth to bedrock for Dekalb soils, slope and stones on the surface for Pineville and Guyandotte soils, and slope, stones on the surface, the seasonal high water table, the moderately slow or slow permeability, and flooding for the soils of minor extent.

2. Berks-Pineville

Moderately deep and very deep, very steep, well drained soils; formed in siltstone, shale, and sandstone; on uplands

This map unit consists of soils on uplands, on foot slopes, and in mountain coves in the central and southeastern parts of the county (fig. 2). Stones cover 3 to 15 percent of the surface of most of the acreage, and some areas have exposed bedrock.

This map unit makes up about 70 percent of the survey area. It is about 40 percent Berks soils, 35 percent Pineville soils, and 25 percent soils of minor extent.

Berks soils are moderately deep. They are on ridgetops and side slopes. They formed in material weathered from interbedded siltstone, shale, and fine-grained sandstone. The surface layer is dark brown channery loam. The subsoil is yellowish brown and strong brown channery loam and very channery loam.

Pineville soils are very deep. They are on foot slopes, on side slopes, and in coves. They formed in mixed colluvial material from sandstone, siltstone, and shale. The surface layer is dark brown channery loam. The subsoil is brownish yellow and yellowish brown channery loam.

The soils of minor extent are the well drained Dekalb soils on narrow ridgetops, the well drained Gilpin and Lily soils on the broader ridgetops, well drained surface-mined areas, the moderately well drained Buchanan soils on foot slopes, the somewhat excessively drained Itmann soils in mine refuse areas, and the somewhat well drained Chagrin soils and the somewhat excessively drained Potomac soils on the narrow flood plains.

Most areas of this map unit are wooded. Some cleared areas in the narrow valleys are in urban use, are farmed, or are used for garden crops. Erosion is a severe hazard.

The main limitations to most uses are slope, stones on the surface, and depth to bedrock for Berks soils, slope and stones on the surface for Pineville soils, and slope,

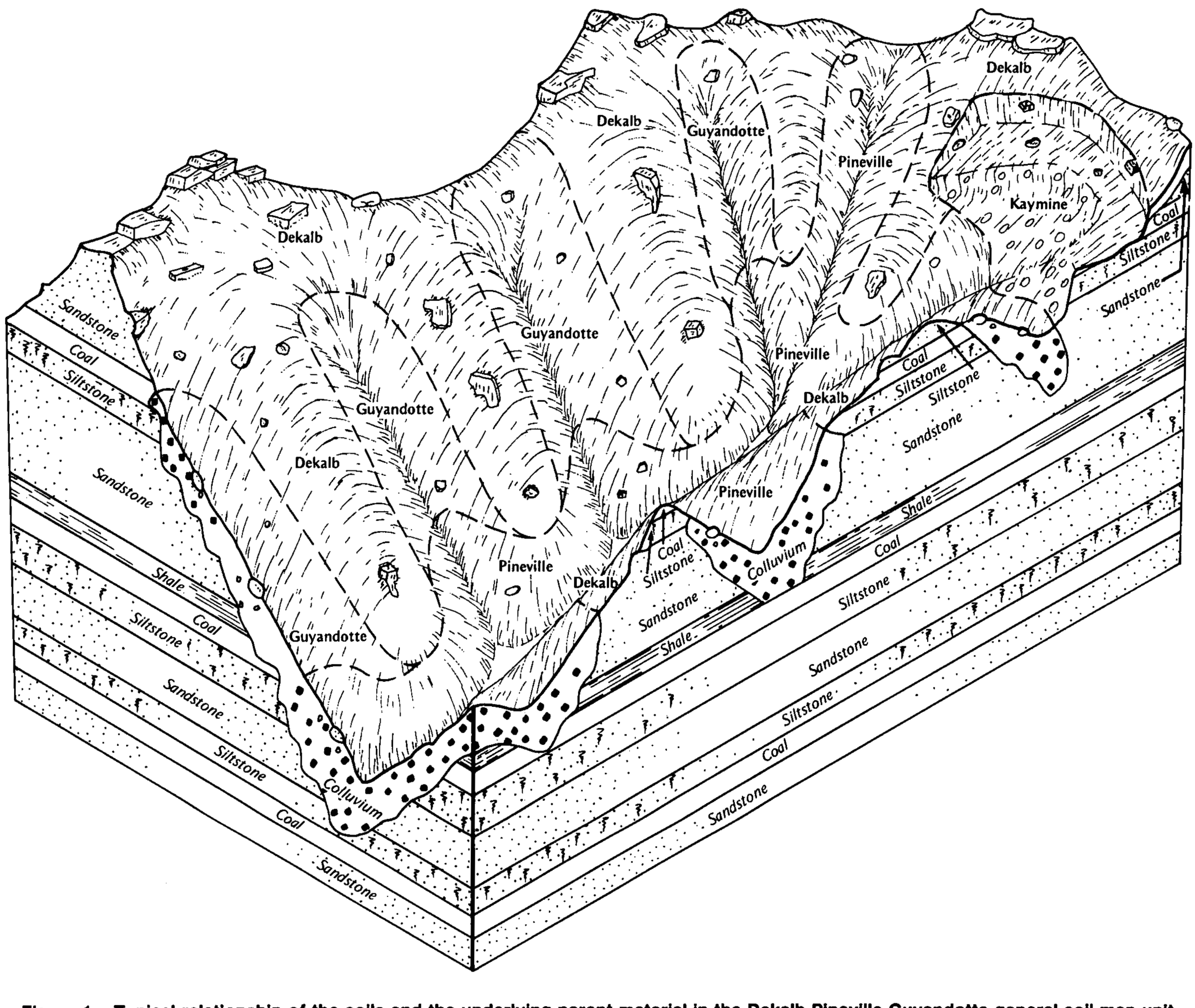


Figure 1.—Typical relationship of the soils and the underlying parent material in the Dekalb-Pineville-Guyandotte general soil map unit.

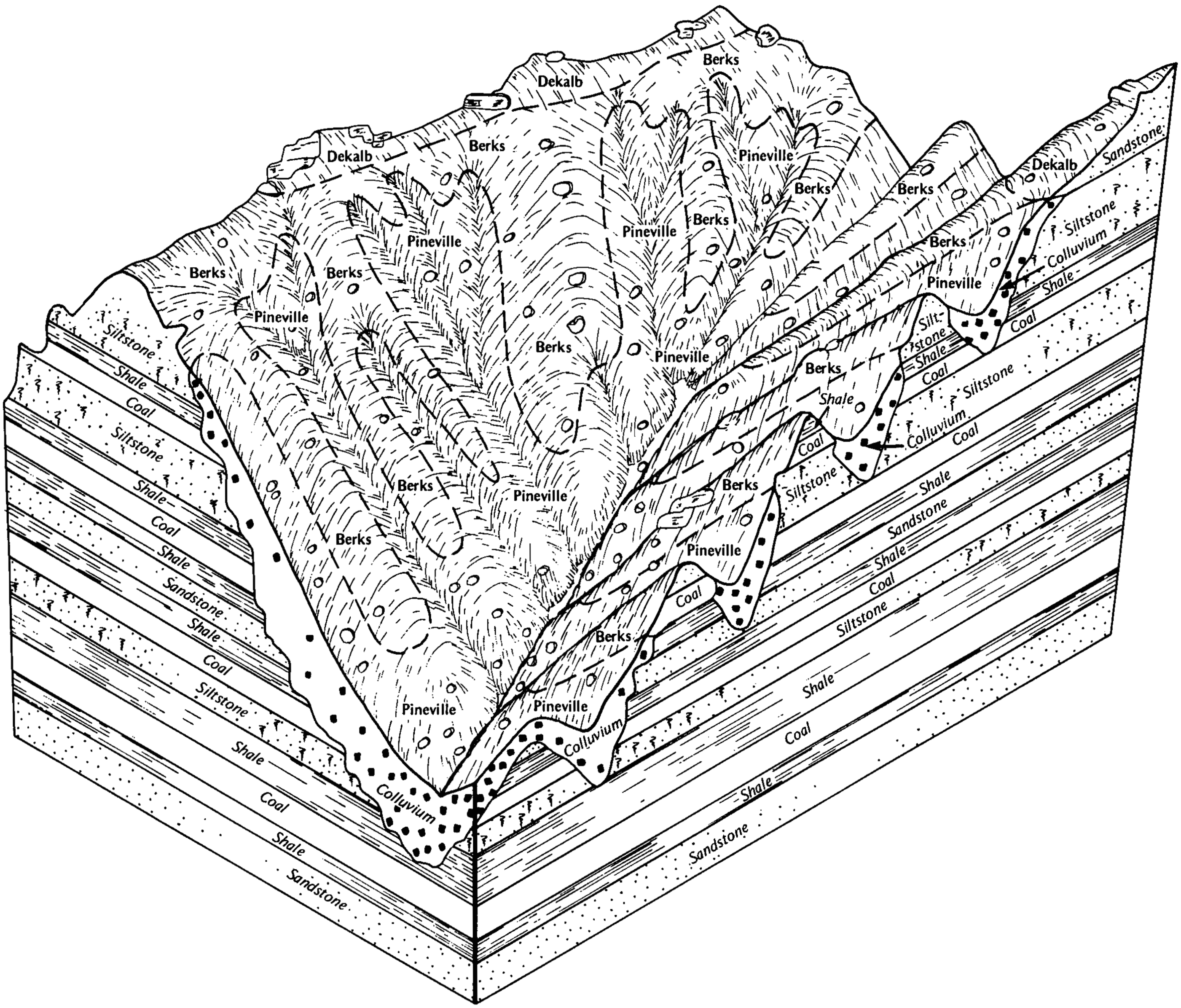


Figure 2.—Typical relationship of the soils and the underlying parent material in the Berks-Pineville general soil map unit.

stones on the surface, the seasonal high water table, the moderately slow or slow permeability, and flooding for the soils of minor extent.

3. Gilpin-Lily

Moderately deep, gently sloping to steep, well drained soils; formed in siltstone, shale, and sandstone; on uplands

This map unit consists of soils on the broad and narrow ridgetops and on the upper side slopes in the central and southeastern parts of the county.

This map unit makes up about 6 percent of the survey area. It is about 30 percent Gilpin soils, 30 percent Lily soils, and 40 percent soils of minor extent.

Gilpin soils are moderately deep. They are on the broad and narrow ridgetops and the upper side slopes. They formed in material weathered from interbedded shale, siltstone, and sandstone. The surface layer is dark brown silt loam. The subsoil is yellowish brown silt loam and strong brown channery silty clay loam.

Lily soils are moderately deep. They are on the broad and narrow ridgetops and the upper side slopes. They formed in material weathered from sandstone and some interbedded siltstone and shale. The surface layer is dark brown loam. The subsoil is yellowish brown and strong brown loam and channery loam.

The soils of minor extent are the well drained Pineville soils and the moderately well drained Buchanan soils on foot slopes, the well drained Berks and Dekalb soils on the very steep ridges and side slopes, and a few small areas of the poorly drained Holly soils and the moderately well drained Lobdell soils on the narrow flood plains.

Most areas of this map unit are wooded. Some of the broader ridgetops are farmed. Erosion is a moderate or severe hazard.

The main limitations to most uses are slope and depth to bedrock slope for Gilpin and Lily soils and slope, depth to bedrock, stones on the surface, the seasonal high water table, the moderately slow or slow permeability, and flooding for the soils of minor extent.

4. Cedarcreek-Dekalb-Kaymine

Very deep and moderately deep, very steep, well drained soils; formed in siltstone, shale, and sandstone; on uplands

This map unit consists of soils on uplands in the northwestern and southeastern parts of the county. In most areas coal has been intensively surface mined. Stones and boulders cover 1 to 15 percent of the surface of most of the acreage, and some areas have many highwalls of exposed bedrock.

This map unit makes up about 8 percent of the survey area. It is about 30 percent Cedarcreek soils, 14 percent Dekalb soils, 13 percent Kaymine soils, and 43 percent soils of minor extent.

Cedarcreek soils are very deep. They are in the contour-surface-mined areas of mountain side slopes. They formed in mixed sandstone, siltstone, shale, and some coal. The surface layer is very dark gray channery loam. The substratum is olive brown and olive gray extremely channery loam.

Dekalb soils are moderately deep. They are on ridgetops and side slopes. They formed in material weathered from sandstone and some interbedded siltstone and shale. The surface layer is very dark grayish brown channery sandy loam. The subsoil is yellowish brown channery sandy loam.

Kaymine soils are very deep. They are in the contour-surface-mined areas on mountain side slopes. They formed in mixed siltstone, sandstone, shale, and some coal. The surface layer is dark brown very channery loam. The substratum is dark brown and dark grayish brown very channery loam and extremely channery loam.

The soils of minor extent are the well drained Pineville soils in coves and on foot slopes, the moderately well drained Buchanan soils on foot slopes, the somewhat excessively drained Itmann soils in mine refuse areas, the somewhat excessively drained Fiveblock and Sewell soils in the surface-mined areas on ridgetops, and the somewhat excessively drained Potomac soils and the well drained Chagrin soils on the narrow flood plains.

Most areas of this map unit are wooded. Some reclaimed surface-mined areas near Corinne are in grasses and legumes. Erosion is a severe hazard.

The main limitations to most uses are slope, stones on the surface, and depth to bedrock for Dekalb soils, stones and boulders on the surface and slope for Cedarcreek and Kaymine soils, and slope, stones on the surface, the seasonal high water table, the moderately slow or slow permeability, and flooding for the soils of minor extent.

Detailed Soil Map Units

Dr. John Sencindiver, Associate Professor of Agronomy, West Virginia Agricultural and Forestry Experiment Station, helped to prepare this section.

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

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

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

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

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

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

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

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Berks-Pineville association, very steep, very stony, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Gilpin and Lily soils, 15 to 35 percent slopes, is an undifferentiated group in this survey area.

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

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

Soil descriptions

BpF—Berks-Pineville association, very steep, very stony. This map unit consists of soils on mountains (fig. 3). The soils are in areas that are underlain dominantly by siltstone bedrock, and that are dissected by numerous drainageways. The unit is about 45 percent Berks and similar soils, 35 percent Pineville and similar soils, and 20 percent minor soils and areas of rock outcrop. Typically, the Berks soils are on ridgetops and the convex, upper side slopes and the Pineville soils are on the concave, upper side slopes, in coves, on the lower side slopes, and on foot slopes. Slope ranges from 35 to 80 percent. Relief ranges from about 600 to 1,300 feet. In most areas stones cover 3 to 15 percent of the surface. Areas of the individual soils are large enough to map separately, but in considering the present and predicted use they were mapped as one unit.

Figure 3.—Typical landscape of Berks-Pineville association, very steep, very stony.

The Berks soils are moderately deep and well drained. Typically, the surface layer is dark brown channery loam about 7 inches thick. The subsoil is yellowish brown and strong brown channery loam and very channery loam about 27 inches thick. The substratum is yellowish brown very channery loam that extends to bedrock at a depth of about 38 inches. In some areas the soils are similar to the Berks soils except that they have less silt and clay in the subsoil than the Berks soils.

The Pineville soils are very deep and well drained. Typically, the surface layer is dark brown channery loam about 3 inches thick. The subsoil is yellowish brown channery loam and very channery loam about 47 inches thick. The substratum is yellowish brown very channery loam that extends to a depth of 60 inches or more. In some areas the soils are similar to the Pineville soils except that they have more rock fragments than the Pineville soils.

The most extensive minor soils in this map unit are deep, well drained soils on the middle and lower side slopes and in coves. These soils have more silt in the subsoil than the Pineville soils. The other minor soils are Gilpin and Lily soils on the less steep ridgetops, Kaymine and Cedarcreek soils in contour-surface-mined areas, and Chagrin and Potomac soils on narrow flood plains. Small areas of rock outcrops are on some ridgetops and the upper side slopes. Small areas of soils where stones and boulders cover 15 to 50 percent of the surface are in some cove drainageways.

Permeability of the Berks soils is moderate in the subsoil and moderately rapid in the substratum. The available water capacity is very low to moderate. Runoff is very rapid, and natural fertility is low. Depth to bedrock is 20 to 40 inches. The soil is very strongly acid to slightly acid. In some areas reaction is higher in the surface layer because of repeated forest fires.

Permeability of the Pineville soils is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate or high. Runoff is very rapid, and natural fertility is low or medium. Depth to bedrock is more than 60 inches.

Reaction is very strongly acid to neutral in the surface layer and very strongly acid or strongly acid in the subsoil and the substratum.

Most areas of these soils are woodland. A few areas have been surface mined. A few small areas of the Pineville soils on foot slopes and a few small areas of the included Gilpin and Lily soils on ridgetops are used for pasture.

These soils generally are not suitable for cultivated crops, hay, and pasture because of slope, stones on the surface, and the erosion hazard. The soils are suited to deciduous and coniferous trees.

Potential productivity for trees on the Berks and similar associated soils on ridgetops and the upper side slopes is moderate on the south aspect and moderately high on the north aspect. Timber stands are dominatly chestnut oak, scarlet oak, white oak, black locust, and red maple, but a few shortleaf pine and Virginia pine are on the south aspect.

Potential productivity for trees on the Pineville and similar associated soils in coves, on the lower side slopes and on foot slopes is moderately high. Timber stands are dominantly yellow-poplar, cucumbertree, northern red oak, basswood, black walnut, white oak, and eastern hemlock. The common trees to plant for commerical wood production are eastern white pine, northern red oak, yellow-poplar, black walnut, and black cherry. Both the Berks and the Pineville soils have stands of black oak and hickory.

In some areas of both soils the trees on south-facing slopes are of poor quality because of past forest fires. Fire control in some areas is difficult because of the long, very steep slopes, which offer little protection from the wind. Forest fires are a hazard in areas near the numerous residential developments in the narrow valleys. Access roads to mining areas and gas wells are used in fire control and for access to logging. Erosion is a hazard on roads, on skid trails, and in loading areas. Laying out roads and trails on the contour and seeding and mulching bare areas help to control erosion. Special equipment or management techniques adapted to steep slopes are needed in harvesting timber.

These soils are suited to use as habitat for woodland wildlife. Many areas support a moderate population of grouse, squirrel, and other small game species. Some areas, especially near Twin Falls State Park, support a large population of white-tailed deer. In many areas, especially on the north-facing coves and the northern side slopes of the Pineville soils, the understory vegetation consists of ginseng, trillium, may apple, spring beauty, and ferns.

Most areas of these soils are not suited to use as sites for community development or to industrial use because of the very steep slopes. Extensive excavation and leveling are required for construction. In areas cleared for construction erosion is a very severe hazard.

The capability subclass for both soils is VIIs. The Berks soils are in woodland ordination group 3R on the south aspect and in woodland ordination group 4R on the north aspect. The Pineville soils are in woodland ordination group 4R on the south aspect and in woodland ordination group 5R on the north aspect.

CeF—Cedarcreek-Rock outcrop complex, very steep. This map unit consists of very deep, well drained soils mostly on mountain side slopes in areas that were surface mined for coal. It is about 65 percent Cedarcreek soils, 15 percent areas of Rock outcrop, and 20 percent other soils. The areas consist of nearly vertical highwalls of rock outcrop, gently sloping to strongly sloping benches (fig. 4), and very steep out slopes. Highwalls make up about 15 percent of the map unit. Benches make up about 25 percent of the map unit. They are generally concave, and slope ranges from 3 to 35 percent. The out slope areas make up about 60 percent of the map unit. They have stones and boulders on 1 to 15 percent of the surface, and slope ranges from 35 to 80 percent.

Typically, the surface layer of the Cedarcreek soil is very dark gray very channery loam about 3 inches thick. The substratum extends to a depth of about 60 inches or more. In the upper 12 inches it is olive brown very channery loam. Below that, it is dark olive gray extremely channery loam. About 50 percent of the rock fragments is sandstone, about 40 percent is siltstone, and about 10 percent is other rocks and coal.

Rock outcrop consists of exposures or highwalls of bedrock. Highwalls resulted from surface mining. They are vertical or nearly vertical and about 25 to 100 feet above the bench floor.

Included with this unit in mapping are areas of soils that are less than 20 inches deep to bedrock, soils that are 40 to 60 inches deep to bedrock, small, wet depressions on the bench areas, and areas on out slopes where stones and boulders cover more than 90 percent of the surface. Also included are areas of Berks and Dekalb soils near the highwall edges, areas of Pineville soils in coves, and small areas of Kaymine and Itmann soils on benches and out slopes.

Permeability of the Cedarcreek soil is moderate or moderately rapid in the substratum. The available water capacity is low to high. Natural fertility is low or moderate. Runoff is slow or medium on benches and rapid or very rapid on out slopes. Depth to bedrock is more than 60 inches. In most areas the soil is extremely acid to strongly acid. In some areas the surface layer is neutral or alkaline because of liming during reclamation.

Most areas of this Cedarcreek soil are woodland. Some reclaimed areas are in grasses and legumes. Areas of Rock outcrop are generally barren.

This soil generally is not suited to cultivated crops and hay because of slope, stones and boulders on the surface, and the erosion hazard. In the less sloping

Figure 4.—An area of Cedarcreek-Rock outcrop complex, very steep. The Cedarcreek soil is on the bench in the foreground. The areas of rock outcrop are adjacent to the Berks-Pineville association, very steep, very stony, in the background.

bench areas the soil is poorly suited to pasture. Erosion is a severe hazard if the pasture is overgrazed. Deferred grazing, rotation grazing, lime and fertilizer, and planting desirable species help to establish and maintain good forage and to control erosion.

Potential productivity for trees on this soil is moderately high. It is suited to both coniferous and deciduous trees. Most trees are not large enough for saw logs, but some are large enough for mine timbers. The common trees to plant for commerical wood production are eastern white pine, shortleaf pine, yellow-poplar, black locust, and American sycamore. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour and seeding and mulching the disturbed areas help to control erosion. Access to some areas is limited because of highwalls and the very steep side slopes.

Timber stands on this Cedarcreek soil differ from place to place, but commonly consist of black locust, yellow-poplar, American sycamore, eastern white pine, and Virginia pine. The understory vegetation consists of sweet birch, red maple, sourwood, sassafras, blackberry, and multiflora rose. Some open areas are covered with grasses, legumes, and autumn-olive.

This Cedarcreek soil is suited to use as habitat for woodland wildlife. The variety of vegetation provides food and cover for wildlife, and the small wet areas on benches help to provide water. Many areas support large populations of grouse.

Many areas of this Cedarcreek soil are sites for underground coal mines. The bench areas are used for access to the coal seam. Erosion is a hazard on roads and near mine sites. Laying out roads on the contour, collecting runoff in small sediment basins, and seeding and mulching the disturbed areas help to control erosion.

The main limitations of this Cedarcreek soil as sites for community development are stones, boulders, the very steep side slopes, rock outcrops, and potential differential settling. Onsite investigation is needed to determine the limitations and potentials for most uses.

This Cedarcreek soil is in capability subclass VIIs and woodland ordination group 4R.

Cg—Chagrin loam, rarely flooded. This is a nearly level and well drained soil. The areas are on high flood plains mostly along Clear Fork, southwest of Oceana. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark grayish brown and dark brown loam about 9 inches thick. The subsoil extends to a depth of 48 inches. In the upper 23 inches it is dark yellowish brown loam. In the lower 16 inches it is dark yellowish brown sandy loam. The substratum extends to a depth of 60 inches or more. It is dark yellowish brown fine sandy loam that has a few strong brown mottles.

Included with this soil in mapping are a few areas of the somewhat excessively drained Potomac soils, the moderately well drained Lobdell soils, and the poorly drained Holly soils. Also included are a few areas of soils that have a sandy loam surface layer, a few areas of urban land, some areas of Udorthents, and a few small areas of soils that are similar to this Chagrin soil but are strongly acid. The included soils make up about 20 percent of this map unit.

Permeability of this Chagrin soil is moderate in the subsoil and the substratum. The available water capacity is high. Runoff is medium, and natural fertility is medium or high. In unlimed areas the soil is moderately acid. Depth to bedrock is more than 60 inches.

Most areas of this soil have been cleared and are used for cultivated crops, hay, and pasture. Many areas are used as homesites. A few areas are wooded.

This soil is well suited to cultivated crops, hay and pasture, and a variety of early season and late season garden crops. For garden crops, however; late spring frosts are a problem because of poor air drainage. Crops can be grown continuously, but cover crops are needed to protect the soil. Residue from cover crops mixed into the soil helps to maintain fertility and soil tilth. In pasture management, proper stocking rates, rotation grazing, and, during dry seasons, deferred grazing help to maintain desirable grasses and legumes.

Potential productivity for trees on this soil is moderately high. A few stands of yellow-poplar and mixed oaks are along Clear Fork, the Guyandotte River, and Indian Creek. Most areas have stands of American sycamore and river birch.

The main limitation of this soil as sites for community development is flooding. A plant cover in the unprotected areas and surface drainage to remove runoff help to control stream scouring and sedimentation.

The capability class is I, and the woodland ordination group is 5A.

Ch—Chagrin sandy loam, occasionally flooded. This is a nearly level and well drained soil. The areas are on flood plains along the larger streams in the county. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown sandy loam about 7 inches thick. The subsoil is brown sandy loam to a depth of about 36 inches. The substratum to a depth of 60 inches or more is brown sandy loam that has pockets of loamy fine sand.

Included with this soil in mapping are a few areas of the somewhat excessively drained Potomac soils, the moderately well drained Lobdell soils, and the poorly drained Holly soils. Also included are a few areas of soils that have a surface layer of loam, a few areas of urban land, some areas of Udorthents, and a few small areas of soils that are similar to this Chagrin soil but are strongly acid. The included soils make up about 15 percent of this map unit.

Permeability of this Chagrin soil is moderate in the subsoil and the substratum. The available water capacity is high. Runoff is medium, and natural fertility is medium or high. In unlimed areas the soil is moderately acid. Depth to bedrock is more than 60 inches.

Most areas of this soil are wooded. Some small areas are used for cultivated crops, hay, and pasture. A few areas are idle.

This soil is suited to cultivated crops, hay and pasture, and a variety of early season and late season garden crops. For garden crops, however, late spring frosts are a problem because of poor air drainage. Flooding during the growing season is a hazard. Cultivated crops can be grown continuously, but cover crops are needed to protect the soil. Residue from cover crops mixed into the soil helps to maintain fertility and soil tilth. In pasture management, proper stocking rates, rotation grazing, and, during dry seasons, deferred grazing help to maintain desirable grasses and legumes.

Potential productivity for trees on this soil is moderately high. The principal tree species are American sycamore, beech, river birch, yellow-poplar, red maple, and mixed oaks. The use of logging equipment is restricted during periods of flooding.

The main limitation to use of this soil as sites for community development is flooding. A plant cover in the unprotected areas and surface drainage to remove runoff help to control stream scouring and sedimentation.

The capability subclass is IIw, and the woodland ordination group is 5A.

Cu—Chagrin-Urban land complex. This map unit consists of the nearly level, well drained Chagrin soil and areas of Urban land along the larger streams in the county. It is about 40 percent Chagrin soil, about 35 percent Urban land, and 25 percent other soils. The soil is subject to rare flooding. Slope ranges from 0 to 3 percent. The Chagrin soil and Urban land are so intermingled that it was not practical to map them separately at the scale selected for mapping.

Typically, the surface layer of the Chagrin soil is dark grayish brown and dark brown loam about 9 inches thick. The subsoil extends to a depth of 48 inches. In the upper 23 inches it is dark yellowish brown loam, and in the lower 16 inches it is dark yellowish brown sandy loam. The substratum to a depth of 60 inches or more is dark yellowish brown fine sandy loam that has a few strong brown mottles.

Urban land consists of land covered by streets, parking lots, buildings, and other impermeable structures in urban areas.

Included with this complex in mapping are a few small areas of the somewhat excessively drained Potomac soils, the moderately well drained Lobdell and Monongahela soils, and the poorly drained Holly soils. Also included are a few small areas of soils that are subject to occasional flooding, soils that are similar to the Chagrin soil but that are strongly acid, soils that have slope of 3 to 8 percent, and some areas of Udorthents.

Permeability of the Chagrin soil is moderate in the subsoil and the substratum. The available water capacity is high. Runoff is medium, and natural fertility is medium or high. In unlimed areas the soil is moderately acid. Depth to bedrock is more than 60 inches.

Most areas of this map unit are used as sites for homes and commercial structures. Many small areas of the Chagrin soil are used for home gardens, and a few small areas are wooded or are idle.

This Chagrin soil is well suited to use as home gardens. A wide variety of early season and late season garden crops can be grown on the soil. Late spring frosts are a problem because of poor air drainage. Garden crops can be grown continuously, but cover crops are needed to protect the soil. Residue from cover crops mixed into the soil helps to maintain fertility and soil tilth.

The main limitation to use of this Chagrin soil as sites for community development is flooding. A plant cover in the unprotected areas and surface drainage to remove runoff help to control stream scouring and sedimentation.

This map unit is not assigned a capability subclass. The Chagrin soil is in woodland ordination group 5A.

DpF—Dekalb-Pineville-Guyandotte association, very steep, very stony. This map unit consists of soils on mountains. The soils are in areas dominated by sandstone bedrock and that are dissected by numerous drainageways. The unit is about 30 percent Dekalb and similar soils, 25 percent Pineville and similar soils, 15 percent Guyandotte and similar soils, and 30 percent minor soils and areas of rock outcrop. Typically, the Dekalb soils are on ridgetops and the convex, upper side slopes, the Pineville soils are on the lower side slopes and foot slopes, and the Guyandotte soils are in the north-facing coves and on the upper and middle, north-facing side slopes. Soils similar to the Guyandotte soils are in similar, south-facing positions. Slope ranges from 35 to 80 percent. Relief ranges from about 900 to 1,800 feet. In most areas stones cover 3 to 15 percent of the surface.

The Dekalb soils are moderately deep and well drained. Typically, the surface layer is very dark grayish brown channery sandy loam about 5 inches thick. The subsoil is yellowish brown channery and very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches. In places the soils are similar to the Dekalb soils except that they have fewer rock fragments.

The Pineville soils are very deep and well drained. Typically, the surface layer is dark brown channery loam about 3 inches thick. The subsoil is yellowish brown channery loam and very channery loam about 50 inches thick. The substratum is yellowish brown very channery loam that extends to a depth of 60 inches or more. In places the soils are similar to the Pineville soils except that they have more rock fragments.

The Guyandotte soils are very deep and well drained. Typically, the surface layer is about 12 inches thick. It is black, very dark grayish brown and dark brown channery sandy loam. The subsoil is 53 inches thick. In the upper 26 inches it is dark yellowish brown very channery sandy loam. In the lower 27 inches it is yellowish brown extremely channery sandy loam that extends to a depth of about 60 inches. On the south-facing slopes soils similar to the Guyandotte soils have a dark surface layer that is not as thick or as dark as that of the Guyandotte soils. In places the soils are similar to the Guyandotte soils except that they have fewer rock fragments.

The most extensive minor soils in this map unit are Berks soils on ridge points and deep, well drained, sandy soils on saddles and the upper side slopes. The other minor soils are Fiveblock, Kaymine, and Cedarcreek soils in contour-surface-mined areas and Potomac soils on narrow flood plains. Small areas of rock outcrops are on ridgetops and the upper side slopes. Small areas of soils where stones and boulders cover 50 percent of the surface are in coves and drainageways.

Permeability of the Dekalb soils is rapid in the subsoil and the substratum. The available water capacity is very low to moderate. Runoff is very rapid, and natural fertility is low. Depth to bedrock is 20 to 40 inches. Reaction is very strongly acid or strongly acid. In some areas reaction in the surface layer is higher because of repeated forest fires.

Permeability of the Pineville soils is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate or high. Runoff is very rapid, and natural fertility is low or medium. Depth to bedrock is more than 60 inches. Reaction is very strongly acid to neutral in the surface layer and strongly acid or very strongly acid in the subsoil and the substratum. In some areas reaction is higher in the surface layer because of repeated forest fires.

Permeability of these Guyandotte soils is moderate or moderately rapid in the substratum. The available water capacity is low to high. Runoff is very rapid, and natural fertility is medium or high. Depth to bedrock is more than 60 inches. Reaction is very strongly acid to neutral in the surface layer and very strongly acid to moderately acid in the subsoil and the substratum.

Most areas of these soils are woodland. A few areas have been surface mined. A few small areas of the Pineville soils on foot slopes are used for pasture.

These soils generally are not suited to cultivated crops and to hay and pasture because of slope, stones on the surface, and the erosion hazard. The soils are suited to deciduous and coniferous trees.

Potential productivity for trees on the Dekalb and similar associated soils on ridgetops and the upper side slopes is moderate on the south aspect and moderately high on the north aspect. Timber stands are dominantly chestnut oak, scarlet oak, black oak, white oak, and red maple. The common trees to plant for commercial wood production are eastern white pine, shortleaf pine, northern red oak, and black locust.

Potential productivity for trees on the Pineville and similar associated soils in coves, on the lower side slopes, and on foot slopes is moderately high. Timber stands are dominantly yellow-poplar, cucumbertree, sugar maple, basswood, black walnut, black oak, beech, and white oak. The common trees to plant for commercial wood production are eastern white pine, northern red oak, yellow-poplar, black walnut, and white oak.

Potential productivity for trees on the Guyandotte and similar associated soils in the north-facing coves and the upper and middle side slopes is moderately high. Timber stands are dominately yellow-poplar, cucumbertree, basswood, black cherry, sugar maple, and buckeye. The common trees to plant for commercial wood production are black cherry, northern red oak, black walnut, and yellow-poplar.

The Dekalb, Pineville, and Guyandotte soils have stands of northern red oak, red maple, and hickory. In some areas of these soils the trees on the south-facing slopes are of poor quality because of past forest fires. Fire control is difficult because of the long, very steep slopes, which offer little protection from the wind. The fire hazard is greater in areas near the numerous residential developments in the narrow valleys. Access roads to mining areas and gas wells are used in fire control and for access to logging. Erosion is a hazard on logging roads, on skid trails, and in loading areas. Laying out roads and trails on the contour and seeding and mulching bare areas help to control erosion. Special equipment or management techniques adapted to very steep slopes are needed in harvesting timber.

These soils are suited to use as habitat for woodland wildlife. Many areas support a moderate population of grouse, squirrel, and European wild boar. The boar has been introduced into a rugged area along the county boundary in the northwest part of the survey area. In many areas, especially in the north-facing coves and on side slopes of Guyandotte and Pineville soils, the understory vegetation consists of ramps, or wild leeks, ginseng, trillium, may apple, spring beauty, and ferns.

Most areas of these soils are not suited to use as sites for community development or to industrial use because of the very steep slopes. Extensive excavation and leveling are required for construction. In areas cleared for construction erosion is a very severe hazard.

The capability subclass is VIIs. The Dekalb soils are in woodland ordination group 3R on the south aspect and in woodland ordination group 4R on the north aspect. The Pineville soils are in woodland ordination group 4R on the south aspect and in woodland ordination group 5R on the north aspect. The Guyandotte soils are in woodland ordination group 5R.

FvE—Fiveblock channery sandy loam, steep. This is a very deep, somewhat excessively drained soil in areas where coal was surface mined. It is mostly on mountaintops along the northern boundary of the county, on the gently sloping to strongly sloping benches and hilltops (fig. 5), the steep to very steep out slopes, and valley fills. The benches and hilltops make up about 50 percent of the map unit. They generally have concave slopes that range from 3 to 25 percent. The out slopes make up about 50 percent of the map unit. They generally have convex slopes that range from 25 to 60 percent. In most areas stones and boulders cover 1 to 15 percent of the surface.

Typically, the surface layer is brown channery sandy loam about 6 inches thick. In the upper 19 inches the substratum is brown very channery sandy loam. Below that, to a depth of 60 inches or more, it is dark grayish brown very channery sandy loam. About 80 percent of the rock fragments are sandstone, and about 20 percent are siltstone.

Included with this soil in mapping are areas of soils that are less than 40 inches deep to bedrock, small wet depressions in the bench areas, and areas of soils on

Figure 5.—Typical area of Fiveblock channery sandy loam, steep.

out slopes and in coves of valley fills where stones and boulders cover more than 90 percent of the surface. Also included are areas of soils that have slope of 60 to 80 percent, a few areas of the moderately deep Dekalb soils near the edges of out slopes and ridgetops, and a few areas of the very deep Pineville and Guyandotte soils in coves. Also included are some small areas of the very deep Kaymine soils on benches and out slopes and a few areas of soils that have sand in the substratum. The included soils make up about 30 percent of the map unit.

Permeability of this block soil is moderately rapid or rapid in the substratum. The available water capacity is very low to moderate. Runoff is slow or medium on hilltops and rapid or very rapid on out slopes. Natural fertility is medium or high. The soil is moderately acid to mildly alkaline.

Most areas of this soil are in grasses and legumes. Some older, reclaimed areas have small trees, such as locust and yellow-poplar.

This soil generally is not suited to cultivated crops and hay because of slope, and stones and boulders on the surface. In the bench areas the soil is poorly suited to pasture. In areas used for pasture erosion is a very severe hazard. Deferred grazing, rotational grazing, lime and fertilizer as needed, and planting desirable species help to maintain good forage and to reduce erosion.

Potential productivity for trees on this soil is moderately high. It is suited to both coniferous and deciduous trees. Most trees are not large enough for timber harvesting. The common trees to plant for commercial wood production are eastern white pine, Virginia pine, black locust, yellow-poplar, and American sycamore. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour and seeding and mulching disturbed areas help to control erosion. Access to some areas is limited because of the very steep side slopes.

This soil is suited to use as habitat for woodland wildlife. The variety of vegetation provides food and cover, and the small wet areas on benches and hilltops help to provide water.

This soil is not suited to use as sites for community development because of slope, potential differential settling, and difficulty in excavating because of stones and boulders.

The capability subclass is VIIs, and the woodland ordination group is 4X.

GpC—Gilpin and Lily soils, 3 to 15 percent slopes. This map unit consists of gently sloping and strongly sloping soils on ridgetops throughout the county. Some areas of the map unit are made up of Gilpin soils, some of Lily soils, and some of both soils. The total acreage of the map unit is about 40 percent Gilpin silt loam, 40 percent Lily loam, and 20 percent other soils. These soils were mapped together because they are similar in use and management.

Typically, the surface layer of the Gilpin soils is dark brown silt loam about 3 inches thick. The subsoil extends to a depth of 24 inches. In the upper 6 inches it is yellowish brown silt loam, and in the lower 15 inches it is strong brown channery silty clay loam. The substratum is strong brown extremely channery silty clay loam to a depth of about 27 inches. Soft, gray and brown siltstone bedrock is at a depth of about 27 inches. Hard, gray and brown siltstone bedrock is at a depth of about 39 inches.

Typically, the surface layer of Lily soils is dark brown loam about 3 inches thick. The subsoil extends to a depth of 29 inches. In the upper 8 inches it is yellowish brown loam, in the next 10 inches it is strong brown loam, and in the lower 8 inches it is strong brown channery loam. The substratum is strong brown channery loam to a depth of about 34 inches. Brown sandstone bedrock is at a depth of about 34 inches.

Included with these soils in mapping are small areas of moderately deep, well drained Berks and Dekalb soils and a few small areas of soils more than 40 inches deep to bedrock. Also included are some areas of soils where stones cover 1 to 3 percent of the surface and a few areas of soils where slope is more than 15 percent but less than 35 percent.

Permeability of the Gilpin soils is moderate in the subsoil and the substratum. The available water capacity is moderate. Runoff is medium or rapid, and natural fertility is low or medium. In unlimed areas the soils are strongly acid or very strongly acid. The root zone for some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

Permeability of the Lily soils is moderately rapid in the subsoil and the substratum. The available water capacity is moderate. Runoff is medium or rapid, and natural fertility is low. In unlimed areas the soils are strongly acid or very strongly acid. The root zone for some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

Many areas of these soils are cleared and used for cultivated crops (fig. 6) and for hay and pasture. Some areas are wooded or are idle. A few areas are used as homesites.

These soils are suited to cultivated crops and to hay and pasture. Erosion is a moderate or severe hazard in the unprotected areas. Conservation tillage, crops planted in contour strips, a crop sequence that includes hay, and crop residue mixed into the soil help to control erosion and to maintain fertility and soil tilth. In pasture management, proper stocking rates, rotation grazing, and, during dry seasons, deferred grazing help to maintain desirable grasses and legumes.

These soils are suited to home gardens. In some years droughtiness is a limitation during dry periods. Cover crops, mulch, and green manure crops help to conserve moisture and to maintain fertility, soil tilth, and the organic matter content. Late spring frosts are a minor concern because air drainage on these soils is good.

Potential productivity for trees on these soils is moderately high. The common trees to plant for commercial wood production are eastern white pine, northern red oak, white oak, black locust, and yellow-poplar. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour and out of streams helps to control erosion and sedimentation.

The main limitations to use of these soils as sites for community development are depth to bedrock and slope. Maintaining the plant cover on construction sites, establishing a plant cover in the unprotected areas, and installing drainage to remove runoff help to control erosion and sedimentation.

The capability subclass is IIIe, and the woodland ordination group is 5A.

GpE—Gilpin and Lily soils, 15 to 35 percent slopes. This map unit consists of moderately steep and steep soils on ridgetops throughout the county. Some areas of this unit are Gilpin soils, some are Lily soils, and some consist of both soils. The total acreage of this map unit is about 40 percent Gilpin soils, 40 percent Lily soils, and 20 percent other soils. These soils were mapped together because they are similar in use and management.

Typically, the surface layer of the Gilpin soils is dark brown silt loam about 2 inches thick. The subsoil extends to a depth of 22 inches. In the upper 5 inches it is yellowish brown silt loam, and in the lower 15 inches it is strong brown channery silty clay loam. The substratum is strong brown extremely channery silty clay loam to a depth of 27 inches. Soft, gray and brown siltstone bedrock is at a depth of about 27 inches. Hard, gray and brown siltstone bedrock is at a depth of about 39 inches.

Typically, the surface layer of the Lily soils is dark brown loam about 2 inches thick. The subsoil extends to a depth of 30 inches. In the upper 8 inches it is yellowish brown loam, in the next 10 inches it is strong brown loam, and in the lower 10 inches it is strong brown channery loam. The substratum is strong brown channery loam to a depth of about 34 inches. Brown sandstone bedrock is at a depth of about 34 inches.

Included with these soils in mapping are small areas of the moderately deep, well drained Berks and Dekalb soils and a few small areas of soils that are more than 40 inches deep to bedrock. Also included are small areas of soils where stones cover 1 to 3 percent of the surface and a few areas of soils that have slope of more than 35 percent.

Permeability of the Gilpin soils is moderate in the subsoil and the substratum. The available water capacity is moderate. Runoff is medium or rapid, and natural fertility is low or medium. In unlimed areas the soil is strongly acid or very strongly acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

Permeability of the Lily soils is moderately rapid in the subsoil and the substratum. The available water capacity is moderate. Runoff is medium or rapid, and natural fertility is low. In unlimed areas the soil is strongly acid or very strongly acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

Most areas of these soils are wooded. Some areas have been cleared and are used for gardens and for hay and pasture. A few small areas are used as homesites.

These soils are not suited to cultivated crops or hay. They are poorly suited to pasture. Erosion is a severe or very severe hazard in unprotected areas. In pasture management, proper stocking rates, rotation grazing, and, during dry seasons, deferred grazing help to maintain desirable grasses and legumes.

Potential productivity for trees on these soils is moderately high. Most areas have stands of oaks, hickory, yellow-poplar, black locust, and red maple. The common trees to plant for commercial wood production are eastern white pine, northern red oak, white oak, black walnut, black locust, and yellow-poplar. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour and out of streams (fig. 7) helps to control erosion and sedimentation.

Figure 6.—A cultivated area of Gilpin and Lily soils, 3 to 15 percent slopes.

Figure 7.—Woodland road in an area of Gilpin and Lily soils, 15 to 35 percent slopes.

The main limitations to use of these soils as sites for community development are the moderately steep and steep slopes and depth to bedrock. Maintaining the plant cover on construction sites, establishing a plant cover in the bare areas, and installing surface drainage help to control erosion and sedimentation.

The capability subclass is VIe. The woodland ordination group is 4R on the south aspect and 5R on the north aspect.

Ho—Holly-Lobdell complex. This map unit consists of nearly level soils on flood plains that are subject to occasional flooding. It is about 40 percent very deep, poorly drained Holly soil, 40 percent very deep, moderately well drained Lobdell soil, and 20 percent other soils. The Holly soil is generally slightly lower on the flood plain than the Lobdell soil. Slope ranges from 0 to 3 percent. The Holly and Lobdell soils are so intermingled on the landscape that it was not practical to map them separately at the scale selected for mapping.

Typically, the surface layer of the Holly soil is dark grayish brown silt loam about 3 inches thick. The subsoil is mottled, dark gray and dark grayish brown silt loam to a depth of about 28 inches. The substratum is mottled, dark gray sandy loam and fine sandy loam to a depth of 60 inches or more.

Typically, the surface layer of the Lobdell soil is dark grayish brown loam about 8 inches thick. The subsoil is yellowish brown loam about 28 inches thick. In the lower 20 inches it is mottled. The substratum is mottled, light brownish gray loam to a depth of 60 inches or more.

Included with these soils in mapping are a few areas of the somewhat excessively drained Potomac soils, the well drained Chagrin and Pineville soils, and the moderately well drained Buchanan soils. Also included are a few areas of soils that are very strongly acid and a few areas of soils that are subject to frequent flooding.

Permeability of the Holly soil is moderate in the subsoil and moderately rapid in the substratum. The available water capacity is high. Runoff is slow, and natural fertility is medium or high. The soil is moderately acid to neutral throughout. The root zone of some types of plants is restricted by the seasonal high water table, which is at or near the surface. Some areas of the Holly soil are subject to ponding by surface runoff during the wet seasons. Depth to bedrock is more than 60 inches.

Permeability of the Lobdell soil is moderate in the subsoil and moderately rapid in the substratum. The available water capacity is high. Runoff is slow, and natural fertility is medium or high. In unlimed areas the soil is strongly acid or moderately acid in the surface layer and the subsoil and moderately acid in the substratum. The root zone of some types of plants is restricted by the seasonal high water table 1.5 to 3 feet below the surface. Depth to bedrock is more than 60 inches.

Most areas of these soils are wooded or idle. Some areas are used for pasture, and a few areas are used for hay and cultivated crops.

These soils are suited to cultivated crops, but are better suited to hay and pasture plants that tolerate wetness. Most areas, which are long and narrow, are difficult to manage for farming. Artificial drainage is needed for cultivated crops and for hay and pasture. Some areas do not have suitable drainage outlets, and in places diversions are needed to intercept runoff from the higher areas. Conservation tillage, crop sequence that includes hay, tillage delayed until the soil is reasonably dry, and crop residue mixed into the soil help to maintain fertility and soil tilth. In pasture management, proper stocking rates, rotation grazing, and deferred grazing until the soils are firm help to maintain the desirable grasses and legumes. These soils are poorly suited to use as home gardens because of flooding, ponding, and the seasonal high water table. Artificial drainage is needed, especially for such cool-season crops as lettuce, peas, and onions. These soils are better suited to warm-season crops. In some areas late spring frosts are a problem because of poor air drainage on these soils.

Potential productivity on these soils for trees that tolerate wetness is moderately high. The use of equipment is restricted during the wet seasons because the soil is soft.

The main limitations of these soils as sites for community development are flooding and the seasonal high water table. A plant cover in the unprotected areas and surface drainage help to control stream scouring and sedimentation.

The capability subclass is IIIw. The woodland ordination group is 5w for the Holly soil and 5A for the Lobdell soils.

ImE—Itmann channery loam, steep. This is a very deep, somewhat excessively drained soil that formed mostly in coal and in high-carbon shale from coal mining. The soil is mostly in valley fills and on the steep and very steep slopes close to active or abandoned coal mines. Most areas of the soil are active waste dumping sites that have been covered with 6 to 18 inches of natural soil material in reclamation. In a few areas water is ponded. Slope is dominantly 20 to 60 percent but ranges from 3 to 60 percent. The top slopes make up about 30 percent of the map unit. They are generally gently sloping or strongly sloping. Out slopes make up about 70 percent of the map unit. They are steep or very steep.

Typically, the surface layer is dark brown channery loam about 9 inches thick. The subsurface layer is mixed, dark brown and black very channery loam about 4 inches thick. The substratum is black very channery and extremely channery sandy loam to a depth of 60 inches or more. More than 50 percent of the rock fragments is carbolith.

Included with this soil in mapping are areas that have not been covered with natural soil material and areas of the well drained Berks, Cedarcreek, Dekalb, Kaymine, and Pineville soils. Also included are areas of soils that are less acid than Itmann soils and areas of soils that have burned or are burning. The included soils make up about 30 percent of this map unit.

Permeability of this Itmann soil is moderately rapid or rapid in the substratum. The available water capacity is very low to moderate. Runoff is medium or rapid in the bench areas and very rapid on out slopes. Natural fertility is very low. In unlimed areas the soils are strongly acid to extremely acid.

Most areas have been recently reclaimed and are in grasses and legumes. A few areas are covered with blackberries, weeds, and small trees.

This soil is not suitable for cultivated crops or for hay and pasture because of slope, the very low natural fertility, and the erosion hazard. Rill and gully erosion is a very severe hazard. Potential productivity for trees on this soil is very low. The soil is very poorly suited to use as habitat for woodland wildlife. Diversions to control runoff, seeding, and heavy mulching help to establish vegetation and to control erosion.

Onsite investigation and testing are needed to determine the limitations and potentials of this soil for most uses. The included areas of burned soil material, or red dog, are used as a local source of road subgrade and fill material.

The capability subclass is VIIs. The soil is not assigned to a woodland ordination group.

ItF—Itmann very channery sandy loam, very steep. This is a very deep, somewhat excessively drained soil that formed mostly in coal and high-carbon shale from coal mining (fig. 8). The soil is mostly on hillsides and in valley fills close to abandoned or active coal mines. A few areas of this soil are valley fills, which impound water. Slope ranges from 5 to 80 percent, but are dominantly 25 to 80 percent. The top slopes make up about 25 percent of this map unit. They are gently sloping to moderately steep and generally narrow. The out slopes make up about 75 percent of the map unit. They are steep or very steep.

Typically, the surface layer is black very channery sandy loam about 5 inches thick. The substratum is black very channery and extremely channery sandy loam to a depth of 60 inches or more. About 55 percent of the rock fragments are coal and other high-carbon fragments, about 40 percent, are siltstone, and about 5 percent are sandstone.

Included with this soil in mapping are a few small areas of the well drained Berks, Cedarcreek, Dekalb, Kaymine, and Pineville soils. Also included are areas of soils that are less acid than Itmann soils and areas of soils that have burned or are burning. The included soils make up about 30 percent of this map unit.

Permeability of this Itmann soil is moderately rapid or rapid in the substratum. The available water capacity is very low to moderate. Runoff is medium or rapid in the bench areas and very rapid on out slopes. Natural fertility is very low. In unlimed areas the soil is strongly acid to extremely acid.

Most areas of this soil are barren. A few small areas have warm season grasses and a few trees. Trees on areas of the burned soil material include sweet birch, red maple, and sourwood.

This soil is not suitable for cultivated crops and for hay and pasture because of slope, the very low natural fertility, and the erosion hazard. Rill and gully erosion is a very severe hazard. Most steep and very steep areas are difficult to revegetate because of the very low fertility, the very low to moderate available water capacity, the acidity of the soil, and the high soil temperature in the surface layer. Diversions to reduce surface runoff, seeding, lime, fertilizer, and heavy mulching help to establish vegetation and to control erosion.

Potential productivity for trees on this soil is very low. The soil is very poorly suited to use as habitat for woodland wildlife.

Onsite investigation and testing are needed to determine the limitations and potentials of this soil for most uses. The included areas of burned soil material, or red dog, are used as a local source of road subgrade and fill material.

The capability subclass is VIIIs. The soil is not assigned to a woodland ordination group.

KcF—Kaymine-Cedarcreek-Dekalb complex, very steep. This map unit consists of well drained soils on mountain side slopes. It is about 30 percent very deep Kaymine soil and similar soils, 25 percent very deep Cedarcreek soil and similar soils, 20 percent moderately deep Dekalb soil and similar soils, and 25 percent other soils. The Kaymine and Cedarcreek soils formed in material from the surface mining of coal. The Dekalb soil is in the unmined areas of this map unit. The Kaymine and Cedarcreek soils are on the gently sloping or strongly sloping benches and the steep or very steep out slopes. They are adjacent to the nearly vertical highwallls. The Dekalb soil is very steep. It is on the undisturbed side slopes. Slope ranges from 3 to 35 percent on the benches and from 35 to 80 percent on out slopes and side slopes. Highwalls make up about 15 percent of the surface-mined areas, benches make up 25 percent, and out slopes make up 60 percent. In most areas stones and boulders cover 1 to 15 percent of the surface. The Kaymine, Cedarcreek, and Dekalb soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Kaymine soil is dark brown very channery loam about 3 inches thick. In the upper 14 inches the substratum is dark brown very channery loam. Below that, it is dark grayish brown very channery loam to a depth of 60 inches or more. About 60 percent of the rock fragments are siltstone and about 40 percent are sandstone. In places the soils are similar to the Kaymine soil except that they have more sand than that soil.

Typically, the surface layer of the Cedarcreek soil is very dark gray channery loam about 3 inches thick. In the upper 12 inches the substratum is olive brown very channery loam. Below that, it is dark olive gray extremely channery loam to a depth of 60 inches or more. About 50 percent of the rock fragments are sandstone, about 40 percent are siltstone, and about 10 percent are other rocks and coal. In places the soils are similar to the Cedarcreek soil except that they have more sand than the Cedarcreek soil.

Typically, the surface layer of the Dekalb soil is very dark grayish brown channery sandy loam about 5 inches thick. The subsoil is yellowish brown channery and very channery sandy loam, about 23 inches thick. The substratum is yellowish brown very channery sandy loam

Figure 8.—An area of Itmann very channery sandy loam, very steep, in the foreground and a snow-covered area of Dekalb-Pineville-Guyandotte association, very steep, very stony, in the background.

to bedrock at a depth of about 33 inches. In places the soils are similar to the Dekalb soil except that they have fewer rock fragments than the Dekalb soil.

Included with this complex in mapping are areas of vertical highwalls of rock outcrop. Also included are small areas of the well drained Berks, Pineville, and Guyandotte soils and the somewhat excessively drained Itmann soils. Also included are areas of soils less than 20 inches deep to bedrock, wet soils, soils where stones cover 15 to 50 percent of the surface, and rubble land.

Permeability of the Kaymine soil is moderate or moderately rapid in the substratum. The available water capacity is low to high, and natural fertility is medium or high. Runoff is medium or rapid on benches and rapid or very rapid on out slopes. Depth to bedrock is more than 60 inches. In unlimed areas the soil is moderately acid to neutral.

Permeability of this Cedarcreek soil is moderate or moderately rapid in the substratum. The available water capacity is low to high, and natural fertility is low or medium. Runoff is medium or rapid on benches and rapid or very rapid on out slopes. Depth to bedrock is more than 60 inches. In unlimed areas the soil is extremely acid to strongly acid.

Permeability of the Dekalb soil is rapid in the subsoil and the substratum. The available water capacity is very low to moderate, and natural fertility is low. Runoff is very rapid. Depth to bedrock is 20 to 40 inches. In unlimed areas the soil is very strongly acid or strongly acid.

Most areas of the soils in this map unit are woodland. Some areas are in grasses and legumes.

These soils are generally not suitable for cultivated crops or hay because of slope, stones and boulders on the surface, and the erosion hazard. In the less sloping bench areas the soils are poorly suited to pasture. Erosion is a severe hazard if the pasture is overgrazed. Deferred grazing, rotational grazing, lime, fertilizer, and planting desirable species help to establish and maintain good forage and to control erosion.

Potential productivity for trees on the soils is moderate or moderately high. The soils are suited to both coniferous and deciduous trees. In most areas the trees are not large enough to harvest for saw logs but can be harvested in places for mine timbers. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour and seeding and mulching the disturbed areas help to control erosion. Access to some areas is limited because of highwalls and the very steep slopes.

The vegetation on the Kaymine and Cedarcreek soils differs from place to place, but commonly consists of black locust, yellow poplar, American sycamore, white pine, and Virginia pine. The understory vegetation consists of sweet birch, red maple, sourwood, sassafras, blackberry, and multiflora rose. The common trees to plant for commercial wood production are eastern white pine, shortleaf pine, Virginia pine, black locust, yellow-poplar, and American sycamore. The vegetation on the Dekalb soil commonly consists of chestnut oak, scarlet oak, red maple, and black locust. Some open areas are covered by grasses, legumes, and autumn-olive.

These soils are suited to use as habitat for woodland wildlife. The variety of vegetation provides excellent food and cover for wildlife. The small wet depressions on benches help to provide water. Many areas support large populations of grouse.

Many areas of these soils are locations of or are used as access to undergound coal mines. Erosion is a hazard on roads and around mine sites. Laying out roads on the contour, collecting runoff in small sediment basins, and seeding and mulching in the disturbed areas help to control erosion.

The main limitations to use of these soils as sites for community development are stones, boulders, the very steep side slopes, potential differential settling, and highwalls. Onsite investigation and testing are needed to determine the limitations and potentials of these soils for most uses.

The capability subclass is VIIs. The Kaymine and Cedarcreek soils are in woodland ordination group 4R, and the Dekalb soil is in woodland ordination group 3R.

KmF—Kaymine-Rock outcrop complex, very steep. This map unit consists of the very deep, well drained Kaymine soil and areas of Rock outcrop in areas where coal was surface mined. It is about 65 percent Kaymine soil, 15 percent Rock outcrop, and 20 percent other soils. The Kaymine soil and areas of Rock outcrop are so intermingled that it was not practical to map them separately at the scale selected for mapping. The soils in this map unit are mostly on mountain side slopes. They are on the nearly vertical highwalls, the gently sloping and strongly sloping benches, and the very steep out slopes. The highwalls make up about 15 percent of the map unit. The benches are generally concave and have a slope range of 3 to 35 percent. They make up about 25 percent of the map unit. Out slopes are generally convex, and have a slope range of 35 to 80 percent. Out slopes make up about 60 percent of the map unit. In most areas stones and boulders cover 1 to 15 percent of the surface.

Typically, the surface layer of the Kaymine soil is dark brown very channery loam about 3 inches thick. In the upper 14 inches the substratum is dark brown very channery loam. Below that, it is dark grayish brown very channery loam to a depth of 60 inches or more. About 60 percent of the rock fragments is siltstone and about 40 percent is sandstone.

Rock outcrop consists of exposures of bedrock that have resulted from surface mining. The highwalls are vertical or nearly vertical and about 25 to 100 feet above the bench floor.

Included with this unit in mapping are areas of soils that are less than 20 inches deep to bedrock, soils that are 40 to 60 inches deep to bedrock, small wet depressions on bench areas, and areas on out slopes where stones and boulders cover more than 90 percent of the surface. Also included are a few areas of the very deep Pineville soils in coves and areas of the moderately deep Berks and Dekalb soils near the edge of highwalls. Small areas of the very deep Cedarcreek, Fiveblock, and Itmann soils are included on benches and outslopes.

Permeability of the Kaymine soil is moderate or moderately rapid in the substratum. The available water capacity is low to high, and natural fertility is medium or high. Runoff is medium or rapid on benches and rapid or very rapid on out slopes. Depth to bedrock is more than 60 inches. In unlimed areas the soil is moderately acid to neutral.

Most areas of the Kaymine soil is woodland. Some reclaimed areas are in grasses and legumes. Areas of Rock outcrop are generally barren.

This Kaymine soil is generally not suitable for cultivated crops or hay because of slope and stones and boulders on the surface. In the less sloping bench areas the soil is poorly suited to pasture. Erosion is a severe hazard if the pasture is overgrazed. Deferred grazing, rotational grazing, lime and fertilizer as needed, and planting desirable species help to establish and maintain good forage and to control erosion.

Potential productivity for trees on the Kaymine soil is moderately high. It is suited to both coniferous and deciduous trees. In most areas the trees are not large enough to harvest for saw logs but in places can be harvested for mine timbers. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour and seeding and mulching the disturbed areas help to control erosion. Access to some areas is limited because of highwalls and the very steep side slopes.

The vegetation on the Kaymine soil differs from place to place but commonly consists of black locust, yellow-poplar, American sycamore, and eastern white pine. The common trees to plant for commerical wood production are eastern white pine, black locust, yellow-poplar, sugar maple, and American sycamore. The understory vegetation commonly consists of sugar maple, red maple, redbud, blackberry, jewelweed, and multiflora rose. Some open areas are covered by grasses, legumes, and autumn-olive.

The Kaymine soil is suited to use as habitat for woodland wildlife. The variety of vegetation provides good food and cover for wildlife. The small wet areas on benches help to provide water. Many areas support large populations of grouse.

Many areas of the Kaymine soil are locations of underground coal mines. The bench areas are used as access to the coal seam. Erosion is a hazard on roads and near mine sites. Laying out roads on the contour, collecting runoff in sediment basins, and seeding and mulching the bare areas help to control erosion.

The main limitations to use of the Kaymine soil as sites for community development are stones and boulders, the very steep side slopes, potential differential settling, and rock outcrops. Onsite investigation and testing are needed to determine the limitations and potentials of this soil for most uses.

The Kaymine soil is in capability subclass VIIs and in woodland ordination group 4R.

MgB—Monongahela loam, 3 to 8 percent slopes. This is a gently sloping and moderately well drained soil. Most areas are on terraces along Clear Fork, Laurel Fork, and the Guyandotte River.

Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is 44 inches thick. In the upper 20 inches it is brown, strong brown, and yellowish brown loam that has light gray mottles in the lower part. In the lower 24 inches it is yellowish brown, brittle loam and clay loam mottled with brownish yellow, light gray, and strong brown. The substratum extends to a depth of 60 inches or more. It is yellowish brown clay loam that has light gray and strong brown mottles.

Included with this soil in mapping are a few small areas of the well drained Chagrin soils, the moderately well drained Buchanan and Lobdell soils, and the poorly drained Holly soils. Also included are small areas of urban land and soils that have slope of 8 to 15 percent. The included soils make up about 20 percent of the map unit.

Permeability of this Monongahela soil is moderate above the brittle part of the subsoil and moderately slow or slow in the brittle part. Permeability is moderately slow in the substratum. The available water capacity is moderate. Runoff is medium, and natural fertility is low. In unlimed areas the soil is strongly acid or very strongly acid. The root zone of deep-rooted plants is restricted by the seasonal high water table and fragipan about 1 1/2 to 3 feet below the surface. Depth to bedrock is more than 60 inches.

Most areas of this soil have been cleared and are used for cultivated crops and for hay and pasture. Some areas are used as homesites, and a few small areas are wooded or are idle.

This soil is suited to cultivated crops and to hay and pasture. Erosion is a moderate hazard in unprotected areas. In some small wet areas drainage is needed for crops. Conservation tillage, cover crops, a crop sequence that includes hay, tillage delayed until the soil is reasonably dry, and crop residue mixed into the soil help to maintain fertility and soil tilth and to control erosion. In pasture management, proper stocking rates, rotational grazing, and deferred grazing until the soil is reasonably firm help to maintain the desirable grasses and legumes.

This soil is suited to use as home gardens. The main limitation is the seasonal high water table. In some areas artificial drainage is needed to successfully grow such early season crops as potatoes, lettuce, peas, and onions. The soil is better suited to such late season crops as sweet corn and tomatoes. In some areas late spring frosts are a problem because this soil is in low positions that have poor air drainage.

Potential productivity for trees on this soil is moderately high. A small acreage is wooded. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour helps to control erosion. The soil is soft during the wet seasons and thus restricts the use of equipment.

The main limitations to use of this soil as sites for community development are the seasonal high water table and the moderately slow or slow permeability in the subsoil. Maintaining the plant cover on construction sites, establishing a plant cover in the unprotected areas, and installing surface drainage help to control erosion and sedimentation.

The capability subclass is IIe. The woodland ordination group is 4A.

PbC—Pineville-Buchanan channery loams, 3 to 15 percent slopes. This map unit consists of gently sloping to strongly sloping, well drained and moderately well drained soils on foot slopes mostly along the valleys of large streams. It is about 45 percent Pineville soil, 30 percent Buchanan soil, and 25 percent other soils. The Pineville soil is generally in positions above the Buchanan soil. These soils are so intermingled that it was not practical to map them separately at the scale selected for mapping.

Typically, the surface layer of the Pineville soil is dark brown and brown channery loam about 6 inches thick. The subsoil is yellowish brown channery loam and very channery loam about 47 inches thick. The substratum is yellowish brown very channery loam to a depth of 60 inches or more.

Typically, the surface layer of the Buchanan soil is dark brown channery loam about 4 inches thick. The subsoil is about 55 inches thick. In the upper 13 inches it is dark brown and yellowish brown channery loam. In the next 18 inches it is strong brown channery and very channery loam and is mottled with light brownish gray in the lower part. In the lower 24 inches it is brown, brittle very channery loam that is mottled with light brownish gray and strong brown. The substratum is grayish brown very channery loam to a depth of 60 inches or more.

Included with these soils in mapping are a few small areas of the well drained Chagrin, Potomac, Gilpin, and Lily soils, the moderately well drained Lobdell soils, and the poorly drained Holly soils. Also included are a few small areas of urban land, areas of soils where stones cover 1 to 3 percent of the surface, and soils that have slopes of 15 to 35 percent.

Permeability of the Pineville soil is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate to high. Runoff is medium, and natural fertility is low or medium. In unlimed areas the soil is very strongly acid to neutral in the surface layer and very strongly acid or strongly acid in the subsoil. Depth to bedrock is more than 60 inches.

Permeability of the Buchanan soil is moderate in the upper subsoil and slow in the fragipan and in the substratum. The available water capacity is moderate. Runoff is medium or rapid, and natural fertility is low or medium. In unlimed areas the soil is very strongly acid to slightly acid in the surface layer and strongly acid or very strongly acid in the subsoil. The root zone of deep-rooted plants is restricted by the seasonal high water table and fragipan about 1 1/2 to 3 feet below the surface. Depth to bedrock is more than 60 inches.

Most areas of these soils have been cleared and are used for cultivated crops, hay, and pasture. Some areas are used as homesites, and a few areas are wooded.

These soils are suited to cultivated crops and to hay and pasture. Erosion is a moderate or severe hazard in the unprotected areas. Conservation tillage, contour stripcropping, a crop rotation that includes hay crops, and crop residue mixed into the soil help to maintain fertility and soil tilth and to control erosion. In pasture management, proper stocking rates, rotational grazing, and deferred grazing in spring until the soil is firm help to maintain the desirable grasses and legumes.

These soils are suited to home gardens. On the Buchanan soil, the seasonal high water table is a limitation for early spring crops. On the Buchanan soil, in some areas artificial drainage is needed for such crops as potatoes, lettuce, peas, and onions. On the Pineville and Buchanan soils, in some areas late spring frosts are a problem because the soils are in low positions that have poor air drainage.

Potential productivity for trees on these soils is moderately high. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour and out of streams helps to control erosion and sedimentation.

The main limitations to use of the Buchanan soil as sites for community development are the slow permeability and the seasonal high water table. There are no limitations for the Pineville soil. Maintaining the plant cover at construction sites, establishing a plant cover in the unprotected areas, and installing surface drainage help to control erosion and sedimentation.

The capability subclass is IIIe. The woodland ordination group is 4A.

PcE—Pineville-Buchanan channery loams, 15 to 35 percent slopes, stony. This map unit consists of moderately steep and steep, well drained and moderately well drained soils on foot slopes. It is about 45 percent Pineville soils, 30 percent Buchanan soils, and 25 percent other soils. Stones cover 1 to 3 percent of the surface. The Pineville and Buchanan soils are so intermingled that it was not practical to map them separately at the scale selected for mapping.

Typically, the surface layer of the Pineville soil is very dark grayish brown and brown channery loam about 6 inches thick. The subsoil is yellowish brown channery loam and very channery loam about 47 inches thick. The substratum is yellowish brown very channery loam to a depth of 60 inches or more.

Typically, the surface layer of the Buchanan soil is dark brown channery loam about 4 inches thick. The subsoil is about 55 inches thick. In the upper 13 inches it is dark brown and yellowish brown channery loam. In the next 18 inches it is strong brown channery and very channery loam and is mottled with light brownish gray in the lower part. In the lower 24 inches it is brown, brittle very channery loam that is mottled with light brownish gray and strong brown. The substratum is grayish brown very channery loam to a depth of 60 inches or more.

Included with these soils in mapping are a few small areas of the well drained Chagrin, Potomac, Gilpin, and Lily soils, the moderately well drained Lobdell soils, and the poorly drained Holly soils. Also included are a few small areas of urban land, a few areas of soils where stones cover 3 to 15 percent of the surface, a few areas of nonstony soils, and a few areas of soils that have slope of more than 35 percent.

Permeability of the Pineville soil is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate or high. Runoff is rapid or very rapid, and natural fertility is low or medium. In unlimed areas the soil is very strongly acid to neutral in the surface layer and very strongly acid or strongly acid in the subsoil. Depth to bedrock is more than 60 inches.

Permeability of the Buchanan soil is moderate in the upper part of the subsoil and slow in the lower, brittle part, or fragipan, and in the substratum. Runoff is rapid or very rapid, and natural fertility is low or medium. In unlimed areas the soil is very strongly acid to slightly acid in the surface layer and strongly acid or very strongly acid in the subsoil. The root zone of some deep-rooted plants is restricted by the acid subsoil. Depth to bedrock is more than 60 inches.

These soils are generally not suitable for cultivated crops or hay because of the slope and stones on the surface. They are difficult to manage for pasture. Erosion is a severe or very severe hazard in the unprotected areas. In pasture management, proper stocking rates, rotational grazing, and deferred grazing in spring until the soil is firm help to maintain the desirable grasses and legumes.

Potential productivity for trees on these soils is moderately high. Most areas have stands of yellow-poplar, northern red oak, hickory, white oak, black locust, and beech. The common trees to plant for commercial wood production are northern red oak, yellow-poplar, black walnut, black cherry, and white oak. Erosion is a hazard on roads and skid trails. Laying out roads and trails on the contour and out of streams helps to control erosion and sedimentation.

The main limitation to use of these soils as sites for community development is slope. On the Buchanan soil, the slow permeability and the seasonal high water table are also limitations. Maintaining the plant cover at construction sites, establishing a plant cover in the unprotected areas, and installing surface drainage help to control erosion and sedimentation.

The capability subclass is VIIs. The woodland ordination group for the Pineville soil on the north aspect is 5R and on the south aspect is 4R and for the Buchanan soil is 4R.

PoB—Potomac sandy loam, 3 to 8 percent slopes. This is a gently sloping and somewhat excessively drained soil on the high flood plains along small streams throughout the county. It is subject to rare flooding.

Typically, the surface layer is dark brown sandy loam about 8 inches thick. The substratum extends to a depth of 60 inches or more. In the upper 28 inches it is dark yellowish brown very gravelly loamy sand, and in the lower 29 inches it is yellowish brown extremely cobbly sand.

Included with this soil in mapping are a few small areas of the somewhat excessively drained Itmann soils, the well drained Chagrin and Pineville soils, the moderately well drained Buchanan and Lobdell soils, and the poorly drained Holly soils. Also included are small areas of soils that are subject to occasional flooding, a few small areas of urban land, and some areas of soils that have been altered by cutting and filling. The included soils make up about 20 percent of this map unit.

Permeability of this Potomac soil is rapid or very rapid in the substratum. The available water capacity is low or very low. Runoff is slow or medium, and natural fertility is low or medium. In unlimed areas the soil is strongly acid to neutral. Depth to bedrock is more than 60 inches.

Many areas of this soil have been cleared and are used for cultivated crops and for hay and pasture. Many areas are used as homesites, and some areas are wooded or are idle.

This soil is poorly suited to cultivated crops. It is better suited to hay and pasture. The main limitation is droughtiness during the dry seasons. Cover crops, conservation tillage, a crop sequence that includes hay, and crop residue mixed into the soil helps to increase the moisture holding capacity and to maintain fertility and soil tilth. In pasture management, proper stocking rates, rotational grazing, and during dry seasons, deferred grazing help to maintain the desirable grasses and legumes.

In some areas this soil is suited to use as home gardens (fig. 9). The main limitation is droughtiness in dry periods. This soil is well suited to early season crops, such as potatoes and onions. Cover crops, mulch, and crop residue mixed into the soil help to maintain fertility, organic matter content, and soil tilth. In some areas late spring frosts are a problem because of the poor air drainage on the soil.

Potential productivity for trees on this soil is moderately high (fig. 10). A few stands of yellow-poplar, American beech, and eastern hemlock are along the upper reaches of Pinnacle Creek, Indian Creek, Clear Fork, and Huff Creek. Most areas of this soil have stands of American sycamore and river birch. The common trees to plant for commercial wood production are yellow-poplar, northern red oak, American sycamore, black walnut, and eastern white pine.

The main limitations to use of this soil as sites for community development are flooding and the rapid or very rapid permeability in the substratum. A plant cover

Figure 9.—A home garden in an area of Potomac sandy loam, 3 to 8 percent slopes.

in the unprotected areas and installing surface drainage help to control stream scouring and sedimentation.

The capability is IVs. The woodland ordination group is 5F.

PuB—Potomac-Urban land complex, 3 to 8 percent slopes. This map unit consists of the well drained Potomac soils and areas of Urban land along the smaller streams in urban areas. It is about 40 percent Potomac soils, 35 percent Urban land, and 25 percent other soils. The Potomac soil and Urban land are on the gently sloping flood plains that are subject to rare flooding. The Potomac soil and areas of Urban land are in such an intricate pattern that it was not practical to map them separately at the scale selected for mapping.

Typically, the surface layer of the Potomac soil is dark brown sandy loam about 8 inches thick. The substratum extends to a depth of 60 inches or more. In the upper 28 inches it is dark yellowish brown very gravelly loamy sand, and in the lower 29 inches it is yellowish brown extremely cobbly sand.

The Urban land consists of areas covered by houses, streets, commercial buildings, parking areas, railroads, and other impermeable structures in urban areas.

Included with this unit in mapping are a few small areas of the well drained Chagrin soils, the moderately well drained Lobdell soils, the poorly drained Holly soils,

Figure 10.—A wooded area of Potomac sandy loam, 3 to 8 percent slopes.

and soils that are subject to occasional flooding. Also included are small areas of the moderately well drained Monongahela soils, the somewhat excessively drained Itmann soils, soils that have slope of 0 to 3 percent, and some areas of soils that have been altered by cutting and filling.

Permeability of this Potomac soil is rapid or very rapid in the substratum. The available water capacity is very low or low. Runoff is medium, and natural fertility is low or medium. In unlimed areas the soil is strongly acid to neutral. Depth to bedrock is more than 60 inches.

Most areas of this Potomac soil are used as sites for homes and small commercial structures. Many small areas are used for home gardens, and some small areas are wooded or are idle.

The Potomac soil is suited to use as home gardens. The main limitation is droughtiness in dry periods. The soil is well suited to early season crops, such as potatoes and onions. Cover crops, mulch, and crop residue mixed into the soil help to maintain fertility, organic matter content, and soil tilth. In some areas late spring frosts are a problem because of poor air drainage on the soil.

The main limitations to use of this Potomac soil as sites for community development is flooding and the

Figure 11.—A vegetated area of Sewell channery sandy loam, strongly sloping.

rapid or very rapid permeability in the substratum. A plant cover in the unprotected areas and surface drainage help to control stream scouring and sedimentation.

This map unit is not assigned to a capability subclass or woodland ordination group.

SeC—Sewell channery sandy loam, strongly sloping. This is a very deep, somewhat excessively drained soil in areas where coal was surface mined. It is mostly on mountaintops along the southern boundary of the county. It is on the gently sloping to strongly sloping hilltops and the steep or very steep out slopes. The hilltops generally have concave slopes that range from 3 to 25 percent. They make up about 70 percent of the map unit. The out slopes generally have convex slopes that range from 25 to 45 percent. They make up about 30 percent of the map unit. In most areas stones and boulders cover 1 to 15 percent of the surface.

Typically, the surface layer is yellowish brown channery sandy loam about 4 inches thick. The substratum extends to a depth of 60 inches or more. In the upper 5 inches it is dark yellowish brown very channery sandy loam, and in the lower 56 inches it is yellowish brown extremely channery sandy loam. About 90 percent of the rock fragments are sandstone and about 10 percent are siltstone.

Included with this soil in mapping are areas of soils that are less than 60 inches deep to bedrock, small wet depressions in the hilltop areas, small areas of rubble land on out slopes, a few areas of the moderately deep Berks soils and Dekalb soils near the edges of out slopes and ridgetops, and a few areas of the very deep Pineville soils in coves. Also included are some small areas of the very deep Cedarcreek soils on benches and out slopes and some areas of soils that have a sand texture. The included soils make up about 30 percent of this map unit.

Permeability of this Sewell soil is moderately rapid or rapid in the substratum. The available water capacity is very low to moderate. Runoff is slow to medium on hilltops and rapid or very rapid on out slopes. Natural fertility is low. The soil is extremely acid to strongly acid.

Most areas of this soil are in grasses and legumes (fig. 11). Some older, reclaimed areas have small trees, such as locust and yellow-poplar.

This soil generally is not suitable for cultivated crops because of slope, and stones and boulders on the surface. In the hilltop areas the soil is poorly suited to hay and pasture. On pasture, erosion is a severe hazard. Deferred grazing, rotational grazing, lime and fertilizer, and planting desirable species help to maintain good forage and to control erosion.

Potential productivity for trees on this soil is moderately high. It is suited to deciduous and coniferous trees. Most trees are not large enough to harvest for timber. The common trees to plant for commercial wood production are eastern white pine, Virginia pine, shortleaf pine, and black locust. Erosion is a hazard on logging roads and skid trails. Laying out roads and trails on the contour and seeding and mulching in the disturbed areas help to control erosion. Access to some areas is limited because of the steep and very steep side slopes.

This soil is suited to use as habitat for woodland wildlife. The variety of vegetation provides food and cover for wildlife, and the small wet areas on hilltops help to provide water.

This soil is not suited to use as sites for community development because of the steep and very steep out slopes, potential differential settling, and difficulty in excavating because of stones and boulders.

The capability subclass is VIIs. The woodland ordination group is 4X.

Ud—Udorthents, smoothed. This map unit is nearly level to very steep. It consists of mixed soil material and rock fragments from areas that have been excavated, graded, or filled.

The soils in this map unit are commonly gray, brown, and yellow and are generally mottled. Most areas are loamy, but a few areas are clayey.

In a few areas these soils are poorly suited to pasture, but most areas are better suited to use as woodland or as habitat for wildlife. Onsite investigation is needed to determine the suitability of this map unit for other uses.

This map unit is not assigned a capability subclass or woodland ordination group.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 8 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 1,955 acres of prime farmland. That acreage makes up about 0.6 percent of the total acreage in the survey area and is mainly adjacent to Clear Fork but is also throughout the rest of the county.

The soil map units that make up prime farmland in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed Soil Map Units."

Use and Management of the Soils

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

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Dixie L. Shreve, State Resource Conservationist, Soil Conservation Service, helped to prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Some general principles of management apply throughout the survey area to all soils suitable for farm crops and pasture, although individual soils or groups of soils require different kinds of management.

Natural fertility on most soils in the survey area is medium or low; thus lime and fertilizer are necessary. The application rates for lime and fertilizer depend on the type of soil, the cropping history, the type of crop grown, the desired level of yield, and soil tests and analyses.

The organic matter content, which is low in most cultivated soils, generally cannot feasibly be increased. It can, however, be increased by farm manure, crop residue mixed into the soil, sod crops, cover crops, and green manure crops.

Tillage tends to break down the soil structure, and should be kept to a minimum in preparing the seedbed and in controlling weeds. Maintaining the organic matter content in the plow layer helps to maintain the soil structure.

Artificial drainage is needed on Holly soils for cultivated crops, and for hay and pasture. On soils that have a fragipan in the subsoil, such as Buchanan and Monongahela soils, drainage with tile is difficult. Drainage on such soils is better with random tile drainage, diversions, or both.

Runoff and erosion occur on the soil mainly while under cultivation or soon after harvest. All the gently sloping and steeper soils that are cultivated are subject to erosion and thus require a suitable cropping system to control erosion. Proper crop rotation, conservation tillage, crop residue mixed into the soil, cover crops, green manure crops, and lime and fertilizer are suitable management practices. Contour farming, diversions for runoff, and grassed waterways help to control erosion. 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 soil for pasture is effective in controlling erosion in most areas. On some soils, a high level of pasture management, including fertilizer, controlled grazing, rotational grazing, deferred grazing, and careful selection of pasture plant mixtures, is needed to maintain adequate ground cover and to control erosion. Controlled grazing is not allowing grazing closer than 3 inches. Rotational grazing is rotating livestock from one pasture to another. Deferred grazing is providing idle periods on pasture to allow the regrowth of plants. Some soils need pasture plant mixtures that require a minimum of renovation to maintain good ground cover and forage.

Many small areas in Wyoming County are used for home gardens. A good soil for gardens is nearly level or gently sloping, loamy, and moderately permeable, and the available water capacity is high. Reaction needed for most garden plants is slightly acid or neutral. Most soils in the survey area are strongly acid to extremely acid, and thus require lime. Erosion is a hazard on cultivated soils. Diversions, contour farming, cover crops, green manure crops, and lime and fertilizer help to maintain fertility and soil tilth and to control erosion.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. The levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony;

and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

C. Lewis Rowan, forester, Soil Conservation Service, and Raymond L. Arnold, forester, West Virginia Department of Natural Resources, helped to prepare this section.

Virgin forest once covered almost all of the land in Wyoming County. Early settlers cleared land suitable for cultivation along the major streams; however, the vast majority of forest land was cut when steam-driven sawmills and the railroad became operative in the area between 1890 and 1930. Woodland now takes in about 93 percent of the survey area, or 300,687 acres (*5*). Forest fires have been a serious problem in this area since the early lumbering operations. Fire control in recent years has caused a decrease in the size of burned areas; however, the number of forest fires has remained about the same.

Most forest land has been cut over at least once, and the second-growth timber is of low to average quality. Timber is sold mainly for use in the mines, and about 20 percent is sold for grade lumber. Many pole-sized timber stands are cut for mine props before they reach sawtimber size.

Among the most common commercial forest types, the oak-hickory type makes up about 51 percent of the forest, the yellow-poplar-cucumber tree-basswood type makes up about 32 percent, the maple-beech-birch-cherry-ash (northern hardwoods) type makes up about 9 percent, the hemlock type makes up about 7 percent, and the Virginia-shortleaf-pitch white pine type makes up about 1 percent. The yellow-poplar type has increased considerably in the last 50 years, mainly as a result of regrowth on abandoned farmland. Surface mining, a major influence on forest land, has caused an increase of the pioneer species and a decrease of the climax species. Access for fire control has been improved in some remote areas of the county because of roads built for mining.

Thinning out the mature trees and removing the undesirable species during timbering operations would improve much of the existing commercial woodland. Culverts and water bars on haul roads, filter strips between haul roads and streams, protection from grazing, fire control, and disease and insect control are also needed to improve timber productivity and to control erosion on forest land.

The aspect of some soils, generally those that have slope of more than 15 percent, is shown in table 8. North aspect means facing any compass direction from 315 degrees to 135 degrees. South aspect means facing any compass direction from 135 degrees to 315 degrees. Aspect affects potential productivity on the sloping soils. The soils on the north aspect generally are moister than those on the south aspect and generally have a higher site index (see below). Aspect also affects the occurrence of tree species and the need for management practices.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed in the tables. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 through 8, high; 9 through 11, very high; and 12 or more, extremely high.

The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W*, excessive water in or on the soil; *T*, excessive alkalinity, acidity, sodium salts, or other toxic substances in the soil; *D*, restricted rooting depth caused by bedrock, hardpan, or other restrictive layer; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, high content of rock fragments in the soil profile. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R,X,W,T,D,C,S, and F.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 16. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *Slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 2 months. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 2 to 6 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 3 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occuring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality.

Plant competition is the likelihood of the invasion or growth of undesirable species where openings are made in the canopy. The main factors that affect plant competition are depth to the water table and available water capacity of the soil. A rating of *slight* indicates that competition from unwanted plants is not likely to suppress the more desirable species or prevent their natural regeneration. Planted seedlings have good prospects for development without undue competition. A rating of *moderate* indicates that competition may delay the natural regeneration of desirable species or of planted trees and may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent natural regeneration or restrict planted seedlings unless precautionary measures are taken.

Adequate site preparation before planting the new crop can help reduce plant competition.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as *site index* and *average annual growth*. Site index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. Average annual growth, which varies with stand vigor and other factors, is equal to total volume growth at rotation divided by rotation age. Yield data are based on site indices of natural stands at age 50 using the International 1/4 Log Rule and standard rough cords. This information should be used for planning only.

Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Gary A. Gwinn, biologist, Soil Conservation Service, helped to prepare this section.

Wildlife species commonly found in Wyoming County are generally those adapted to woodland habitat. Species such as gray squirrel, gray fox, ruffed grouse, wood thrush, and red-eyed vireo are distributed throughout the county. Turkey, which was recently introduced, is expected to increase in numbers. Another recent introduction, the European wild boar, is established in a stable population in one area, and is expected to increase in numbers.

Openland wildlife species, such as bobwhite quail, cottontail, and meadowlark, are limited in the county, both in variety and in total numbers. Inasmuch as less than 1 percent of the county is classified as farmland, these species are restricted by the lack of suitable habitat. Wetland wildlife species are limited for similar reasons.

The general absence of openland habitat also greatly reduces the amount of "edge," or transitional, habitat in the county. This "edge" habitat is very important to a great variety of wildlife species, including white-tailed deer (fig. 12). The number of deer in the county, although slowly increasing, is still far below desirable levels. Poachers and predators, especially wild dogs, have reduced the deer population.

"Edge" habitat in the county is found largely in the surface-mined areas. As additional areas are mined, planned reclamation can provide needed openland habitat and consequently can help to increase the density and diversity of wildlife populations.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface

Figure 12.—White-tailed deer in a snow-covered area of Holly-Lobdell complex.

stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, red clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, ragweed, asters, and broomsedge.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, yellow poplar, cherry, aspen, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are mountain ash, viburnum, and American hazel.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, hemlock, and red cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, bulrushes, cutgrass, rushes, sedges, and cattails.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

Engineering

James L. Dove, engineer, Soil Conservation Service, helped to prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

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

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 17 gives the frequency of flooding.

Frequency, which is estimated, generally is expressed as *none, rare, occasional, common,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year).

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*8*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ochrept (*Ochr*, meaning light-colored surface, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Dystrochrepts (*Dystr*, meaning low base saturation, plus *ochrept*, the suborder of the Inceptisols that have a light-colored surface layer).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Dystrochrepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy-skeletal, mixed, mesic Typic Dystrochrepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

Dr. John Sencindiver, Associate Professor of Agronomy, West Virginia Agricultural and Forestry Experiment Station, helped to prepare this section.

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*7*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*8*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Berks Series

The Berks series consists of moderately deep, well drained soils. These soils formed in material weathered from interbedded siltstone, shale, and fine-grained sandstone. They are on side slopes and ridgetops throughout most of the county. Slope ranges from 35 to 80 percent.

Berks soils are near the well drained Cedarcreek, Gilpin, Kaymine, Lily, and Pineville soils and the moderately well drained Buchanan soils. Berks soils are shallower than Buchanan, Cedarcreek, Kaymine, and Pineville soils. They have more rock fragments and less clay in the subsoil than Gilpin and Lily soils.

Typical pedon of Berks channery loam, in an area of Berks-Pineville association, very steep, very stony, about 2 miles southwest of Herndon Heights, in woodland:

Oe—1 inch to 0; decomposed hardwood leaf litter.

A—0 to 7 inches; dark brown (10YR 3/3) channery loam; light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine, medium, and coarse roots; 20 percent rock fragments; strongly acid; abrupt smooth boundary.

BA—7 to 14 inches; yellowish brown (10YR 5/4) channery loam; weak fine subangular blocky structure; friable; common fine, medium, and coarse roots; 30 percent rock fragments; slightly acid; clear wavy boundary.

Bw—14 to 29 inches; strong brown (7.5YR 5/6) very channery loam; weak to moderate medium subangular blocky structure; friable; few fine and medium roots, 35 percent rock fragments; slightly acid; clear wavy boundary.

BC—29 to 34 inches; yellowish brown (10YR 5/6) very channery loam; weak medium subangular blocky structure; friable; few fine and medium roots; 40 percent rock fragments; slightly acid; clear wavy boundary.

C—34 to 38 inches; yellowish brown (10YR 5/6) very channery loam; massive; firm; few fine roots; 55 percent rock fragments; strongly acid; abrupt wavy boundary.

R—38 inches; brown, fine-grained sandstone.

The solum ranges from 18 to 40 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Rock fragments of siltstone, fine-grained sandstone, and shale make up 10 to 35 percent of the A horizon, 15 to 75 percent of individual subhorizons of the B horizon, and 35 to 90 percent of the C horizon. In unlimed areas reaction ranges from very strongly acid to slightly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3.

The BA, Bw, and BC horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. The fine earth material is loam or silt loam. In the B horizon structure is weak or moderate, fine or medium, subangular blocky. Consistence is friable or firm.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. Consistence is friable or firm. The fine earth material is loam or silt loam.

Buchanan Series

The Buchanan series consists of very deep, moderately well drained soils. These soils formed in colluvial material that moved downslope from soils on uplands underlain by sandstone, siltstone, and shale. They are on foot slopes, along drainageways, and in coves throughout the county. Slope ranges from 3 to 35 percent.

Buchanan soils are near the well drained Berks and Pineville soils. Unlike Berks and Pineville soils, Buchanan soils have a fragipan. Also, Buchanan soils are deeper than Berks soils.

Typical pedon of Buchanan channery loam, in an area of Pineville-Buchanan channery loams, 15 to 35 percent slopes, stony, about 100 feet east of Pinnacle Creek Road, about 2.1 miles southeast of its junction with West Virginia Route 16, in woodland:

A—0 to 4 inches; dark brown (10YR 3/3) channery loam; moderate fine granular structure; very friable; many fine roots; 20 percent rock fragments; strongly acid; abrupt wavy boundary.

BA—4 to 10 inches; dark brown (7.5YR 4/4) channery loam; moderate fine subangular blocky structure; friable; common fine and medium roots; 15 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—10 to 17 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few faint clay films on faces of peds; 30 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—17 to 26 inches; strong brown (7.5YR 5/6) very channery loam; many medium light brownish gray (2.5YR 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; common faint clay films on faces of peds; 40 percent rock fragments; very strongly acid; clear wavy boundary.

Bt3—26 to 35 inches; strong brown (7.5YR 5/6) channery loam; many medium light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint clay films on faces of peds; 20 percent rock fragments; strongly acid; clear wavy boundary.

Bx—35 to 59 inches; brown (10YR 5/3) very channery loam; common fine light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure parting to weak medium subangular blocky; very firm and brittle; 35 percent rock fragments; strongly acid; gradual wavy boundary.

C—59 to 65 inches; grayish brown (10YR 5/2) very channery loam; common fine light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) mottles;

massive; very firm; 35 percent rock fragments; strongly acid.

The solum ranges from 40 to 60 inches in thickness, and depth to bedrock is more than 60 inches. Rock fragments of sandstone, siltstone, or shale make up 10 to 40 percent of the solum and 20 to 60 percent of the C horizon. In unlimed areas reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4.

The Bt and Bx horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. The fine earth material is loam, clay loam, or silt loam. In the Bt horizon structure is weak or moderate, fine, medium, or coarse subangular blocky and consistence is friable or firm. In the Bx horizon structure is weak or moderate very coarse prismatic and consistence is firm or very firm.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 8. The fine earth material is loam, clay loam, or silt loam. Consistence is firm or very firm.

Cedarcreek Series

The Cedarcreek series consists of very deep, well drained soils. These soils formed in partly weathered sandstone, siltstone, shale, and some coal from the surface mining of coal. They are on ridgetops, benches, and side slopes throughout the county. Slope ranges from 3 to 80 percent.

Cedarcreek soils are near the well drained Berks, Dekalb, and Kaymine soils and the somewhat excessively drained Fiveblock, Itmann, and Sewell soils. Cedarcreek soils are deeper than Berks and Dekalb soils, are more acid than Fiveblock and Kaymine soils, and have more clay in the substratum than Itmann and Sewell soils.

Typical pedon of Cedarcreek channery loam, in an area of Kaymine-Cedarcreek-Dekalb complex, very steep, about 1.5 miles southwest of Ivy Knob Fire Tower, about 200 feet northwest of Crane Fork, in a grass-legume area:

A—0 to 3 inches; very dark gray (5Y 3/1) channery loam; weak fine granular structure; very friable; many fine and medium roots; 35 percent channers and stones (70 percent sandstone and 30 percent siltstone); very strongly acid; gradual wavy boundary.

Cl—3 to 15 inches; olive brown (2.5Y 4/4) very channery loam; common yellow, brown, and gray lithochromic mottles; massive, firm; few fine and medium roots; 60 percent channers and stones (55 percent sandstone, 40 percent siltstone, and 5 percent coal fragments); very strongly acid; gradual wavy boundary.

C2—15 to 65 inches; dark olive gray (5Y 3/2) extremely channery loam; common yellow, brown, and gray lithochromic mottles; massive, very firm; few fine and medium roots; 70 percent channers and stones (55 percent sandstone, 40 percent siltstone, and 5 percent coal fragments); very strongly acid.

Depth to bedrock is more than 60 inches. Reaction ranges from strongly acid to extremely acid except where the surface layer has been limed. Rock fragments range from 35 to 80 percent by volume throughout. They are sandstone, siltstone, shale, and coal, and the percentage of each is less than 65 percent of the total rock fragments in the control section. They are mostly channers, but include stones and a few boulders. Most pedons have red, brown, yellow, or gray lithochromic mottles in some or all horizons.

The A horizon is neutral or has hue of 7.5YR to 5Y, value of 2 to 5, and chroma of 1 to 4. Consistence is friable or very friable. In some pedons the A horizon was formed by spreading soil material, which had been stockpiled at the start of excavation, over the land surface. In these pedons the A horizon is 4 to 20 inches thick and is, by volume, 10 to 35 percent channers.

The C horizon is neutral or has hue of 7.5YR to 5Y, value of 2 to 6, and chroma of 1 to 8. The fine earth material is mostly loam or silt loam, but the range includes sandy loam. Consistence is friable or firm.

Chagrin Series

The Chagrin series consists of very deep, well drained soils. These soils formed in alluvial material washed from soils on uplands underlain by sandstone and shale. They are on the low and high flood plains of Clear Fork and the Guyandotte River and their tributaries. Slope ranges from 0 to 3 percent.

Chagrin soils are near the somewhat excessively drained Potomac soils, the moderately well drained Lobdell and Monongahela soils, and the poorly drained Holly soils. Chagrin soils do not have the fragipan typical of Monongahela soils. They have fewer rock fragments throughout than Potomac soils.

Typical pedon of Chagrin loam, rarely flooded, about 1,000 feet northwest of West Virginia Route 971, about 1 mile south of Lillydale, in a hayfield:

Apl—0 to 2 inches; dark grayish brown (10YR 4/2) loam; moderate fine granular structure; very friable; many fine and very fine roots; moderately acid; abrupt smooth boundary.

Ap2—2 to 9 inches; dark brown (10YR 4/3) loam; moderate fine granular structure; very friable; many fine and medium roots; moderately acid; clear wavy boundary.

Bw1—9 to 13 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; many fine and medium roots; moderately acid; clear wavy boundary.

Bw2—13 to 32 inches; dark yellowish brown (10YR 4/4) loam; moderate coarse subangular blocky structure; friable; few faint silt films on faces of peds; common fine and medium roots; moderately acid; clear wavy boundary.
BC—32 to 48 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak coarse subangular blocky structure; friable; few fine roots; moderately acid; gradual wavy boundary.
C—48 to 65 inches; dark yellowish brown (10YR 4/4) fine sandy loam; few fine strong brown (7.5YR 5/6) and brown (10YR 5/3) mottles; massive; very friable; moderately acid.

The solum ranges from 30 to 48 inches in thickness. Depth to bedrock is more than 60 inches. Gravel content ranges from 0 to 10 percent in the solum and from 0 to 15 percent in the substratum. In unlimed areas reaction is moderately acid.

The A horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is sandy loam or loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is fine sandy loam, loam, or silt loam. The B horizon has weak or moderate, medium or coarse, subangular blocky structure. Consistence is friable or very friable.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6. It is sandy loam, fine sandy loam, or loam. Below a depth of 40 inches it is loamy fine sand, and in some pedons below a depth of 48 inches it has high and low chroma mottles. Consistence is friable or very friable.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils. These soils formed in material weathered from sandstone and some interbedded siltstone and shale. They are on ridgetops and side slopes throughout the county. Slope ranges from 35 to 80 percent.

Dekalb soils are near the well drained Cedarcreek, Gilpin, Guyandotte, Kaymine, Lily, and Pineville soils and the somewhat excessively drained Fiveblock and Sewell soils. Dekalb soils are shallower than Cedarcreek, Guyandotte, Kaymine, Pineville, Fiveblock, and Sewell soils and have more rock fragments than Gilpin and Lily soils.

Typical pedon of Dekalb channery sandy loam, in an area of Dekalb-Pineville-Guyandotte association, very steep, very stony, about 1.5 miles northwest of Lillyhaven, about 1,000 yards south of the junction of Old Haven Branch and Lower Road Branch, in woodland:

Oi—2 inches to 1 inch; loose, hardwood leaf litter.
Oe—1 inch to 0; partly decomposed hardwood leaf litter.
A—0 to 5 inches; very dark grayish brown (10YR 3/2) channery sandy loam; moderate fine granular structure; very friable; many fine and medium roots; 20 percent rock fragments; extremely acid; clear wavy boundary.
BA—5 to 9 inches; yellowish brown (10YR 5/4) channery sandy loam; weak fine subangular blocky structure; friable; many medium and coarse roots; 25 percent rock fragments; extremely acid; clear wavy boundary.
Bw—9 to 19 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 35 percent rock fragments; very strongly acid; clear wavy boundary.
BC—19 to 28 inches; yellowish brown (10YR 5/4) very channery sandy loam; weak fine and medium subangular blocky structure; friable; common fine roots; 40 percent rock fragments; very strongly acid; clear wavy boundary.
C—28 to 33 inches; yellowish brown (10YR 5/4) very channery sandy loam; massive; friable; few fine roots; 50 percent rock fragments; very strongly acid; abrupt wavy boundary.
R—33 inches; brown sandstone.

Solum thickness and depth to bedrock range from 20 to 40 inches. Rock fragments make up 10 to 60 percent of the individual horizons in the solum and 50 to 90 percent of the C horizon. In umlimed areas reaction is extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 4.

Some pedons have a thin E horizon that has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. The fine earth material is sandy loam or loam. The E horizon has weak or moderate, fine or very fine granular structure.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. The fine earth material is sandy loam or loam. The B horizon has weak, fine to coarse subangular blocky structure.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. The fine earth material is sandy loam or loamy sand. Consistence is friable or very friable.

Fiveblock Series

The Fiveblock series consists of very deep, somewhat excessively drained soils. These soils formed in partly weathered acid sandstone and some siltstone, shale, and coal from the surface mining of coal. They are on ridgetops mainly along Buffalo Mountain. Slope ranges from 3 to 60 percent.

Fiveblock soils are near the well drained Cedarcreek, Dekalb, Gilpin, Kaymine, and Lily soils and the somewhat excessively drained Sewell soils. Fiveblock soils are less acid than Cedarcreek, Dekalb, Gilpin, Lily, and Sewell soils and deeper than Dekalb, Gilpin, and Lily soils. They have more sand in the substratum than Cedarcreek, Gilpin, and Kaymine soils.

Typical pedon of Fiveblock channery sandy loam, steep, about 3.5 miles south of Craneco, near the Wyoming-Logan Counties boundary, in a grass-legume area:

A—0 to 6 inches; brown (10YR 4/3) channery sandy loam; weak fine granular structure; very friable; many fine and medium roots; 35 percent stones, channers, and boulders (90 percent sandstone, 10 percent siltstone); moderately acid; gradual wavy boundary.

C1—6 to 25 inches; brown (10YR 4/3) very channery sandy loam; common yellow and brown lithochromic mottles; massive, friable; many fine and medium roots; 55 percent stones, channers, and boulders (90 percent sandstone, 10 percent siltstone); neutral, gradual wavy boundary.

C2—25 to 65 inches; dark grayish brown (10YR 4/2) very channery sandy loam; common yellow and brown lithochromic mottles; massive; friable; 60 percent stones, channers, and boulders (80 percent sandstone, 20 percent siltstone); neutral.

Depth to bedrock is more than 60 inches. Reaction ranges from moderately acid to mildly alkaline. The surface layer of the original soil material that was stockpiled during mining is generally strongly acid. Rock fragments range from 20 to 80 percent, by volume, and average about 55 percent. Gray, neutral sandstone makes up 65 percent or more of rock fragments, and small amounts of siltstone, shale, and coal make up the rest. Rock fragments are mostly channers but include stones and boulders.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. Pedons in some reclaimed areas have an A horizon that was formed by spreading soil material, which had been stockpiled at the start of excavation, over the land surface. In these pedons the A horizon is 4 to 20 inches thick and is 10 to 35 percent channers, by volume.

The C horizon has hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 1 to 4. The fine earth material is sandy loam or loamy sand. Consistence is friable or very friable.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils. These soils formed in material weathered from interbedded shale, siltstone, and sandstone. They are on ridgetops throughout the county. Slope ranges from 3 to 35 percent.

Gilpin soils are near the well drained Berks, Dekalb, Lily, and Pineville soils and the somewhat excessively drained Fiveblock and Sewell soils. Gilpin soils have fewer rock fragments in the subsoil than Berks and Dekalb soils and have more silt in the Bt horizon than Lily soils. They are shallower than Pineville, Fiveblock, and Sewell soils.

Typical pedon of Gilpin silt loam, in an area of Gilpin and Lily soils, 15 to 35 percent slopes, about 2.5 miles east of the junction of Pinnacle Creek and White Oak Branch, near the Wyoming-McDowell Counties boundary, in woodland:

A—0 to 2 inches; dark brown (10YR 4/3) silt loam; moderate fine granular structure; very friable; many fine and medium roots; 10 percent rock fragments; very strongly acid; abrupt smooth boundary.

BA—2 to 7 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; 10 percent rock fragments; strongly acid; clear smooth boundary.

Bt1—7 to 15 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate medium subangular blocky structure; friable; common faint clay films on faces of peds; common fine and medium roots; 20 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—15 to 22 inches; strong brown (7.5YR 5/6) channery silty clay loam; strong fine subangular blocky structure; friable; common faint clay films on faces of peds; common fine and medium roots; 25 percent rock fragments; strongly acid; clear wavy boundary.

C—22 to 27 inches; strong brown (7.5YR 5/6) extremely channery silty clay loam; massive; friable; few to common faint clay films on rock fragment faces; few fine roots; 80 percent rock fragments; strongly acid; gradual wavy boundary.

Cr—27 to 39 inches; soft, gray and brown siltstone that has few faint silt and clay films on rock faces.

R—39 inches; hard, gray and brown siltstone.

The solum ranges from 18 to 36 inches in thickness. Depth to bedrock is 20 to 40 inches. Rock fragments of siltstone, shale, and sandstone make up 5 to 40 percent of the individual horizons in the solum and 30 to 90 percent of the C horizon. In umlimed areas reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 4.

The BA and Bt horizons have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The fine earth material is silty clay loam or silt loam. In the BA horizon structure is weak or moderate, fine or medium subangular blocky. In the Bt horizon structure is moderate or strong, fine or medium subangular blocky. Consistence is friable or firm. Some pedons have a BC horizon.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. The fine earth material is silty clay loam or silt loam. Consistence is friable or firm.

Guyandotte Series

The Guyandotte series consists of very deep, well drained soils. These soils formed in colluvial material that moved downslope from soils on uplands underlain by mostly sandstone and some siltstone. They are on the north-facing side slopes and in coves. Slope ranges from 35 to 80 percent.

Guyandotte soils are near the well drained Dekalb and Pineville soils. They are deeper than Dekalb soils and have a thicker, darker surface layer than Dekalb and Pineville soils.

Typical pedon of Guyandotte very channery sandy loam, in an area of Dekalb-Pineville-Guyandotte association, very steep, very stony, about 1,000 yards southwest of Ivy Knob fire tower, in woodland:

Oi—3 inches to 1 inch; slightly decomposed oak, maple, and magnolia leaves.

Oa—1 inch to 0; black (10YR 2/1) mostly decomposed organic material.

A1—0 to 2 inches; black (10YR 2/1) very channery sandy loam; very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many fine, medium, and coarse roots; 55 percent channers and stones; very strongly acid; abrupt wavy boundary.

A2—2 to 7 inches; very dark grayish brown (10YR 3/2) very channery sandy loam; dark brown (10YR 3/3) dry; weak fine granular structure; very friable; many fine, medium, and coarse roots; 40 percent channers and stones; strongly acid; clear wavy boundary.

A3—7 to 12 inches; dark brown (10YR 3/3); very channery sandy loam; dark yellowish brown (10YR 3/4) dry; moderate fine granular structure; very friable; many fine, medium, and coarse roots; 40 percent channers and stones; strongly acid; clear wavy boundary.

BA—12 to 23 inches; dark yellowish brown (mixed 10YR 3/4 and 10YR 4/6) very channery sandy loam; weak fine subangular blocky structure; very friable; many fine, medium, and coarse roots; 55 percent channers and stones; strongly acid; gradual wavy boundary.

Bw1—23 to 38 inches; dark yellowish brown (10YR 4/6) very channery sandy loam; weak fine subangular blocky structure; friable; 55 percent rock fragments; moderately acid; gradual wavy boundary.

Bw2—38 to 65 inches; yellowish brown (10YR 5/4) extremely channery sandy loam; weak medium subangular blocky structure; friable; 65 percent rock fragments; moderately acid.

The solum ranges from 50 to 70 inches or more in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 25 to 70 percent, by volume, in individual horizons, but average 35 percent or more in the control section. Reaction is very strongly acid to neutral in the A horizon and ranges from very strongly acid to moderately acid in the B and C horizons.

The A horizon has hue of 10YR, value of 2 to 3, and chroma of 1 to 3. It is 10 to 17 inches thick.

The B horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. The fine earth material is sandy loam or loam. Structure is weak or moderate, fine to coarse subangular blocky. Consistence is friable or firm. Some pedons have a BC horizon. In some pedons a few faint silt or clay films are on rock fragments in the lower part of the B horizon.

Some pedons have a C horizon that has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The fine earth material is loam or sandy loam.

Holly Series

The Holly series consists of very deep, poorly drained soils. These soils formed in loamy alluvial material washed from soils on uplands underlain by siltstone and sandstone. They are on the low flood plains of streams throughout the county. Slope ranges from 0 to 3 percent.

Holly soils are near the well drained Chagrin soils, the somewhat excessively drained Potomac soils, and the moderately well drained Lobdell and Monongahela soils. Holly soils are wetter than all these soils and do not have the fragipan typical of Monongahela soils.

Typical pedon of Holly silt loam, in an area of Holly-Lobdell complex, about 150 feet west of West Virginia Route 971, about 1.2 miles south of Lillydale, in an idle area:

A—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium and fine granular structure; friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

Bg1—3 to 15 inches; dark gray (10YR 4/1) silt loam that has many dark reddish brown (5YR 3/4) iron stains; moderate medium and coarse subangular blocky structure; friable; common fine roots; slightly acid; clear wavy boundary.

Bg2—15 to 20 inches; dark grayish brown (10YR 4/2) silt loam that has many fine dark yellowish brown (10YR 4/4) and dark brown (7.5YR 4/4) mottles; moderate coarse subangular blocky structure; friable; common fine roots; slightly acid; gradual wavy boundary.

Bg3—20 to 28 inches; dark grayish brown (10YR 4/2) silt loam that has many fine dark yellowish brown (10YR 4/4) and dark brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; friable; few fine roots; slightly acid; gradual wavy boundary.

Cg1—28 to 40 inches; dark gray (10YR 4/1) sandy loam that has many fine dark brown (7.5YR 4/4) mottles; massive; friable; neutral; gradual wavy boundary.

Cg2—40 to 65 inches; dark gray (5Y 4/1) fine sandy loam; massive; friable; neutral.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 10 percent, by volume, in the solum and from 0 to 25 percent in the C horizon. In unlimed areas reaction is moderately acid to neutral.

The A horizon has hue of 10YR, value of 4, and chroma of 1 or 2.

The B horizon is neutral or has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2. The fine earth material is silt loam, silty clay loam, or loam. Structure is weak to moderate, medium or coarse subangular blocky.

The C horizon is neutral or has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2. The fine earth material is silt loam, loam, fine sandy loam, or sandy loam. In some pedons the soil is stratified below a depth of 40 inches.

Itmann Series

The Itmann series consists of very deep, somewhat excessively drained soils. These soils formed mostly in coal and high carbon shales and in small amounts of siltstone and sandstone. They are on side slopes and in valleys near coal mines or coal-cleaning plants. Slope ranges from 0 to 80 percent.

Itmann soils are on the landscape with Cedarcreek, Kaymine, and Pineville soils. They have less clay in the control section than any of the other soils.

Typical pedon of Itmann very channery sandy loam, very steep, in an area about 0.3 miles east of West Virginia Route 54, about 1.5 miles north of Maben, in a barren area:

A—0 to 5 inches; black (N2/0) very channery sandy loam; weak fine granular structure; loose; 50 percent channers (55 percent carbolith, 20 percent siltstone, 15 percent sandstone, 10 percent shale); extremely acid; gradual wavy boundary.

C1—5 to 21 inches; black (N 2/0) very channery sandy loam; massive; firm; 60 percent channers (50 percent carbolith, 35 percent siltstone, 10 percent sandstone, 5 percent shale); extremely acid; clear wavy boundary.

C2—21 to 65 inches; black (N 2/0) extremely channery sandy loam; massive; firm; 80 percent channers (60 percent carbolith, 25 percent siltstone, 10 percent sandstone, 5 percent shale); extremely acid.

Depth to bedrock is more than 60 inches. Channers of carbolith, siltstone, sandstone, and shale range from 35 to 80 percent, by volume, throughout. Carbolith fragments make up more than 50 percent of the total rock fragments. Reaction ranges from extremely acid to strongly acid, except where the surface has been limed.

The A horizon is neutral or has hue of 10YR, value of 2 or 3, and chroma of 0 to 2. In some pedons the A horizon was formed by spreading soil material, which had been stockpiled at the start of excavation, over the land surface. In these pedons the A horizon is 6 to 20 inches thick and is 10 to 35 percent channers, by volume.

The C horizon is neutral or has hue of 10YR, value of 2 or 3, and chroma of 0 to 2. The fine earth material is sandy loam or loam. Some pedons have thin layers or pockets of loamy sand. Consistence is loose to firm.

Kaymine Series

The Kaymine series consists of very deep, well drained soils. These soils formed in partly weathered siltstone, sandstone, shale, and some coal from the surface mining of coal. The soils are on benches and side slopes throughout the county. Slope ranges from 0 to 80 percent.

Kaymine soils are near the well drained Berks, Cedarcreek, and Dekalb soils and the somewhat excessively drained Fiveblock and Itmann soils. Kaymine soils are deeper than Berks and Dekalb soils, have less sand in the substratum than Fiveblock soils, and are less acid than Berks, Cedarcreek, Dekalb, and Itmann soils.

Typical pedon of Kaymine very channery loam, in an area of Kaymine-Cedarcreek-Dekalb complex, very steep, about 1.2 miles northeast of Clear Fork Gap, about 0.5 miles southwest of West Virginia Route 99, in woodland:

Oe—2 inches to 0; partly decomposed leaf litter.

A—0 to 3 inches; dark brown (10YR 4/3) very channery loam; weak fine granular structure; very friable; many fine and medium and few large roots; 50 percent channers and stones (60 percent siltstone, 40 percent sandstone); neutral; gradual wavy boundary.

C1—3 to 17 inches; dark brown (10YR 4/3) very channery loam; common yellow, brown, and gray lithochromic mottles; massive; friable; common fine and medium roots; 50 percent channers and stones (60 percent siltstone, 40 percent sandstone); neutral; gradual wavy boundary.

C2—17 to 65 inches; dark grayish brown (10YR 4/2) very channery loam; common yellow, brown, and gray lithochromic mottles; massive; friable; few fine and medium roots to 24 inches; 60 percent channers and stones (60 percent siltstone, 40 percent sandstone); neutral; gradual wavy boundary.

Depth to bedrock is more than 60 inches. Reaction ranges from moderately acid to neutral. Rock fragments range from 35 to 80 percent, by volume, throughout. They are siltstone, sandstone, shale, and coal, and the percentage of each is less than 65 percent of the total rock fragments in the control section. Rock fragments are mostly channers, but include stones and a few boulders. Most pedons have red, brown, yellow, or gray lithochromic mottles in some or all horizons.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. In some pedons the A horizon was formed by spreading soil material, which had been stock piled at the start of excavation, over the land surface. In these pedons the A horizon is 4 to 20 inches thick and is 10 to 35 percent channers, by volume. Consistence is very friable or friable.

The C horizon has hue of 5YR to 5Y, value of 2 to 6, and chroma of 1 to 8. The fine earth material is loam or silt loam. Consistence is friable or firm.

Lily Series

The Lily series consists of moderately deep, well drained soils. These soils formed in material weathered from sandstone and some interbedded siltstone and shale. They are on ridgetops throughout the survey area. Slope ranges from 3 to 35 percent.

Lily soils are near the well drained Berks, Dekalb, Gilpin, and Pineville soils and the somewhat excessively drained Fiveblock and Sewell soils. Lily soils are shallower than Pineville, Fiveblock, and Sewell soils, have fewer rock fragments than Berks and Dekalb soils, and have less silt in the Bt horizon than Gilpin soils.

Typical pedon of Lily loam, in an area of Gilpin and Lily soils, 15 to 35 percent slopes, about 100 yards north of White Knob Trail, about 0.9 miles east of park headquarters of Twin Falls State Park, in woodland:

Oe—2 inches to 0; hardwood leaf litter, some of which is decomposed.

A—0 to 2 inches; dark brown (10YR 4/3) loam; weak fine granular structure; very friable; many fine, medium, and large roots; 5 percent rock fragments; very strongly acid, abrupt irregular boundary.

BA—2 to 10 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; many fine, medium, and large roots; 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—10 to 20 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 10 percent rock fragments; few faint clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—20 to 30 inches; strong brown (7.5YR 5/6) channery loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 20 percent rock fragments; common faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

C—30 to 34 inches; strong brown (7.5YR 5/6) channery loam; massive; friable; few fine roots; 30 percent rock fragments; common faint clay films on rock fragments and in pores; very strongly acid; abrupt wavy boundary.

R—34 inches; brown, sandstone bedrock.

The solum thickness and depth to bedrock range from 20 to 40 inches. Rock fragments of siltstone, shale, and sandstone make up 0 to 25 percent of the individual horizons of the solum and 20 to 35 percent of the C horizon. In unlimed areas the soils are strongly acid or very strongly acid throughout. Some pedons have high and low chroma mottles immediately above bedrock.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. The fine earth material is loam or clay loam. Structure is weak or moderate, fine or medium subangular blocky. Consistence is friable or firm.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. The fine earth material is loam, clay loam, or sandy loam. Consistence is friable or firm.

Lobdell Series

The Lobdell series consists of very deep, moderately well drained soils. These soils formed in loamy alluvial material washed from soils on uplands underlain by siltstone and sandstone. They are on flood plains throughout the county. Slope ranges from 0 to 3 percent.

Lobdell soils are near the somewhat excessively drained Potomac soils, the well drained Chagrin soils, the moderately well drained Monongahela soils, and the poorly drained Holly soils. Unlike Lobdell soils Monongahela soils have a fragipan.

Typical pedon of Lobdell loam, in an area of Holly-Lobdell complex, about 50 feet west of Milam Fork, about 1 mile upstream from McGraws, in an idle area:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam; moderate fine and medium granular structure; friable; many fine and medium roots; strongly acid; abrupt wavy boundary.

BA—8 to 16 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; common fine roots; strongly acid; clear wavy boundary.

Bw1—16 to 25 inches; yellowish brown (10YR 5/4) loam; common fine light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8) mottles; weak coarse and medium subangular blocky structure; friable; common fine roots; strongly acid; clear wavy boundary.

Bw2—25 to 36 inches; yellowish brown (10YR 5/4) loam; many medium light brownish gray (10YR 6/2) and common fine strong brown (7.5YR 5/8) mottles; weak coarse and medium subangular blocky structure; friable; few fine roots; strongly acid; gradual wavy boundary.

Cg—36 to 65 inches; light brownish gray (10YR 6/2) loam; many medium yellowish brown (10YR 5/4) and common medium strong brown (7.5YR 5/8) mottles; massive; friable; moderately acid.

The solum ranges from 24 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Gravel content ranges from 0 to 5 percent in the A horizon and from 0 to 15 percent in the B and C horizons. In unlimed areas the soils are strongly acid or moderately acid in the A and B horizons and moderately acid in the C horizon.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is loam or sandy loam. Its structure is weak or moderate, medium or coarse subangular blocky.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is loam or sandy loam. Some pedons, below a depth of 40 inches, are stratified sandy loam, loamy sand, or fine sand.

Monongahela Series

The Monongahela series consists of very deep, moderately well drained soils. These soils formed in old alluvial material derived mostly from soils on uplands underlain by sandstone and shale. They are on terraces along Clear Fork, Laurel Fork, and the Guyandotte River. Slope ranges from 3 to 8 percent.

Monongahela soils are near the well drained Chagrin soils, the moderately well drained Lobdell soils, and the poorly drained Holly soils. Unlike these other soils, Monongahela soils have a fragipan.

Typical pedon of Monongahela loam, 3 to 8 percent slopes, about 1,200 feet southeast of the Norfolk and Southern railroad bridge across Clear Fork, at Lillyhaven, in a cornfield:

Ap—0 to 7 inches; dark brown (10YR 4/3) loam; moderate fine granular structure; friable; many fine and medium roots; moderately acid; abrupt smooth boundary.

BA—7 to 11 inches; brown (7.5YR 5/4) loam; weak medium subangular blocky structure; friable; common fine and medium roots; moderately acid; clear wavy boundary.

Bt1—11 to 22 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; common fine and medium roots; few faint clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—22 to 27 inches; yellowish brown (10YR 5/6) loam; few fine light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint clay films on faces of peds; few black coatings on peds and few black concretions; very strongly acid; clear wavy boundary.

Btx1—27 to 38 inches; yellowish brown (10YR 5/4) loam; common fine brownish yellow (10YR 6/8) and light gray (10YR 7/2) mottles; weak very coarse prismatic structure; very firm and brittle; common faint clay films on faces of peds; very strongly acid; clear wavy boundary.

Btx2—38 to 51 inches; yellowish brown (10YR 5/4) clay loam; many fine light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; very firm and brittle; common faint clay films on faces of peds; common black coatings on peds and common black concretions; 5 percent gravel; very strongly acid; clear wavy boundary.

C—51 to 65 inches; yellowish brown (10YR 5/6) clay loam; many fine light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; massive; firm; 10 percent gravel; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 20 to 30 inches. Rounded sandstone and shale rock fragments 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.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The BA and Bt horizons have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. They are loam, silt loam, or clay loam. Their structure is weak or moderate, fine or medium, subangular blocky. Consistence is friable or firm.

The Btx horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 2 to 6. It is loam or clay loam. Its structure is weak or moderate, coarse to very coarse, prismatic parting in some subhorizons to subangular blocky or platy.

The C horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is loam, clay loam, or sandy loam.

Pineville Series

The Pineville series consists of very deep, well drained soils. These soils formed in acid, colluvial material that moved downslope from soils on uplands underlain by sandstone, siltstone, and shale. They are on mountain coves, the lower side slopes, and foot slopes. Slope ranges from 3 to 35 percent on foot slopes and from 35 to 80 percent on side slopes and coves.

Pineville soils are near the somewhat excessively drained Itmann soils, the well drained Berks, Dekalb, Gilpin, Guyandotte, and Lily soils, and the moderately well drained Buchanan soils. They are deeper than Berks, Dekalb, Gilpin, and Lily soils. They do not have a fragipan typical of Buchanan soils and do not have the thick, dark surface layer typical of Guyandotte soils.

Typical pedon of Pineville channery loam, in an area of Berks-Pineville association, very steep, very stony, about 500 feet northwest of Cedar Creek, about 1.5 miles northeast of West Virginia Route 54 at Maben, in woodland:

Oi—1 inch to 0; slightly decomposed oak and yellow poplar leaves.

A—0 to 3 inches; dark brown (10YR 3/3) channery loam; moderate fine granular structure; very friable; many fine and medium roots; 20 percent rock fragments; very strongly acid; abrupt wavy boundary.

BA—3 to 10 inches; yellowish brown (10YR 5/6) channery loam; weak, fine subangular blocky structure; many fine and medium roots; 20 percent rock fragments; strongly acid; gradual wavy boundary.

Bt1—10 to 23 inches; brownish yellow (10YR 6/6) channery loam; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; few distinct clay films on faces of peds; 20 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—23 to 33 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; 20 percent rock fragments; strongly acid; gradual wavy boundary.

Bt3—33 to 50 inches; yellowish brown (10YR 5/6) very channery loam; weak medium subangular blocky structure; friable; few fine and very fine roots; common distinct clay films on faces of peds; 35 percent rock fragments; strongly acid; gradual wavy boundary.

C—50 to 65 inches; yellowish brown (10YR 5/6) very channery loam; massive; firm; 50 percent rock fragments; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 10 to 60 percent, by volume, in the individual horizons, but average 15 to 35 percent in the control section. Reaction is very strongly acid to neutral in the A horizon and very strongly acid to strongly acid in the B and C horizons.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 1 to 3. Consistence is very friable or friable.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. The fine earth material is loam, clay loam, or sandy loam. Structure is weak or moderate, fine to coarse subangular blocky. Consistence is friable or firm.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. The fine earth materail is loam, sandy loam, or clay loam. Consistence is firm or friable. In some pedons the horizon has brown, yellow, and gray mottles in the lower part.

Potomac Series

The Potomac series consists of very deep, somewhat excessively drained soils. These soils formed in alluvial material washed from upland soils derived from sandstone, siltstone, and shale. They are on flood plains along small streams throughout the county. Slope ranges from 3 to 8 percent.

Potomac soils are near the well drained Chagrin soils, the moderately well drained Lobdell soils, and the poorly drained Holly soils. They have more gravel in the substratum than all of these other soils.

Typical pedon of Potomac sandy loam, 3 to 8 percent slopes, about 50 feet southeast of Clear Fork, about 0.9 mile southeast of Crany, in woodland:

Ap—0 to 8 inches; dark brown (10YR 3/3) sandy loam; light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; many fine and medium roots; 10 percent gravel; strongly acid; abrupt smooth boundary.

C1—8 to 36 inches; dark yellowish brown (10YR 4/4) very gravelly loamy sand; single grain; loose; common fine and medium roots; 40 percent gravel and 10 percent cobbles; moderately acid; abrupt wavy boundary.

C2—36 to 65 inches, yellowish brown (10YR 5/4) extremely cobbly sand; single grain; loose; few fine and medium roots; 50 percent cobbles and 20 percent gravel; moderately acid.

Depth to bedrock is more than 60 inches. Gravel and cobblestones, dominantly of sandstone, range from 0 to 50 percent, by volume, in the A horizon and from 35 to 70 percent in the C horizon. In unlimed areas reaction is strongly acid to neutral.

The A horizon has hue of 7.5YR or 10YR and value and chroma of 2 to 4.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. The fine earth material is loamy sand or sand. Some pedons have subhorizons of sandy loam. Consistence is very friable or loose.

Sewell Series

The Sewell series consists of very deep, somewhat excessively drained soils. These soils formed mostly in partly weathered sandstone and from some siltstone, shale, and coal from surface mine operations. They are on ridgetops in the southeast part of the county. Slope ranges from 3 to 15 percent.

Sewell soils are near the somewhat excessively drained Fiveblock soils and the well drained Cedarcreek, Dekalb, Gilpin, and Lily soils. They are deeper than Dekalb, Gilpin, and Lily soils and have less clay in the substratum than Cedarcreek soils. They are more acid than Fiveblock soils.

Typical pedon of Sewell channery sandy loam, strongly sloping, in an area about 600 yards southwest of Sand Gap, about 1.5 miles southeast of West Virginia Route 16 at Corinne, in an idle area:

A—0 to 4 inches; yellowish brown (10YR 5/6) channery sandy loam; weak fine granular structure; very friable; many fine and medium roots; 35 percent stones, channers, and boulders (90 percent micaceous sandstone, 10 percent siltstone); very strongly acid; gradual wavy boundary.

C1—4 to 9 inches; dark yellowish brown (10YR 4/6) very channery sandy loam; common fine and medium red, yellow, and gray lithochromic mottles; massive; friable; common fine roots; 50 percent stones, channers, and boulders (95 percent micaceous sandstone, 5 percent siltstone); strongly acid; gradual wavy boundary.

C2—9 to 29 inches; yellowish brown (10YR 5/4) extremely channery sandy loam; common fine and medium red, yellow, and gray lithochromic mottles; massive; friable; few fine and medium roots; 65 percent stones, channers, and boulders (90 percent micaceous sandstone, 10 percent siltstone); strongly acid; gradual wavy boundary.

C3—29 to 65 inches; yellowish brown (10YR 5/4) extremely channery sandy loam; common fine and medium red, yellow, and gray lithochromic mottles; massive; friable; 75 percent stones, channers, and boulders (90 percent micaceous sandstone, 10 percent siltstone); strongly acid.

Depth to bedrock is more than 60 inches. Rock fragments range from 35 to 80 percent, by volume, throughout. Sandstone makes up 65 percent or more of the rock fragments, and small amounts of siltstone, shale, and coal make up the rest. Rock fragments are mostly stones, but include channers and boulders. In unlimed areas reaction is extremely acid to strongly acid. Most pedons have red, brown, yellow, or gray lithochromic mottles in some or all horizons.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6.

The C horizon has hue of 7.5YR or 10YR, value of 2 to 6, and chroma of 1 to 8. The fine earth material is sandy loam or loam. Some pedons have thin layers or pockets that have a loamy sand texture or are 1 to 20 percent coal fragments, by volume. Consistence is friable or firm.

Udorthents

Udorthents consist of mixed soil material and rock fragments in areas that have been excavated, graded, or filled. These soils are mostly along the Guyandotte River and Pinnacle Creek in the eastern part of the survey area.

Udorthents differ greatly from place to place; thus a typical pedon is not given. Depth to bedrock generally is more than 40 inches. Rock fragments range widely in kind, size, and amount. The soils have hue of 7.5YR to 5Y, value of 3 to 6, and chroma of 2 to 8. The fine earth material is sandy loam, loam, silt loam, or clay loam.

Formation of the Soils

The origin and development of the soils in Wyoming County and the influence of the five factors of soil formation are described in this section. The morphology of soils, as related to horizon nomenclature and to the processes involved in horizon development, and the geology of the area are also described.

Factors of Soil Formation

The soils in Wyoming County have resulted from the interaction of five major factors of soil formation: parent material, time, climate, living organisms, and topography. Each factor modifies the effect of the others. Parent material, topography, and time have produced the major differences among the soils in the survey area. Climate and living organisms generally have shown their influence throughout broad areas, and their effects have been relatively uniform throughout the area.

Parent Material, Time, and Climate

The parent material strongly influences the time required for soil formation and the nature of the soil produced. The soils in the area are formed in residual, colluvial, and alluvial materials.

Residual material, the oldest parent material in the survey area, is weathered, interbedded shale, siltstone, and sandstone. Berks soils, for example, formed in material weathered from interbedded siltstone, shale, and fine-grained sandstone and Dekalb soils, from sandstone and some interbedded siltstone and shale. However, most of the soils are not as well developed as some soils that formed in younger material, mainly because the soil-forming processes have been slowed in some areas by resistant rock, slope, and erosion.

Colluvial material, which moved downslope from the residual soils, is on the lower side slopes, along foot slopes, and in coves. Buchanan, Guyandotte, and Pineville soils formed in colluvial material.

Alluvial material, which washed from soils on uplands, is on terraces and flood plains. The soil-forming processes have acted on the material on terraces for a considerable time. Many additions, losses, and alterations have taken place. Monongahela soils for example, which are on terraces, are strongly leached and moderately well developed. Most soils on flood plains in the survey area are poorly developed because the alluvial deposits on flood plains are the youngest parent material. The soil forming processes have acted on this material for a shorter time. Chagrin, Potomac, and Holly soils are examples of soils on flood plains.

Climate generally is uniform throughout the survey area. Climatic differences, which are slight, between the northern and southern parts of the county do not significantly affect soil formation. Climate, therefore, is not responsible for major differences in the soils. Rainfall and temperature, however, generally influence the development of layers in the soil profile. Cooler temperatures and higher rainfall in the northern part of the county have influenced the development of the thick, dark surface layer of Guyandotte soils. A detailed description of climate is given in the section "General Nature of the County."

Living Organisms

All living organisms, plants, animals, bacteria, fungi, and man, affect soil formation. The kind and amount of vegetation are generally responsible for the amount of organic matter, the color of the surface layer, and, in part, the amount of nutrients. Earthworms and burrowing animals help to keep the soil open and porous. They move soil to the surface and thus mix organic and mineral matter. Bacteria and fungi decompose organic matter and thus release nutrients for plant food. Human activities that influence the characteristics of the surface layer include clearing the forest, plowing, burning, mining, and any other ways of disturbing the land. These activities also include adding fertilizers, mixing some of the soil horizons, and moving soils from place to place.

Topography

Topography affects the amount of water moving through the soil, the amount and rate of runoff, and the rate of erosion.

Large amounts of water have moved through the gently sloping and strongly sloping soils. Consequently, these soils are deep and moderately developed to well developed. Less water has moved through the steep and very steep soils, and the amount and rate of runoff on these soils are greater. In addition, in some areas the soil material is washed away almost as rapidly as it forms. Thus, the soils on the steeper, upper side slopes likely will be shallower to bedrock than the soils in the cove areas, on the lower side slopes, and on foot slopes.

In this survey area topography favors the formation of soils of flood plains, which progresses rather rapidly. These soils, however, are weakly developed mainly because too little time has elapsed for the development of well-defined soil horizons.

Morphology of the Soils

The different layers, or soil horizons, in the soil profile show the effects of soil-forming processes. The profile extends from the surface downward to material little changed by the soil-forming processes. In most soils it has three major horizons: the A, B, and C horizons. These major horizons can be separated further into subhorizons by the use of numbers and letters to indicate internal changes.

The A horizon, or surface layer, is the horizon of maximum accumulation of organic matter. It is also the zone of eluviation, or removal, of clay and iron.

Underlying the A horizon, the B horizon, or subsoil, is the horizon of illuviation, or accumulation, of clay, iron, aluminum, and other compounds. Its structure commonly is blocky. The B horizon generally is firmer and lighter in color than the A horizon.

Below the A and B horizons the C horizon consists of weathered material that has been little altered by soil-forming processes.

Soil horizons are formed because of many processes. Those processes of greater importance 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. These processes have been taking place continually for thousands of years.

On most soils on uplands the yellowish brown or strong brown B horizon indicates iron oxides. Its structure is blocky, and in some soils the horizon also has translocated clay.

A fragipan, or dense and brittle layer, has formed in the B horizon of the moderately well drained soils on foot slopes and terraces. Permeability to water and air is moderately slow or slow. The grayish mottles in a fragipan indicate the reduction of iron.

Geology

Gordon B. Bayles, geologist, Soil Conservation Service, helped to prepare this section.

The landforms of Wyoming County show the effects of geologic erosion. The relative resistance to erosion of various rocks has affected the topography of the county. Generally, the valleys north of the Guyandotte River trend northeast to southwest, and those south of the river trend southeast to northwest. Sandstone, which is more erosion-resistant than other rocks, generally is at the higher elevations. It is also throughout the strata in the deeper valleys along the Guyandotte River, Clear Fork, and Pinnacle Creek.

All surface rocks of Wyoming County, sandstone, siltstone, shale, and coal, are sedimentary rocks of the Pennsylvanian Period (*4*). Little local folding has taken place, and generally the rocks regionally dip northwestward.

Most of the rocks in the county belong to the Kanawha, New River, and Pocahonta Formations in the Pottsville Group. A few small areas on ridgetops along the north county line are part of the Allegheny Formation.

The rugged terrain in the northern part of the survey area is dominantly within the Kanawha Formation of the Pottsville Group. This formation, which is mostly sandstone, has strongly influenced the topography. Coal has been surface mined and deep mined extensively in the Allegheny and Kanawha Formations. The main coal seams are No. 5 Block in the Allegheny Formation and, in the Kanawha Formation, Stockton-Lewiston, Coalburg, Winifrede, Hernshaw, Dorothy, Cedar Grove, Alma, Campbell Creek (No. 2 Gas), Eagle, and Lower War Eagle. The major soils in the Allegheny and Kanawha Formations are Dekalb, Pineville, and Guyandotte soils.

The central part and much of the southern part of the county are dominantly within the New River Formation of the Pottsville Group. This formation consists of mixed sandstone and siltstone. Its relief is less than that of the Kanawha Formation. Hard sandstone crops out along Pinnacle Creek and the Guyandotte River. Iaeger, Sewell, Beckley, Fire Creek, and Pocahontas No. 9 coal in this formation has been extensively surface mined and deep mined. The major soils in this formation are Berks, Pineville, Gilpin, and Lily soils.

Along the valleys, at the lower elevations, in the eastern part of the county and along Pinnacle Creek the rock outcrops are part of the Pocahontas Formation of the Pottsville Group. This formation is mixed sandstone, siltstone, and shale. Pocahontas No. 6, No. 4, and No. 3 coal has been surface mined and deep mined. The major soils in this formation are Berks and Pineville soils.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 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

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench. A platform-type, nearly level to gently inclined erosional surface developed on resistant strata in areas where valleys are cut in alternating strong and weak layers with an essentially horizontal attitude.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to

arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.
California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.
Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.
Carbolith. Dark colored sedimentary rocks that make a black or very dark (Munsell value of 3 or less) streak or powder. Carbolith includes coal, bone coal, high carbon shales, and high carbon mudstones. In general, this material contains at least 25 percent carbonaceous matter, by volume, oxidizable at 350-400 degrees Celsius.
Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.
Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.
Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.
Cement rock. Shaly limestone used in the manufacture of cement.
Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.
Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.
Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.
Coarse textured soil. Sand or loamy sand.
Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.
Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.
Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.
Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.
Compressible (in tables). Excessive decrease in volume of soft soil under load.
Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.
Congeliturbate. Soil material disturbed by frost action.
Conservation tillage. A form of noninversion tillage that retains protective amounts of residue mulch on the surface throughout the year. Conservation tillage includes no-tillage, strip tillage, stubble mulching, and other types of noninversion tillage.
Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are
Loose. Noncoherent when dry or moist; does not hold together in a mass.
Friable. When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky. When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard. When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft. When dry, breaks into powder or individual grains under very slight pressure.

Cemented. Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

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 (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained. Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained. Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained. Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained. Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained. Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained. Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained. Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial melt water. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon. An organic layer of fresh and decaying plant residue.

A horizon. The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon. The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon. The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon. The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon. Soft, consolidated bedrock beneath the soil.

R layer. Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are

Border. Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin. Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding. Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation. Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle). Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow. Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler. Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation. Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding. Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Lithochromic mottles. Mottles that have inherited their color from the rocks that made up the parent material of the soil.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minesoil. A young soil that formed in recently deposited earthy material resulting from deep mining or surface mining of coal.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance *few, common,* and *many*; size *fine, medium,* and *coarse*; and contrast *faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. An indurated mud that has the texture and composition of shale but that lacks the fine lamination of fissility; a blocky or massive, fine-grained sedimentary rock in which the proportions of clay and silt are approximately the same.

Munsell notation. A designation of color by degrees of the three simple variables hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Out slope. The exposed area sloping away from a bench cut section.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material).

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperture below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting ground ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The 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
Moderately 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.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables.) Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Much has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. A mudrock that appears predominantly fissile (having a tendency to split along parallel planes into thin layers). These layers must be less than 5 mm thick.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multipled by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity are

	SAR
Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are *platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period the the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifiying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by melt water streams, in glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-80 at Pineville, West Virginia]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	42.2	20.9	31.6	70	-7	64	3.73	2.17	5.11	9	9.3
February---	46.0	22.1	34.1	73	-3	82	3.27	1.68	4.66	8	6.8
March------	55.6	29.7	42.7	82	9	171	4.33	2.62	5.86	10	3.0
April------	68.0	38.3	53.2	89	21	396	4.06	2.44	5.52	10	.2
May--------	76.6	48.0	62.3	91	29	691	4.02	2.52	5.36	9	.0
June-------	82.9	56.5	69.7	95	41	891	4.05	2.48	5.46	8	.0
July-------	85.7	61.3	73.5	96	50	1,039	4.98	3.29	6.51	10	.0
August-----	85.1	60.6	72.9	95	47	1,020	4.08	2.60	5.41	8	.0
September--	79.8	53.7	66.8	93	36	804	3.49	2.04	4.77	7	.0
October----	68.8	40.5	54.7	86	21	463	2.96	1.11	4.49	6	.1
November---	56.3	30.9	43.6	79	12	147	3.08	1.88	4.15	8	1.6
December---	45.8	24.1	35.0	73	1	75	3.32	1.76	4.68	8	5.8
Year:											
Average---	66.1	40.6	53.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	97	-8	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,843	45.37	39.45	51.07	101	26.8

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-80 at Pineville, West Virginia]

Probability	Temperature		
	24^{o} F or lower	28^{o} F or lower	32^{o} F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 15	May 2	May 16
2 years in 10 later than--	April 11	April 26	May 11
5 years in 10 later than--	April 2	April 16	May 1
First freezing temperature in fall:			
1 year in 10 earlier than--	October 18	October 14	October 2
2 years in 10 earlier than--	October 24	October 19	October 7
5 years in 10 earlier than--	November 5	October 28	October 16

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-80 at Pineville, West Virginia]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24^{o} F	Higher than 28^{o} F	Higher than 32^{o} F
	Days	Days	Days
9 years in 10	193	173	145
8 years in 10	201	180	153
5 years in 10	216	194	167
2 years in 10	231	208	182
1 year in 10	239	216	190

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BpF	Berks-Pineville association, very steep, very stony	211,840	65.8
CeF	Cedarcreek-Rock outcrop complex, very steep	5,565	1.7
Cg	Chagrin loam, rarely flooded	1,540	0.5
Ch	Chagrin sandy loam, occasionally flooded	415	0.1
Cu	Chagrin-Urban land complex	1,365	0.4
DpF	Dekalb-Pineville-Guyandotte association, very steep, very stony	58,800	18.2
FvE	Fiveblock channery sandy loam, steep	605	0.2
GpC	Gilpin and Lily soils, 3 to 15 percent slopes	2,255	0.7
GpE	Gilpin and Lily soils, 15 to 35 percent slopes	13,630	4.2
Ho	Holly-Lobdell complex	1,325	0.4
ImE	Itmann channery loam, steep	350	0.1
ItF	Itmann very channery sandy loam, very steep	1,345	0.4
KcF	Kaymine-Cedarcreek-Dekalb complex, very steep	7,760	2.4
KmF	Kaymine-Rock outcrop complex, very steep	1,060	0.3
MgB	Monongahela loam, 3 to 8 percent slopes	235	0.1
PbC	Pineville-Buchanan channery loams, 3 to 15 percent slopes	1,475	0.5
PcE	Pineville-Buchanan channery loams, 15 to 35 percent slopes, stony	4,790	1.5
PoB	Potomac sandy loam, 3 to 8 percent slopes	1,125	0.3
PuB	Potomac-Urban land complex, 3 to 8 percent slopes	1,665	0.5
SeC	Sewell channery sandy loam, strongly sloping	1,140	0.4
Ud	Udorthents, smoothed	2,950	0.9
W	Water	1,325	0.4
	Total	322,560	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
Cg	Chagrin loam, rarely flooded
Ch	Chagrin sandy loam, occasionally flooded

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Wheat	Grass-legume hay	Kentucky bluegrass
		Bu	Bu	Tons	AUM*
BpF**:					
Berks-Pineville	VIIs	---	---	---	---
CeF** Cedarcreek-Rock outcrop	VIIs	---	---	---	---
Cg Chagrin	I	135	---	4.5	5.5
Ch Chagrin	IIw	125	---	4.5	5.5
Cu** Chagrin-Urban land	---	---	---	---	---
DpF**:					
Dekalb-Pineville-Guyandotte	VIIs	---	---	---	---
FvE Fiveblock	VIIs	---	---	---	---
GpC Gilpin and Lily	IIIe	85	35	3.0	4.0
GpE Gilpin and Lily	VIe	---	---	---	3.5
Ho Holly-Lobdell	IIIw	110	---	3.5	4.5
ImE Itmann	VIIs	---	---	---	---
ItF Itmann	VIIIs	---	---	---	---
KcF Kaymine-Cedarcreek-Dekalb	VIIs	---	---	---	---
KmF** Kaymine-Rock outcrop	VIIs	---	---	---	---
MgB Monongahela	IIe	110	40	3.0	4.5
PbC Pineville-Buchanan	IIIe	95	40	3.0	4.0
PcE Pineville-Buchanan	VIIs	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Grass-legume hay	Kentucky bluegrass
		Bu	Bu	Tons	AUM*
PoB------------------------ Potomac	IVs	---	---	2.5	3.5
PuB**---------------------- Potomac-Urban land	---	---	---	---	---
SeC------------------------ Sewell	VIIs	---	---	---	---
Ud. Udorthents					
W. Water					

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	1,540	---	---	---
II	650	235	415	---
III	5,055	3,730	1,325	---
IV	1,125	---	---	1,125
V	---	---	---	---
VI	13,630	13,630	---	---
VII	291,910	---	---	291,910
VIII	1,345	---	---	1,345

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth: Cubic feet/ac	Average annual growth: Board feet/ac	Average annual growth: Cords/ac
BpF*:										
Berks (North aspect)	4R	Moderate	Severe	Moderate	Moderate	Northern red oak	75	57	215	0.75
						Black oak	73	55	200	0.70
						Yellow-poplar	103	112	620	1.30
						Hickory	---	---	---	---
						Eastern hemlock	---	---	---	---
Pineville (North aspect)	5R	Severe	Severe	Slight	Severe	Northern red oak	86	68	290	0.90
						Yellow-poplar	112	127	750	1.45
						Black oak	85	67	285	0.90
						Basswood	---	---	---	---
						Eastern hemlock	---	---	---	---
BpF*:										
Berks (South aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak	67	49	159	0.60
						Black oak	75	46	130	0.60
						White oak	73	55	200	0.70
						Scarlet oak	73	55	200	0.70
						Hickory	---	---	---	---
Pineville (South aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak	81	63	255	0.80
						Yellow-poplar	91	92	455	1.05
						White oak	75	57	215	1.05
						Black oak	83	65	270	0.85
						Hickory	---	---	---	---
CeF*:										
Cedarcreek	4R	Severe	Severe	Moderate	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	174	---	---
						Yellow-poplar	105	115	795	1.50
						American sycamore	90	---	---	---
						Black locust	100	---	---	---
						Red maple	---	---	---	---
						Sourwood	---	---	---	---
						Sassafras	---	---	---	---
Rock outcrop,hard.										
Cg, Ch Chagrin	5A	Slight	Slight	Slight	Severe	Northern red oak	86	68	290	0.90
						Yellow-poplar	96	100	525	1.10
						White oak	---	---	---	---
						Black walnut	---	---	---	---
						American sycamore	---	---	---	---
						American beech	---	---	---	---
						River birch	---	---	---	---
Cu*:										
Chagrin	5A	Slight	Slight	Slight	Severe	Northern red oak	86	68	290	0.90
						Yellow-poplar	96	100	525	1.10
						White oak	---	---	---	---
						Black walnut	---	---	---	---
						American sycamore	---	---	---	---
						American beech	---	---	---	---
						River birch	---	---	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth: Cubic feet/ac	Average annual growth: Board feet/ac	Average annual growth: Cords/ac
Urban land.										
DpF*:										
Dekalb (North aspect)	4R	Moderate	Severe	Moderate	Moderate	Northern red oak	73	55	200	0.70
						Black oak	71	53	185	0.70
						Scarlet oak	74	56	205	0.75
						Sugar maple	---	---	---	---
						Black cherry	---	---	---	---
						Hickory	---	---	---	---
Pineville (North aspect)	5R	Severe	Severe	Slight	Severe	Northern red oak	86	68	290	0.90
						Yellow-poplar	112	127	750	1.45
						American basswood	---	---	---	---
						Sugar maple	---	---	---	---
						White ash	---	---	---	---
						Hickory	---	---	---	---
Guyandotte (North aspect)	5R	Severe	Severe	Moderate	Severe	Northern red oak	92	74	335	1.00
						American basswood	99	---	---	---
						Yellow-poplar	116	133	810	1.55
						Black cherry	86	---	---	---
						Black locust	85	---	---	---
						White ash	---	---	---	---
						Cucumbertree	101	---	---	---
DpF*:										
Dekalb (South aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak	66	48	150	0.60
						Black oak	71	53	185	0.70
						Scarlet oak	71	53	185	0.70
						Chestnut oak	59	42	105	0.50
						Black locust	---	---	---	---
						Black gum	---	---	---	---
Pineville (South aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak	81	63	255	0.80
						Yellow-poplar	91	92	455	1.05
						White oak	75	57	215	0.75
						Black oak	83	64	265	0.85
						Hickory	---	---	---	---
Guyandotte (South aspect)	5R	Severe	Severe	Moderate	Severe	Northern red oak	87	69	300	0.90
						American basswood	99	---	---	---
						Yellow-poplar	104	114	635	1.30
						Black cherry	86	---	---	---
						Black locust	85	---	---	---
						White oak	---	---	---	---
						Cucumbertree	---	---	---	---
FvE Fiveblock	4X	Moderate	Moderate	Moderate	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	223	780	---
						Yellow-poplar	105	115	635	1.30
						American sycamore	90	---	---	---
						Black locust	---	---	---	---
						Sassafras	---	---	---	---
GpC*:										
Gilpin	5A	Slight	Slight	Slight	Moderate	Northern red oak	84	64	265	0.85
						Yellow-poplar	91	92	455	1.25
						Black oak	81	63	255	0.80
						Scarlet oak	81	65	255	0.80
						White oak	74	56	210	0.75
						Hickory	---	---	---	---
						Black locust	---	---	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth: Cubic feet/ac	Board feet/ac	Cords/ac
GpC*:										
Lily	5A	Slight	Slight	Slight	Slight	Northern red oak	84	72	320	0.95
						Yellow-poplar	95	109	595	1.25
						Black oak	85	67	285	0.90
						Scarlet oak	90	82	320	0.95
						White oak	85	72	285	0.90
						Chestnut oak	76	58	220	0.75
GpE*:										
Gilpin (North aspect)	5R	Moderate	Moderate	Moderate	Moderate	Northern red oak	84	66	280	0.85
						Yellow-poplar	92	93	470	1.40
						Black oak	82	64	265	0.85
						Scarlet oak	81	63	255	0.80
						White oak	75	57	215	0.75
						Hickory	---	---	---	---
						Black locust	---	---	---	---
Lily (North aspect)	5R	Moderate	Moderate	Slight	Slight	Northern red oak	84	66	280	0.85
						Yellow-poplar	95	98	510	1.15
						Black oak	85	67	285	0.90
						Black locust	103	---	---	---
						Scarlet oak	90	72	440	1.05
						Chestnut oak	76	58	220	0.75
GpE*:										
Gilpin (South aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	74	56	210	0.75
						Black oak	71	53	185	0.70
						White oak	68	50	165	0.65
						Scarlet oak	72	54	195	0.70
						Hickory	---	---	---	---
						Black locust	---	---	---	---
Lily (South aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak	74	56	210	0.75
						White oak	69	51	175	0.65
						Scarlet oak	75	57	215	0.75
						Black oak	---	---	---	---
						Chestnut oak	63	46	130	0.55
Ho*:										
Holly	5W	Slight	Severe	Severe	Severe	Pin oak	90	72	320	0.95
						Red maple	---	---	---	---
						American sycamore	---	---	---	---
						River birch	---	---	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns				Potential productivity		Average annual growth		
		Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Plant competi-tion	Common trees	Site index	Cubic feet/ac	Board feet/ac	Cords/ac
Ho*:										
Lobdell	5A	Slight	Slight	Slight	Moderate	Northern red oak	87	69	300	0.90
						Yellow-poplar	---	---	---	---
						Red maple	---	---	---	---
						River birch	---	---	---	---
						Black walnut	---	---	---	---
						Black cherry	---	---	---	---
						American sycamore	---	---	---	---
ImE, ItF Itmann	---	Severe	Severe	Severe	Slight	Sweet birch	---	---	---	---
						Red maple	---	---	---	---
						Sourwood	---	---	---	---
KcF*:										
Kaymine	4R	Severe	Severe	Moderate	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	174	780	---
						Yellow-poplar	105	115	650	1.30
						American sycamore	90	---	---	---
						Black locust	100	---	---	---
						Red maple	---	---	---	---
						Sourwood	---	---	---	---
Cedarcreek	4R	Severe	Severe	Moderate	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	174	780	---
						Yellow-poplar	105	115	650	1.30
						American sycamore	90	---	---	---
						Black locust	100	---	---	---
						Red maple	---	---	---	---
						Sourwood	---	---	---	---
Dekalb	3R	Moderate	Severe	Moderate	Moderate	Northern red oak	66	48	150	0.60
						Black oak	71	53	185	0.70
						Scarlet oak	71	53	185	0.70
						Chestnut oak	59	42	105	0.50
						Black locust	---	---	---	---
KmF*:										
Kaymine	4R	Severe	Severe	Moderate	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	174	780	---
						Yellow-poplar	105	115	650	1.30
						American sycamore	90	---	---	---
						Black locust	100	---	---	---
						Red maple	---	---	---	---
Rock outcrop, hard.										
MgB Monongahela	4A	Slight	Slight	Slight	Severe	Northern red oak	70	52	180	0.65
						Yellow-poplar	85	81	380	0.95
						Hickory	---	---	---	---
						Black oak	---	---	---	---
						Sourwood	---	--	---	---
						Red maple	---	--	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth: Cubic feet/ac	Average annual growth: Board feet/ac	Average annual growth: Cords/ac
PbC*:										
Pineville------	4A	Slight	Slight	Slight	Moderate	Northern red oak----	81	63	255	0.80
						Yellow-poplar-------	91	92	455	1.05
						Black oak-----------	83	65	270	0.85
						White oak-----------	75	57	215	0.75
						Hickory-------------	---	---	---	---
Buchanan-------	4A	Slight	Slight	Slight	Severe	Northern red oak----	77	59	250	0.80
						Yellow-poplar-------	90	90	440	1.05
						Hickory-------------	---	---	---	---
						Black oak-----------	72	54	195	0.70
						White oak-----------	73	55	200	0.70
						American beech------	---	---	---	---
						Scarlet oak---------	67	49	160	0.65
PcE*:										
Pineville------ (North aspect)	5R	Moderate	Moderate	Slight	Severe	Northern red oak----	86	68	290	0.90
						Yellow-poplar-------	112	127	750	1.45
						Black oak-----------	85	67	285	0.90
						Basswood------------	---	---	---	---
						Eastern hemlock-----	---	---	---	---
Buchanan------- (North aspect)	4R	Moderate	Moderate	Slight	Severe	Northern red oak----	77	59	230	0.75
						Yellow-poplar-------	90	90	440	1.05
						Hickory-------------	---	---	---	---
						Black oak-----------	73	55	200	0.70
						Eastern hemlock-----	---	---	---	---
						American beech------	---	---	---	---
						Scarlet oak---------	71	53	185	0.70
PcE*:										
Pineville------ (South aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	81	63	255	0.80
						Yellow-poplar-------	91	92	455	1.05
						White oak-----------	75	57	270	0.85
						Black oak-----------	83	65	265	0.85
						Hickory-------------	---	---	---	---
Buchanan------- (South aspect)	4R	Moderate	Moderate	Slight	Severe	Northern red oak----	77	59	230	0.75
						Yellow-poplar-------	90	90	440	1.05
						Hickory-------------	---	---	---	---
						White oak-----------	72	54	195	0.70
						Black oak-----------	73	55	200	0.70
						American beech------	---	---	---	---
						Scarlet oak---------	67	49	160	0.65
PoB------------ Potomac	5F	Slight	Slight	Moderate	Moderate	Northern red oak----	85	67	285	0.90
						Yellow poplar-------	107	119	680	1.35
						American sycamore---	---	---	---	---
						Eastern hemlock-----	---	---	---	---
						River birch---------	---	---	---	---
						Yellow birch--------	---	---	---	---
						Black walnut--------	---	---	---	---

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Average annual growth		
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Cubic feet/ac	Board feet/ac	Cords/ac
PuB*:										
Potomac	5F	Slight	Slight	Moderate	Moderate	Northern red oak	85	67	285	0.90
						Yellow-poplar	107	119	675	1.35
						black walnut	---	---	---	---
						American sycamore	---	---	---	---
						Eastern hemlock	---	---	---	---
						American beech	---	--	---	---
						Yellow birch	---		---	---
						River birch	---		---	---
Urban land.										
SeC Sewell	4X	Slight	Moderate	Moderate	Moderate	Northern red oak	80	62	250	0.80
						Eastern white pine	94	174	780	---
						Yellow-poplar	105	115	650	1.30
						American sycamore	90	---	---	---
						Black locust	---	---	---	---
						Sourwood	---	---	---	---
						Red maple	---	---	---	---
						Sassafras	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BpF*:					
Berks	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope.	Severe: slope, small stones.
Pineville	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
CeF*:					
Cedarcreek	---	---	---	---	---
Rock outcrop.					
Cg Chagrin	Severe: flooding.	Slight	Slight	Slight	Slight.
Ch Chagrin	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Cu*:					
Chagrin	Severe: flooding.	Slight	Slight	Slight	Slight.
Urban land.					
DpF*:					
Dekalb	Severe: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, small stones.
Pineville	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Guyandotte	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope, small stones.
FvE Fiveblock	---	---	---	---	---
GpC*:					
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GpC*:					
Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
GpE*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lily	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ho*:					
Holly	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Lobdell	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight	Moderate: flooding.
ImE Itmann	---	---	---	---	---
ItF Itmann	---	---	---	---	---
KcF*:					
Kaymine	---	---	---	---	---
Cedarcreek	---	---	---	---	---
Dekalb	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, small stones.
KmF*:					
Kaymine	---	---	---	---	---
Rock outcrop.					
MgB Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
PbC*:					
Pineville	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope.	Slight	Moderate: small stones, slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
PbC*:					
Buchanan	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
PcE*:					
Pineville	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
Buchanan	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope, small stones.
PoB Potomac	Severe: flooding.	Moderate: large stones, small stones, too sandy.	Severe: large stones, small stones.	Moderate: too sandy.	Moderate: large stones, droughty.
PuB*:					
Potomac	Severe: flooding.	Moderate: large stones, small stones, too sandy.	Severe: large stones, small stones.	Moderate: too sandy.	Moderate: large stones, droughty.
Urban land.					
SeC Sewell	---	---	---	---	---
Ud. Udorthents					
W*. Water					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
BpF*:										
Berks	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Pineville	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
CeF*:										
Cedarcreek	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
Cg, Ch Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Cu*:										
Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
DpF*:										
Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Pineville	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Guyandotte	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
FvE Fiveblock	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GpC*:										
Gilpin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Lily	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GpE*:										
Gilpin	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lily	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ho*:										
Holly	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Lobdell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
ImE, ItF. Itmann	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
KcF*: Kaymine	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Cedarcreek	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
KmF*: Kaymine	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
MgB Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PbC*: Pineville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Buchanan	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PcE*: Pineville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Buchanan	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
PoB Potomac	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
PuB*: Potomac	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land.										
SeC Sewell	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Ud. Udorthents										
W*. Water										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BpF*:						
Berks	Severe: slope.	Severe: slope.	Severe	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Pineville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CeF*:						
Cedarcreek	---	---	---	---	---	---
Rock outcrop.						
Cg Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
Ch Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Cu*:						
Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
Urban land.						
DpF*:						
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Pineville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Guyandotte	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
FvE Fiveblock	---	---	---	---	---	---
GpC*:						
Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
Lily	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GpE*:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lily-------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ho*:						
Holly------------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
Lobdell----------	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
ImE--------------- Itmann	---	---	---	---	---	---
ItF--------------- Itmann	---	---	---	---	---	---
KcF*:						
Kaymine----------	---	---	---	---	---	---
Cedarcreek-------	---	---	---	---	---	---
Dekalb-----------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
KmF*:						
Kaymine----------	---	---	---	---	---	---
Rock outcrop.						
MgB--------------- Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.
PbC*:						
Pineville--------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
Buchanan---------	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: slope, wetness, frost action.	Severe: small stones.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PcE*:						
Pineville--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Buchanan---------	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
PoB--------------- Potomac	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, large stones.	Moderate: large stones, droughty.
PuB*:						
Potomac----------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, large stones.	Moderate: large stones, droughty.
Urban land.						
SeC--------------- Sewell	---	---	---	---	---	---
Ud. Udorthents						
W*. Water						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BpF*:					
Berks	Severe: depth to rock, slope.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Poor: small stones, slope, area reclaim.
Pineville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.
CeF*:					
Cedarcreek	---	---	---	---	---
Rock outcrop.					
Cg Chagrin	Moderate: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: flooding.	Good.
Ch Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
Cu*:					
Chagrin	Moderate: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: flooding.	Good.
Urban land.					
DpF*:					
Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
Pineville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.
Guyandotte	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
FvE Fiveblock	---	---	---	---	---

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GpC*:					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
GpE*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Ho*:					
Holly	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Lobdell	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
ImE, ItF Itmann	---	---	---	---	---
KcF*:					
Kaymine	---	---	---	---	---
Cedarcreek	---	---	---	---	---
Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
KmF*:					
Kaymine	---	---	---	---	---
Rock outcrop.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MgB------------------ Monongahela	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
PbC*:					
Pineville-----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Moderate: small stones, slope.
Buchanan------------	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Poor: small stones.
PcE*:					
Pineville-----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.
Buchanan------------	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: slope.	Poor: small stones, slope.
PoB------------------ Potomac	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Poor: seepage, small stones.
PuB*:					
Potomac-------------	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Poor: seepage, small stones.
Urban land.					
SeC------------------ Sewell	---	---	---	---	---
Ud. Udorthents					
W*. Water					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BpF*:				
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Pineville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CeF*:				
Cedarcreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
Cg, Ch Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Cu*:				
Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Urban land.				
DpF*:				
Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Pineville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Guyandotte	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
FvE Fiveblock	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, area reclaim, slope.
GpC*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Lily	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GpE*:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Lily	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ho*:				
Holly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Lobdell	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
ImE, ItF Itmann	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
KcF*:				
Kaymine	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Cedarcreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
KmF*:				
Kaymine	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
MgB Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
PbC*:				
Pineville	Good.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Buchanan	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PcE*:				
Pineville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Buchanan	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
PoB Potomac	Fair: large stones.	Improbable: small stones.	Probable	Poor: large stones, area reclaim, small stones.
PuB*:				
Potomac	Fair: large stones.	Improbable: small stones.	Probable	Poor: large stones, area reclaim, small stones.
Urban land.				
SeC Sewell	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Ud. Udorthents				
W*. Water				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
BpF*:						
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope, depth to rock.	Slope, depth to rock, large stones.	Depth to rock, large stones, slope.
Pineville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
CeF*:						
Cedarcreek	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop.						
Cg Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Ch Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Soil blowing, flooding.	Soil blowing	Favorable.
Cu*:						
Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.
Urban land.						
DpF*:						
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock, large stones.	Slope, large stones, droughty.
Pineville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Guyandotte	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope	Slope, large stones.	Slope, large stones.
FvE Fiveblock	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty.	Slope, large stones.	Large stones, slope, droughty.
GpC*:						
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Lily	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
GpE*:						
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Ho*:						
Holly	Severe: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, flooding.	Wetness	Wetness.
Lobdell	Severe: seepage.	Severe: piping.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Erodes easily.
ImE, ItF: Itmann	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.	Slope	Slope, droughty.
KcF*:						
Kaymine	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Cedarcreek	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock, large stones.	Slope, large stones, droughty.
KmF*:						
Kaymine	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop.						
MgB: Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
PbC*, PcE*:						
Pineville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Buchanan	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, percs slowly, wetness.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.
PoB: Potomac	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty.	Large stones, too sandy.	Large stones, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
PuB*:						
Potomac	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, droughty.	Large stones, too sandy.	Large stones, droughty.
Urban land.						
SeC Sewell	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Ud. Udorthents						
W*. Water						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BpF*:											
Berks	0-7	Very stony loam	GM, SM, GC, SC	A-2, A-4	15-30	40-80	35-70	30-60	25-45	25-36	5-10
	7-34	Shaly loam, very shaly loam, shaly silt loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	34-38	Shaly loam, very shaly loam, shaly silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	38	Weathered bedrock	---	---	---	---	---	---	---	---	---
Pineville	0-3	Very stony loam	ML, CL-ML, SM, SM-SC	A-2, A-4	15-30	55-90	50-85	45-80	30-75	25-35	4-10
	3-50	Channery loam, channery clay loam, very channery loam.	CL, CL-ML, SC, SM-SC	A-2, A-4, A-6	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	50-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SM-SC CL-ML	A-1, A-2, A-4, A-6	5-20	35-75	30-70	25-65	20-60	25-35	4-12
CeF*:											
Cedarcreek	0-3	Stony loam	GC	A-2, A-4	15-30	45-60	40-55	30-50	20-40	25-35	7-12
	3-65	Stony loam, very stony silt loam, very channery sandy loam.	GC	A-2, A-4	5-30	45-60	40-55	35-50	25-45	25-35	7-12
Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Cg---------------- Chagrin	0-9	Loam--------------	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	9-48	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	48-65	Stratified silt loam to fine sand.	ML, SM	A-4, A-2	0	85-100	75-100	50-85	15-80	20-40	NP-10
Ch---------------- Chagrin	0-7	Sandy loam--------	SM, SM-SC, ML, CL-ML	A-4	0	95-100	85-100	55-85	35-55	<25	NP-5
	7-36	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	36-65	Stratified silt loam to fine sand.	ML, SM	A-4, A-2	0	85-100	75-100	50-85	15-80	20-40	NP-10
Cu*: Chagrin----------	0-9	Loam--------------	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	9-48	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	48-65	Stratified silt loam to fine sand.	ML, SM	A-4, A-2	0	85-100	75-100	50-85	15-80	20-40	NP-10
Urban land.											
DpF*: Dekalb-----------	0-5	Very stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-30	50-90	45-80	40-75	20-55	10-32	NP-10
	5-28	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-9
	28-33	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pineville--------	0-3	Very stony loam	ML, CL-ML, SM, SM-SC	A-2, A-4	15-30	55-90	50-85	45-80	30-75	25-35	4-10
	3-50	Channery loam, channery clay loam, very channery loam.	CL, CL-ML, SC, SM-SC	A-2, A-4, A-6	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	50-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SM-SC CL-ML	A-1, A-2, A-4, A-6	5-20	35-75	30-70	25-65	20-60	25-35	4-12

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
DpF*:											
Guyandotte------	0-12	Very stony sandy loam.	GM-GC, SM-SC, CL-ML, ML	A-1, A-2, A-4	5-20	30-70	25-65	20-60	15-55	20-30	NP-7
	12-65	Very channery sandy loam, very channery loam, extremely channery sandy loam.	GM-GC, SM-SC, CL-ML, ML	A-1, A-2, A-4	5-35	25-65	20-60	15-55	10-50	20-30	NP-7
FvE-------------- Fiveblock	0-6	Channery sandy loam.	SM, SM-SC, GM-GC	A-1, A-2	30-55	55-70	50-65	35-50	10-25	15-25	NP-7
	6-65	Stony sandy loam, very stony sandy loam.	SM, SM-SC, GM-GC	A-1, A-2	15-55	55-70	50-65	35-50	15-25	15-25	NP-7
GpC*, GpE*:											
Gilpin----------	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	7-22	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22-39	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lily------------	0-10	Loam-------------	ML	A-4	0-5	90-100	85-100	70-95	55-75	<35	NP-7
	10-30	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
	30-34	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6, A-1-B	0-10	65-100	50-100	40-95	20-75	<35	3-15
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ho*:											
Holly-----------	0-3	Silt loam--------	ML	A-4	0	90-100	85-100	80-100	70-90	25-35	3-10
	3-28	Silt loam, loam, sandy loam.	ML, SM	A-4, A-6	0	85-100	75-100	70-95	45-85	20-40	NP-14
	28-65	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2	0	85-100	75-100	50-95	25-80	20-40	NP-10
Lobdell---------	0-8	Loam-------------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-100	65-90	20-30	NP-8
	8-36	Loam, silt loam	ML	A-4	0	90-100	80-100	70-95	55-85	20-35	NP-10
	36-65	Stratified sandy loam to silt loam.	ML, SM, CL-ML, CL	A-4	0	90-100	80-100	65-85	40-80	15-35	NP-10
ImE-------------- Itmann	0-5	Channery loam----	ML, CL, SM, SC	A-2, A-4	0-10	65-85	60-80	50-75	30-60	20-30	NP-8
	5-65	Very channery sandy loam, very channery loam, extremely channery sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	20-45	10-35	15-25	NP-7
ItF-------------- Itmann	0-5	Very channery sandy loam.	GM, GM-GC	A-1, A-2	0-10	40-55	35-50	25-45	15-35	15-25	NP-7
	5-65	Very channery sandy loam, very channery loam, extremely channery sandy loam.	GM, GM-GC	A-1, A-2	0-15	30-55	25-50	20-45	10-35	15-25	NP-7
KcF*:											
Kaymine---------	0-3	Very channery loam.	GC	A-2, A-4	15-30	45-60	40-55	30-50	20-40	25-35	7-12
	3-65	Stony loam, very stony silt loam, very channery loam.	GC	A-2, A-4	5-30	45-60	40-55	35-50	25-45	25-35	7-12

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
KcF*:											
Cedarcreek------	0-3	Channery loam----	GC	A-2, A-4	15-30	45-60	40-55	30-50	20-40	25-35	7-12
	3-65	Stony loam, very stony silt loam, very channery sandy loam.	GC	A-2, A-4	5-30	45-60	40-55	35-50	25-45	25-35	7-12
Dekalb----------	0-5	Very stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	10-30	50-90	45-80	40-75	20-55	10-32	NP-10
	5-28	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-9
	28-33	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
KmF*:											
Kaymine---------	0-3	Very channery loam.	GC	A-2, A-4	15-30	45-60	40-55	30-50	20-40	25-35	7-12
	3-65	Stony loam, very stony silt loam, very channery loam.	GC	A-2, A-4	5-30	45-60	40-55	35-50	25-45	25-35	7-12
Rock outcrop.											
MgB-------------- Monongahela	0-11	Loam-------------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	11-27	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	27-51	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	51-65	Silt loam, clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
PbC*:											
Pineville-------	0-3	Channery loam----	ML, CL-ML, SM, SM-SC	A-2, A-4	0-10	60-80	55-75	50-70	30-65	25-35	4-10
	3-50	Channery loam, channery clay loam, very channery loam.	CL, CL-ML, SC, SM-SC	A-2, A-4, A-6	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	50-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SM-SC CL-ML	A-1, A-2, A-4, A-6	5-20	35-75	30-70	25-65	20-60	25-35	4-12

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
PbC*:											
Buchanan--------	0-4	Channery loam----	GM, ML, CL, CL-ML	A-4, A-2	0-10	50-100	45-75	40-75	30-65	20-35	2-11
	4-35	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-4, A-2	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	35-65	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-4, A-2, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
PcE*:											
Pineville-------	0-3	Channery loam----	ML, CL-ML, SM, SM-SC	A-2, A-4	3-15	55-90	50-85	45-80	30-75	25-35	4-10
	3-50	Channery loam, channery clay loam, very channery loam.	CL, CL-ML, SC, SM-SC	A-2, A-4, A-6	0-10	55-85	50-80	45-75	30-65	25-40	6-15
	50-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SM-SC CL-ML	A-1, A-2, A-4, A-6	5-20	35-75	30-70	25-65	20-60	25-35	4-12
Buchanan--------	0-4	Channery loam----	GM, ML, CL, CL-ML	A-2, A-4	3-20	50-90	45-75	40-75	30-65	20-35	2-11
	4-35	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	35-65	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
PoB------------- Potomac	0-8	Sandy loam-------	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	85-100	80-100	50-85	30-60	<20	NP-5
	8-65	Very cobbly loamy sand, very gravelly loamy sand, very gravelly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	<15	NP-3
PuB*:											
Potomac---------	0-8	Sandy loam-------	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	85-100	80-100	50-85	30-60	<20	NP-5
	8-65	Very cobbly loamy sand, very gravelly loamy sand, very gravelly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	<15	NP-3
Urban land.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SeC--------------- Sewell	0-4	Channery sandy loam.	SM, SM-SC, GM-GC	A-1, A-2	30-55	55-70	50-65	35-50	10-25	15-25	NP-7
	4-65	Stony sandy loam, very stony sandy loam, stony loam.	SM, SM-SC, GM-GC	A-1, A-2	15-55	55-70	50-65	35-50	15-25	15-25	NP-7
Ud. Udorthents											
W*. Water											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
BpF*:										
Berks	0-7	5-23	1.20-1.50	0.6-6.0	0.08-0.12	4.5-6.5	Low	0.17	3	.5-4
	7-34	5-32	1.20-1.60	0.6-6.0	0.04-0.10	4.5-6.5	Low	0.17		
	34-38	5-20	1.20-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low	0.17		
	38	---	---	---	---	---	-----------	----		
Pineville	0-3	15-25	1.00-1.30	2.0-6.0	0.10-0.16	4.5-7.3	Low	0.20	4	.5-5
	3-50	18-30	1.30-1.60	2.0-6.0	0.08-0.14	4.5-5.5	Low	0.15		
	50-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	4.5-5.5	Low	0.15		
CeF*:										
Cedarcreek	0-3	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low	0.32	5	<.5
	3-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low	0.32		
Rock outcrop.										
Cg Chagrin	0-9	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-6.0	Low	0.32	5	2-4
	9-48	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-6.0	Low	0.32		
	48-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-6.0	Low	0.32		
Ch Chagrin	0-7	8-20	1.20-1.40	0.6-2.0	0.13-0.18	5.6-6.0	Low	0.32	5	2-4
	7-36	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-6.0	Low	0.32		
	36-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-6.0	Low	0.32		
Cu*:										
Chagrin	0-9	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-6.0	Low	0.32	5	2-4
	9-48	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-6.0	Low	0.32		
	48-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-6.0	Low	0.32		
Urban land.										
DpF*:										
Dekalb	0-5	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low	0.17	2	2-4
	5-28	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low	0.17		
	28-33	5-15	1.20-1.50	6.0-20	0.05-0.10	3.6-5.5	Low	0.17		
	33-37	---	---	---	---	---	-----------	----		
Pineville	0-3	15-25	1.00-1.30	2.0-6.0	0.10-0.16	4.5-7.3	Low	0.20	4	.5-5
	3-50	18-30	1.30-1.60	2.0-6.0	0.08-0.14	4.5-5.5	Low	0.15		
	50-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	4.5-5.5	Low	0.15		
Guyandotte	0-12	5-18	1.00-1.30	0.6-6.0	0.10-0.16	4.5-7.3	Low	0.10	4	2-10
	12-65	5-18	1.30-1.60	0.6-6.0	0.05-0.15	4.5-6.0	Low	0.17		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
FvE------------- Fiveblock	0-6	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low----------	0.32	5	<.5
	6-65	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low----------	0.32		
GpC*, GpE*:										
Gilpin----------	0-7	15-27	1.20-1.40	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.32	3	.5-4
	7-22	18-35	1.20-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24		
	22-39	15-35	1.20-1.50	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.24		
	39	---	---	---	---	---	-------------	----		
Lily------------	0-10	7-27	1.20-1.40	2.0-6.0	0.13-0.18	4.5-5.5	Low----------	0.28	3	.5-4
	10-30	18-35	1.25-1.35	2.0-6.0	0.12-0.18	4.5-5.5	Low----------	0.28		
	30-34	20-35	1.25-1.35	2.0-6.0	0.08-0.17	4.5-5.5	Low----------	0.17		
	34	---	---	---	---	---	-------------	----		
Ho*:										
Holly-----------	0-3	15-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.28	5	2-5
	3-28	18-30	1.20-1.50	0.6-2.0	0.17-0.21	5.6-7.3	Low----------	0.28		
	28-65	10-27	1.20-1.45	2.0-6.0	0.10-0.20	5.6-7.3	Low----------	0.28		
Lobdell---------	0-8	15-27	1.20-1.40	0.6-2.0	0.20-0.24	5.1-6.0	Low----------	0.37	5	1-3
	8-36	18-30	1.25-1.60	0.6-2.0	0.17-0.22	5.1-6.0	Low----------	0.37		
	36-65	15-30	1.20-1.60	2.0-6.0	0.12-0.18	5.6-6.0	Low----------	0.37		
ImE------------- Itmann	0-5	10-20	1.00-1.30	2.0-6.0	0.08-0.15	3.6-5.5	Low----------	0.32	5	<.5
	5-65	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low----------	0.32		
ItF------------- Itmann	0-5	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low----------	0.32	5	<.5
	5-65	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low----------	0.32		
KcF*:										
Kaymine---------	0-3	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.3	Low----------	0.32	5	<.5
	3-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.3	Low----------	0.32		
Cedarcreek------	0-3	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low----------	0.32	5	<.5
	3-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low----------	0.32		
Dekalb----------	0-5	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low----------	0.17	2	2-4
	5-28	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	28-33	5-15	1.20-1.50	6.0-20	0.05-0.10	3.6-5.5	Low----------	0.17		
	33	---	---	---	---	---	-------------	----		
KmF*:										
Kaymine---------	0-3	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.3	Low----------	0.32	5	<.5
	3-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.3	Low----------	0.32		
Rock outcrop.										
MgB------------- Monongahela	0-11	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.43	3	2-4
	11-27	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43		
	27-51	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43		
	51-65	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
PbC*:										
Pineville-------	0-3	15-25	1.00-1.30	2.0-6.0	0.10-0.16	4.5-7.3	Low----------	0.20	4	.5-5
	3-43	18-30	1.30-1.60	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.15		
	43-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	4.5-5.5	Low----------	0.15		
Buchanan--------	0-4	10-27	1.20-1.40	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.24	3-2	1-3
	4-35	18-30	1.30-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.24		
	35-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	4.5-5.5	Low----------	0.17		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
PcE*:										
Pineville--------	0-3	15-25	1.00-1.30	2.0-6.0	0.12-0.18	4.5-7.3	Low----------	0.20	4	.5-5
	3-43	18-30	1.30-1.60	2.0-6.0	0.08-0.14	4.5-5.5	Low----------	0.15		
	43-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	4.5-5.5	Low----------	0.15		
Buchanan---------	0-4	10-27	1.20-1.40	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.24	3-2	.5-5
	4-35	18-30	1.30-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.24		
	35-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	4.5-5.5	Low----------	0.17		
PoB-------------- Potomac	0-8	5-15	1.20-1.40	0.6-6.0	0.10-0.14	5.1-7.3	Low----------	0.24	3	0-2
	8-65	4-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.3	Low----------	0.17		
PuB*:										
Potomac----------	0-8	5-15	1.20-1.40	0.6-6.0	0.10-0.14	5.1-7.3	Low----------	0.24	3	0-2
	8-65	4-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.3	Low----------	0.17		
Urban land.										
SeC-------------- Sewell	0-4	5-18	1.35-1.65	2.0-6.0	0.05-0.12	3.6-5.5	Low----------	0.32	5	<.5
	4-65	5-18	1.35-1.65	2.0-20	0.05-0.12	3.6-5.5	Low----------	0.32		
Ud. Udorthents										
W*. Water										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
BpF*:										
Berks------------	C	None------------	>6.0	---	---	20-40	Soft	Low------	Low------	High.
Pineville--------	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	High.
CeF*:										
Cedarcreek-------	C	None------------	>6.0	---	---	>60	---	Moderate	Moderate	High.
Rock outcrop.										
Cg---------------- Chagrin	B	Rare------------	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low------	Moderate.
Ch---------------- Chagrin	B	Occasional------	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low------	Moderate.
Cu*:										
Chagrin----------	B	Rare------------	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low------	Moderate.
Urban land.										
DpF*, DpF*:										
Dekalb-----------	C	None------------	>6.0	---	---	20-40	Hard	Low------	Low------	High.
Pineville--------	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	High.
Guyandotte-------	B	None------------	>6.0	---	---	>60	---	Low------	Low------	High.
FvE--------------- Fiveblock	C	None------------	>6.0	---	---	>60	---	Moderate	Low------	Low.
GpC*, GpE*:										
Gilpin-----------	C	None------------	>6.0	---	---	20-40	Soft	Moderate	Low------	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
GpC*, GpE*:										
Lily	C	None	>6.0	---	---	20-40	Hard	Moderate	Moderate	High.
Ho*:										
Holly	D	Occasional	0-1.0	Apparent	Dec-May	>60	---	High	High	Moderate.
Lobdell	B	Occasional	2.0-3.5	Apparent	Dec-Apr	>60	---	High	Low	Moderate.
ImE, ItF Itmann	C	None	>6.0	---	---	>60	---	Moderate	High	High.
KcF*:										
Kaymine	C	None	>6.0	---	---	>60	---	Moderate	Low	Low.
Cedarcreek	C	None	>6.0	---	---	>60	---	Moderate	Moderate	High.
Dekalb	C	None	>6.0	---	---	20-40	Hard	Low	Low	High.
KmF*:										
Kaymine	C	None	>6.0	---	---	>60	---	Moderate	Low	Low.
Rock outcrop.										
MgB Monongahela	C	None	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High	High.
PbC*, PcE*:										
Pineville	B	None	>6.0	---	---	>60	---	Moderate	Low	High.
Buchanan	C	None	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	High	High.
PoB Potomac	A	Rare	4.0-6.0	Apparent	Feb-Mar	>60	---	Low	Low	Moderate.
PuB*:										
Potomac	A	Rare	4.0-6.0	Apparent	Feb-Mar	>60	---	Low	Low	Moderate.
Urban land.										

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
SeC---------------- Sewell	C	None------------	>6.0	---	---	>60	---	Moderate	Moderate	High.
Ud. Udorthents										
W*. Water										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Cedarcreek	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Fiveblock	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Guyandotte	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Holly	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Itmann	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Kaymine	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Lobdell	Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Pineville	Fine-loamy, mixed, mesic Typic Hapludults
Potomac	Sandy-skeletal, mixed, mesic Typic Udifluvents
Sewell	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Udorthents	Udorthents

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