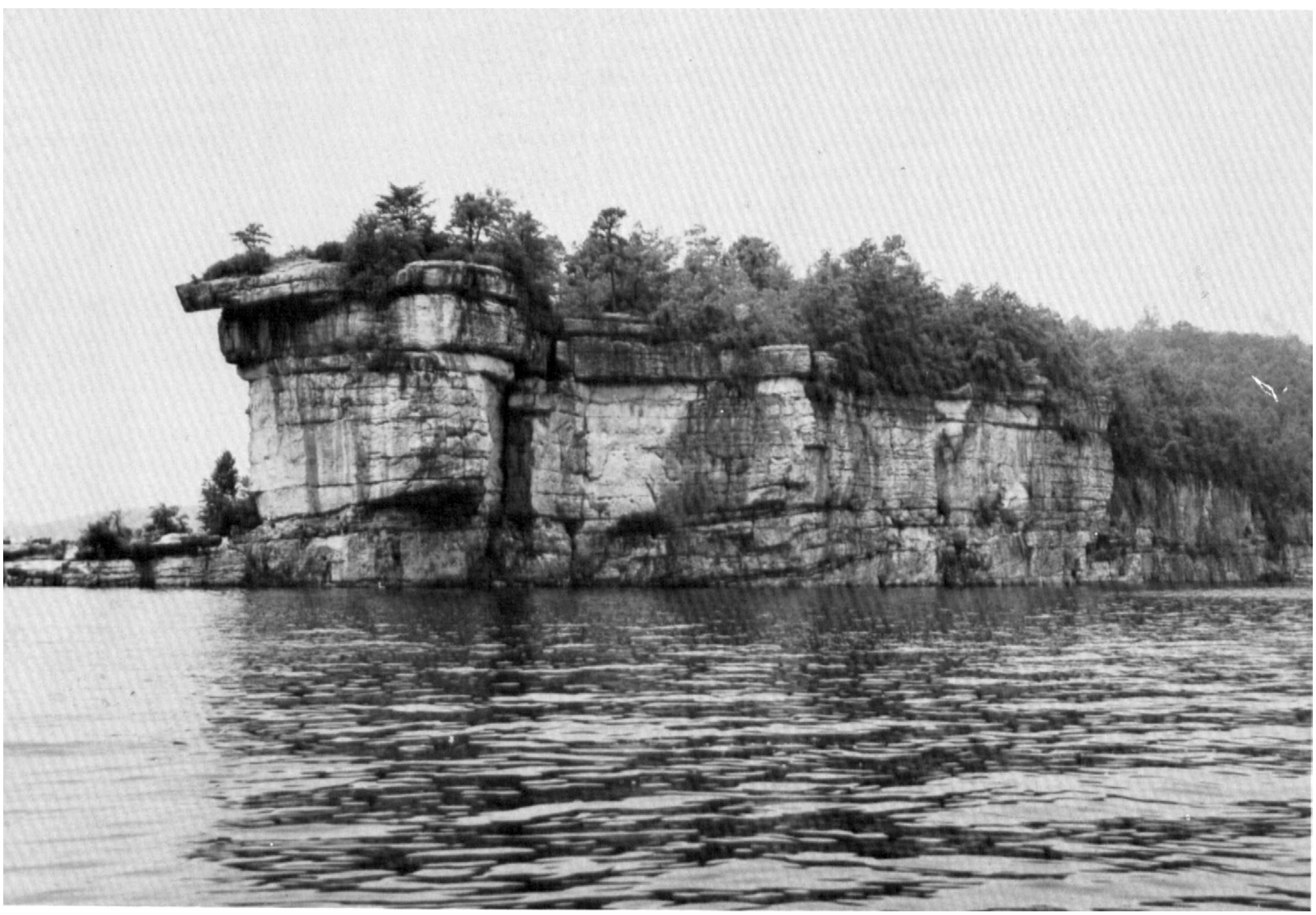
United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
West Virginia Agricultural
and Forestry Experiment
Station; United States
Department of
Agriculture, Forest
Service; and Nicholas
County Commission

Soil Survey of Nicholas County, West Virginia



How To Use This Soil Survey

General Soil Map

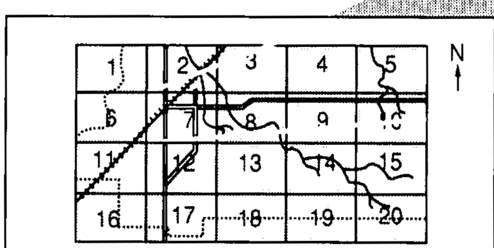
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

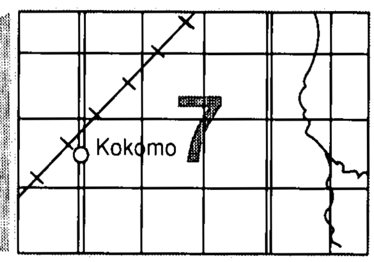
Detailed Soil Maps

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

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

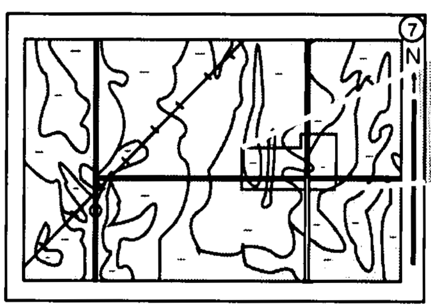


INDEX TO MAP SHEETS

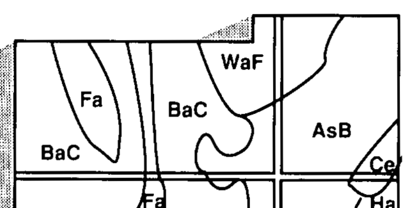


MAP SHEET

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



MAP SHEET



AREA OF INTEREST

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

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

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.

Major fieldwork for this soil survey was completed in 1986. Soil names and descriptions were approved in 1987. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This survey was made cooperatively by the United States Department of Agriculture, Soil Conservation Service and Forest Service, the West Virginia Agricultural and Forestry Experiment Station, and the Nicholas County Commission. The survey is part of the technical assistance furnished to the Elk 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.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Long Point at Summersville Lake. The point is in an area of Dekalb-Buchanan-Rock outcrop association, very steep.

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Issued June 1992

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Summary of Tables

Foreword

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

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

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

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

Rollin N. Swank
State Conservationist
Soil Conservation Service

Soil Survey of
Nicholas County, West Virginia

By Stephen G. Carpenter, Soil Conservation Service

Fieldwork by D. Paul Amick, James W. Bell, Stephen G. Carpenter, Charles H. Delp, and John A. Shaffer, Soil Conservation Service, and Nancy J. Burt and Linton Wright, Jr., Forest Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
West Virginia Agricultural and Forestry Experiment Station; United States Department of Agriculture, Forest Service; and Nicholas County Commission

Nicholas County is in the south-central part of West Virginia (fig. 1). It has an area of 416,000 acres, or 650 square miles. About 23,540 acres is in the Monongahela National Forest. This acreage is managed by the Forest Service.

Richwood, the largest city in the county, is in the eastern corner, near the Webster County line. Summersville, the county seat, is in the central part of the county. The population of Nicholas County was 28,126 in 1980.

A network of state and federal highways, three freight railroads, and a small airport meet the transportation needs in the county. The mining and processing of coal, coal-related industry, manufacturing, and timbering are the main sources of employment.

This soil survey updates the survey of the county published in 1922 *(7)*. It provides additional information and has larger maps, which show the soils in greater detail.

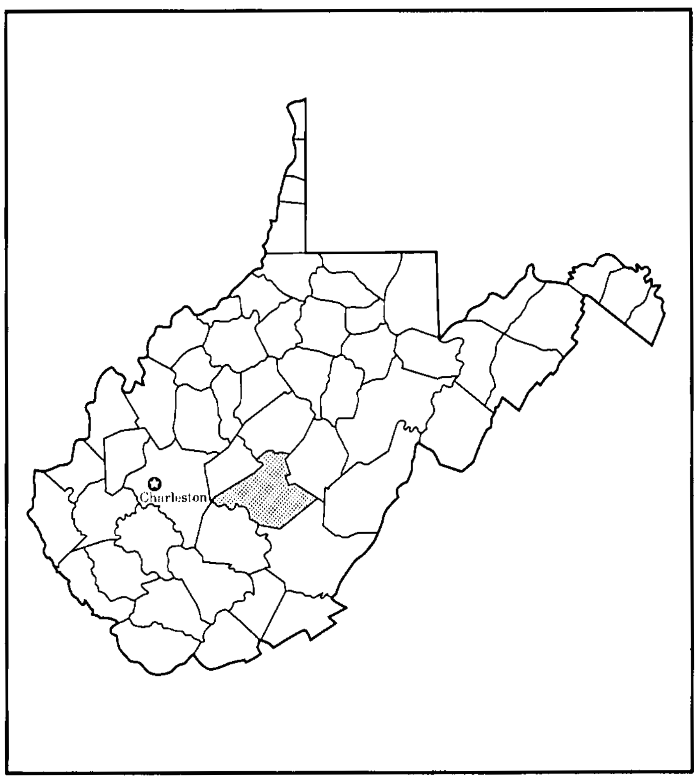

Figure 1.—Location of Nicholas County in West Virginia.

General Nature of the County

This section describes the settlement, farming, relief and drainage, and climate of the county.

Settlement

Around 1776, Henry Morris established the first known settlement in the area now known as Nicholas County. He settled in an area along Peters Creek near what is now Lockwood. He built a log cabin near where the Fairview Baptist Church now stands. The Morris homesite has historical significance because it was the site of the Morris massacre of 1792 *(6)*.

Nicholas County was formed in 1818 from parts of Greenbrier County by an act of the Virginia General Assembly *(4)*. Nicholas County was named for the Honorable Wilson Cary Nicholas, a prominent Virginia pioneer who served as commander of Washington's Life Guard, as United States Senator, and as Governor of Virginia from 1814 to 1816. Summersville was established in 1824 but was not incorporated until 1897. It is named in honor of Judge Lewis Summers, who introduced the bill that established Nicholas County.

Farming

In 1982, Nicholas County had 328 farms and 40,016 acres of farmland *(13)*. Between 1978 and 1982, the number of farms increased from 299 to 329. The value of farm products increased during this period, while the size of the average farm decreased from 137 acres to 122 acres. Beef cattle are the main marketed products. They are followed in importance by dairy products, poultry, grain crops, and wool. Most farms are operated on a part-time basis.

Relief and Drainage

Nicholas County is in two major land resource areas *(12)*. The northwestern quarter is part of the Cumberland Plateau and Mountains. The rest of the county is part of the Eastern Allegheny Plateau and Mountains. The county is characterized by mountain ranges oriented in a northeast-southwest direction and by steep mountainsides, intramountain plateaus, very steep river gorges, and moderately wide and narrow valleys. Elevation ranges from 675 feet above sea level at Belva to 3,850 feet at Briery Knob, near the Webster County line.

The northwestern quarter of Nicholas County is a highly dissected landscape that consists of narrow flood plains and long, steep side slopes between narrow ridgetops or crests. The central part of the county consists mostly of parallel, rounded ridges, steep side slopes, and moderately wide valleys. The southeastern part consists of intramountain plateaus dissected by steep and very steep side slopes. The valleys along the major streams are narrow.

Nicholas County is drained by the Birch, Cherry, Gauley, and Meadow Rivers and by Anglins, Hominy, Muddlety, Peters, and Twentymile Creeks. Nearly all of the streams flow to the Gauley River, but the Birch River flows to the Elk River. All of the drainage in the county is part of the Kanawha River system.

Climate

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

Winters are cold and snowy at the higher elevations in Nicholas County. The valleys are frequently cold, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm in the mountains and very warm in the valleys. Very hot days occasionally occur in the valleys. Rainfall is evenly distributed throughout the year. It is appreciably heavier on the windward, west-facing slopes than in the valleys. The normal annual precipitation is adequate for all of the crops commonly grown in the county, but summer temperatures and the length of the growing season, particularly at the higher elevations, may be inadequate.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Summersville Lake, West Virginia, in the period 1967 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 31 degrees F and the average daily minimum temperature is 20 degrees. The lowest temperature on record, which occurred at Summersville Lake on January 18, 1977, is -17 degrees. In summer, the average temperature is 69 degrees and the average daily maximum temperature is 80 degrees. The highest recorded temperature, which occurred on August 30, 1973, is 94 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.

Of the total annual precipitation, nearly 27 inches, or about 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 24 inches. The heaviest 1-day rainfall during the period of record was 2.6 inches at Summersville Lake on October 9, 1976. Thunderstorms occur on about 44 days each year. Heavy rains, which occur throughout the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

The average seasonal snowfall is about 50 inches. The greatest snow depth at any one time during the period of record was 19 inches. On the average, 34 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 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

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 biological 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 a considerable degree of accuracy the kind of soil at a specific location on the landscape.

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

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

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

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

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

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 or included soils.

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

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

General Soil Map Units

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

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

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

In areas along the borders of Nicholas County, the boundaries on the general soil map and the names of the general soil map units do not match those of adjoining counties. These discrepancies result from differences in the detail of mapping, changes in soil classification, and different proportions of the same soil in adjoining counties. The soils in the adjoining counties match with similar soils in this county.

Soil Descriptions

1. Gilpin-Buchanan

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

This map unit consists of soils on rugged uplands and foot slopes, mostly in the northern and southeastern parts of the county. The landscape is characterized by a rough, mountainous topography. It is a strongly dissected plateau that has broad and narrow ridges and steep or very steep side slopes. Sandstone rock outcrops, stones, and boulders are common on the surface. Slope ranges from 3 to 70 percent.

This map unit makes up about 49 percent of the county. It is about 53 percent Gilpin soils, 28 percent Buchanan soils, and 19 percent soils of minor extent.

Gilpin soils are moderately deep, well drained, and gently sloping to very steep. These stony soils are on uplands. They formed in acid material weathered from interbedded shale, siltstone, and sandstone. They have a dark brown, medium textured surface layer and a yellowish brown, medium textured subsoil.

Buchanan soils are very deep, moderately well drained, and moderately steep to very steep. These very stony soils are on foot slopes. They formed in acid material that moved downslope from areas on uplands. They have a very dark grayish brown, moderately coarse textured surface layer and a yellowish brown, medium textured subsoil that is mottled in the lower part.

Of minor extent in this map unit are Cedarcreek, Dekalb, Fenwick, Fiveblock, Kaymine, and Lily soils on uplands and Chavies, Craigsville, and Pope soils on flood plains.

Most of this map unit is wooded. Some of the ridgetops and flood plains are cleared and are used for cultivated crops, hay, pasture, or residential development. Because of the slope and the stones on the surface, this unit generally is unsuited to cultivated crops and cannot be easily managed for pasture.

The soils in this map unit are suitable for trees. The slope and the stones on the surface restrict the use of equipment. Erosion on logging roads and skid trails is a major management concern. It can be controlled by establishing the roads and trails on or nearly on the contour.

Several limitations affect the use of the soils in this map unit for community development. Gilpin soils are limited by the slope, the stones on the surface, and the depth to bedrock. Buchanan soils are limited by the slope, a seasonal high water table, slow permeability, and the stones on the surface. The soils of minor extent are limited by the slope, large stones, the depth to bedrock, and flooding.

2. Gilpin-Pineville-Lily-Buchanan

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

This map unit consists of soils on rugged mountain side slopes, ridgetops, and foot slopes in the northwestern part of the county. The landscape is characterized by a rough, mountainous topography. It is a deeply dissected plateau that has narrow ridgetops; narrow, winding valleys; and long, very steep side slopes. Slope ranges from 8 to 70 percent.

This map unit makes up about 30 percent of the county. It is about 34 percent Gilpin soils, 15 percent Pineville soils, 14 percent Lily soils, 11 percent Buchanan soils, and 26 percent soils of minor extent.

Gilpin soils are moderately deep, well drained, and very steep. These very stony soils are on uplands. They formed in acid material weathered from interbedded shale, siltstone, and sandstone. They have a dark brown, medium textured surface layer and a yellowish brown, medium textured subsoil.

Pineville soils are very deep, well drained, and very steep. These very stony soils are on mountain side slopes. They formed in acid material that moved downslope from areas on uplands. They have a dark brown, medium textured surface layer and a yellowish brown, medium textured subsoil.

Lily soils are moderately deep, well drained, and strongly sloping to steep. These nonstony soils are on uplands. They formed in acid material weathered from sandstone. They have a dark grayish brown, medium textured surface layer and a yellowish brown and strong brown, medium textured subsoil.

Buchanan soils are very deep, moderately well drained, and moderately steep to very steep. These very stony soils are on foot slopes. They formed in acid material that moved downslope from areas on uplands. They have a very dark grayish brown, moderately coarse textured surface layer and a yellowish brown, medium textured subsoil that is mottled in the lower part.

Of minor extent in this map unit are Cedarcreek, Dekalb, and Fiveblock soils on uplands; Guyandotte soils on side slopes and in coves; and Pope, Craigville, and Chavies soils on flood plains.

Most of this map unit is wooded or mined for coal. Some of the flood plains are cleared and are used for cultivated crops. Some small areas on foot slopes are cleared and are used for pasture or residential development.

Because of the slope and the stones on the surface, this unit is unsuited to cultivated crops. The soils in strongly sloping and steep areas on ridgetops are suited to pasture, but most of these areas are wooded. The soils on the gently sloping to steep foot slopes cannot be easily managed for pasture because of the stones on the surface.

The soils in this map unit are suitable for trees. The slope restricts the use of equipment. Erosion on logging roads and skid trails is a major management concern. It can be controlled by establishing the roads and trails on or nearly on the contour.

Several limitations affect the use of the soils in this map unit for community development. Gilpin soils are limited by the slope, the stones on the surface, and the depth to bedrock. Pineville soils are limited by the slope and the stones on the surface. Lily soils are limited by the slope and the depth to bedrock. Buchanan soils are limited by the slope, a seasonal high water table, slow permeability, and the stones on the surface. The soils of minor extent are limited by the slope, the depth to bedrock, stones, and flooding.

3. Gilpin-Buchanan-Lily

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

This map unit consists of soils on hillsides, plateaus, and foot slopes in the central part of the county. The landscape is characterized by low, rolling hills and broad plateaus. Slope ranges from 3 to 70 percent.

This map unit makes up about 19 percent of the county. It is about 62 percent Gilpin soils, 10 percent Buchanan soils, 4 percent Lily soils, and 24 percent soils of minor extent.

Gilpin soils are moderately deep, well drained, and gently sloping to very steep. They are on uplands. They formed in acid material weathered from interbedded shale, siltstone, and sandstone. They have a dark brown, medium textured surface layer and a yellowish brown, medium textured subsoil.

Buchanan soils are very deep, moderately well drained, and gently sloping to steep. They are on foot slopes. They formed in acid material that moved downslope from areas on uplands. They have a very dark grayish brown, medium textured surface layer and a yellowish brown, medium textured subsoil that is mottled in the lower part.

Lily soils are moderately deep, well drained, and gently sloping to steep. They are on uplands. They formed in acid material weathered from sandstone. They have a dark grayish brown, medium textured surface layer and a yellowish brown and strong brown, medium textured subsoil.

Of minor extent in this map unit are Dekalb, Fenwick, and Kaymine soils on uplands; Purdy, Cotaco, and Monongahela soils on terraces; and Elkins, Pope, Chavies, and Craigsville soils on flood plains.

Most of this map unit has been cleared and is used for cultivated crops, hay, pasture, or residential development. The soils on nearly level to strongly sloping ridgetops and plateaus in the Mt. Lookout, Canvas, and Mt. Nebo area are used extensively for row crops, pasture, or hay. Most of the very steep side slopes are wooded.

The soils in strongly sloping to steep areas on ridgetops and foot slopes are suitable for pasture. Most of these areas have been cleared.

The soils in this map unit are suitable for trees. The slope restricts the use of equipment in the steeper areas. Erosion on logging roads and skid trails is a major management concern. It can be controlled by establishing the roads and trails on or nearly on the contour.

Several limitations affect the use of the soils in this map unit for community development. Gilpin and Lily soils are limited by the slope and the depth to bedrock. Buchanan soils are limited by the slope, a seasonal high water table, and slow permeability. The soils of minor extent are limited by the slope, the depth to bedrock, wetness, large stones, slow permeability, and flooding.

4. Elkins-Cotaco-Purdy

Nearly level and gently sloping, very poorly drained, poorly drained, and moderately well drained soils; on flood plains and terraces

This map unit consists of soils on flood plains and terraces along Muddlety Creek, Glade Creek, Meadow Creek, Beaver Creek, and their tributaries. The landscape is characterized by wide, nearly level to moderately sloping valleys that have meandering, slow-moving streams. Slope ranges from 0 to 8 percent.

This map unit makes up about 2 percent of the county. It is 42 percent Elkins soils, 13 percent Cotaco soils, 7 percent Purdy soils, and 38 percent soils of minor extent.

Elkins soils are very deep, poorly drained and very poorly drained, and nearly level. They are on flood plains. They formed in acid alluvium washed from areas on uplands. They have a very dark gray, medium textured surface layer and a gray, mottled, medium textured subsoil.

Cotaco soils are very deep, moderately well drained, and gently sloping. They are on low terraces. They formed in alluvium washed from areas on uplands. They have a dark brown, medium textured surface layer and a yellowish brown, brownish yellow, and strong brown, medium textured and moderately fine textured subsoil that is mottled in the lower part.

Purdy soils are very deep, poorly drained and very poorly drained, and nearly level and gently sloping. They are on slack-water terraces. They formed in alluvium washed from areas on uplands. They have a dark grayish brown, medium textured surface layer and a grayish brown and olive gray, mottled, medium textured, moderately fine textured, and fine textured subsoil.

Of minor extent in this map unit are Gilpin and Kaymine soils on uplands; Monongahela soils on terraces; Buchanan soils on foot slopes; and Pope, Craigsville, and Chavies soils on flood plains.

Nearly all of this map unit has been cleared and is used for cultivated crops, hay, pasture, or residential development. Elkins and Purdy soils are used mainly for hay and pasture. Because of flooding and a seasonal high water table, they generally are unsuited to cultivated crops. They are suited to hay and pasture plants that are tolerant of wetness. Cotaco soils are suited to cultivated crops, hay, and pasture.

The soils in this map unit are suitable for trees that are tolerant of wetness, but most of the acreage is cleared. Some areas are reverting to woodland.

Several limitations affect the use of the soils in this map unit for community development. Elkins soils are limited by flooding, a seasonal high water table, and slow or very slow permeability. Cotaco and Purdy soils are limited by a seasonal high water table and slow permeability. The soils of minor extent are limited by the slope, the depth to bedrock, a seasonal high water table, slow permeability, and flooding.

Detailed Soil Map Units

Dr. John C. Sencindiver, associate professor of agronomy, West Virginia Agricultural and Forestry Experiment Station, helped 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 substratum, 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 substratum. 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, Gilpin silt loam, 3 to 15 percent slopes, stony, is a phase of the Gilpin series.

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

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. Pope-Craigsville 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. Gilpin-Pineville-Guyandotte association, very steep, very stony, is an example.

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

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

In areas along the borders of Nicholas County, the boundaries on the soil maps and the names of the map units do not match those of adjoining counties. These discrepancies result from differences in the detail of mapping, changes in soil classification, and different proportions of the same soil in adjoining counties. The soils in the adjoining counties match with similar soils in this county.

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

BuB—Buchanan loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. It is on colluvial fans at the mouth of hollows, around the head of drainageways, and on foot slopes in the central part of the county.

The surface layer is typically dark brown loam about 7 inches thick. The subsoil extends to a depth of about 60 inches. The upper 13 inches is yellowish brown channery loam. The lower 40 inches is firm or very firm and is brittle. It is 8 inches of yellowish brown channery loam mottled with light brownish gray and strong brown and 32 inches of yellowish brown very channery loam mottled with light brownish gray. The substratum to a depth of 65 inches is light yellowish brown very channery sandy loam.

Included with this soil in mapping are areas of soils that have slopes of less than 3 percent or more than 8 percent, areas of well drained soils, areas of somewhat poorly drained soils, areas where as much as 15 percent of the surface is covered with stones, and areas of soils that are less than 60 inches deep over bedrock. Included soils make up about 15 percent of this map unit.

The available water capacity of the Buchanan soil is moderate. Permeability is slow in the very firm part of the subsoil. Runoff is medium. Natural fertility also is medium. A seasonal high water table about 1½ to 3 feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is extremely acid to strongly acid. The depth to bedrock is more than 60 inches.

Most areas have been cleared and are used for cultivated crops, hay, pasture, or community development. Some areas are wooded.

This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is moderate in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, maintaining sod in shallow drainageways, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a major management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The seasonal high water table and the slow permeability are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. Increasing the size of septic tank absorption fields, installing the absorption fields on the contour, and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIe.

BuC—Buchanan loam, 8 to 15 percent slopes. This soil is strongly sloping and moderately well drained. It is on colluvial fans at the mouth of hollows, around the head of drainageways, and on foot slopes in the central part of the county.

The surface layer is typically dark brown loam about 7 inches thick. The subsoil extends to a depth of about 60 inches. The upper 13 inches is yellowish brown channery loam. The lower 40 inches is firm or very firm and is brittle. It is 8 inches of yellowish brown channery loam mottled with light brownish gray and strong brown and 32 inches of yellowish brown very channery loam mottled with light brownish gray. The substratum to a depth of 65 inches is light yellowish brown very channery sandy loam.

Included with this soil in mapping are areas of soils that have slopes of less than 8 percent or more than 15 percent, areas of well drained soils, areas of somewhat poorly drained soils, areas where as much as 15 percent of the surface is covered with stones, and areas of soils that are less than 60 inches deep over bedrock. Included soils make up about 20 percent of this map unit.

The available water capacity of the Buchanan soil is moderate. Permeability is slow in the very firm part of the subsoil. Runoff is rapid. Natural fertility is medium. A seasonal high water table about 1½ to 3 feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is very strongly acid or strongly acid. The depth to bedrock is more than 60 inches.

Most areas have been cleared and are used for cultivated crops, hay, pasture, or community development. Some areas are wooded.

This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is severe in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, maintaining sod in shallow drainageways, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a major management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The seasonal high water table and the slow permeability are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. Increasing the size of septic tank absorption fields, installing the absorption fields on the contour, and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIIe.

BuD—Buchanan loam, 15 to 25 percent slopes. This soil is moderately steep and moderately well drained. It is on foot slopes and around the head of drainageways in the central part of the county.

The surface layer is typically dark brown loam about 7 inches thick. The subsoil extends to a depth of about 60 inches. The upper 13 inches is yellowish brown channery loam. The lower 40 inches is firm or very firm and is brittle. It is 8 inches of yellowish brown channery loam mottled with light brownish gray and strong brown and 32 inches of yellowish brown very channery loam mottled with light brownish gray. The substratum to a depth of 65 inches is light yellowish brown very channery sandy loam.

Included with this soil in mapping are small areas of well drained soils. Also included are a few small areas of soils that have slopes of more than 25 percent or less than 15 percent, areas of soils that are somewhat poorly drained, areas where as much as 15 percent of the surface is covered with stones, and areas of soils that are less than 60 inches deep over bedrock. Included soils make up about 20 percent of this map unit.

The available water capacity of the Buchanan soil is moderate. Permeability is slow in the very firm part of the subsoil. Runoff is rapid. Natural fertility is medium. A seasonal high water table about 1½ to 3 feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is very strongly acid or strongly acid. The depth to bedrock is more than 60 inches.

Most areas have been cleared and are used for hay and pasture. Some areas are wooded.

The suitability of this soil for cultivated crops is limited. The soil is better suited to hay and pasture. The hazard of erosion is severe in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, maintaining sod in shallow drainageways, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are management concerns. The equipment limitation is caused by the slope. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Poor logging practices result in very severe erosion. Using equipment that can be operated on moderately steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion.

The slope, the seasonal high water table, and the slow permeability are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The moderately steep slopes require additional grading or excavation on sites for roads, dwellings, or other structures. Maintaining lawns is difficult. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. Increasing the size of septic tank absorption fields, installing the absorption fields on the contour, and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IVe.

BvC—Buchanan channery fine sandy loam, 8 to 15 percent slopes, very stony. This soil is strongly sloping and moderately well drained. It is on colluvial fans at the mouth of hollows, around the head of drainageways, and on foot slopes throughout the county. Stones 10 to 24 inches in diameter cover 3 to 15 percent of the surface.

The surface layer is typically very dark grayish brown and brown channery fine sandy loam about 7 inches thick. The subsoil extends to a depth of about 60 inches. The upper 13 inches is yellowish brown channery loam. The lower 40 inches is firm or very firm and is brittle. It is 8 inches of yellowish brown channery loam mottled with light brownish gray and 32 inches of yellowish brown very channery loam mottled with light brownish gray. The substratum to a depth of at least 65 inches is light yellowish brown very channery sandy loam.

Included with this soil in mapping are a few small areas of the well drained Dekalb, Gilpin, Lily, and Pineville soils. Also included are a few small areas of soils that are deeper to a fragipan than the Buchanan soil, areas where less than 1 percent of the surface is covered with stones, areas where 15 to 50 percent of the surface is covered with stones and boulders 1 to more than 10 feet in diameter, and areas of soils that have slopes of less than 3 percent or more than 15 percent. Included soils make up about 30 percent of this map unit.

The available water capacity of the Buchanan soil is moderate. Permeability is slow in the very firm part of the subsoil. Runoff is rapid. Natural fertility is medium. A seasonal high water table about 1½ to 3 feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is strongly acid to extremely acid. The depth to bedrock is more than 60 inches.

Most areas are used as woodland. Some areas have been cleared and are used for pasture or community development.

This very stony soil is not suited to cultivated crops or hay. It is suited to pasture. The stones restrict the use of farm machinery. The hazard of erosion is severe in unprotected areas. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition and an equipment limitation are management concerns. The equipment limitation is caused by the stones. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Carefully laying out logging roads and skid trails and using equipment that can be operated in very stony areas help to overcome the equipment limitation. Poor logging practices result in severe erosion.

The seasonal high water table and the slow permeability are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. Increasing the size of septic tank absorption fields, installing the absorption fields on the contour, and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings. The excavation and disposal of large rock fragments are difficult. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIs.

BvE—Buchanan channery fine sandy loam, 15 to 35 percent slopes, very stony. This soil is moderately steep and steep and is moderately well drained. It is on foot slopes, along drainageways, on benches, and in coves throughout the county. Stones 10 to 24 inches in diameter cover 3 to 15 percent of the surface.

The surface layer is typically very dark grayish brown and brown channery fine sandy loam about 7 inches thick. The subsoil extends to a depth of about 60 inches. The upper 13 inches is yellowish brown channery loam. The lower 40 inches is firm or very firm and is brittle. It is 8 inches of yellowish brown channery loam mottled with light brownish gray and 32 inches of yellowish brown very channery loam mottled with light brownish gray. The substratum to a depth of at least 65 inches is light yellowish brown very channery sandy loam.

Included with this soil in mapping are small areas of the well drained Dekalb, Gilpin, Lily, and Pineville soils. Also included are a few small areas of soils that are

Figure 2.—A large yellow poplar in an area of Buchanan channery fine sandy loam, 15 to 35 percent slopes, very stony.

deeper to a fragipan than the Buchanan soil, areas where less than 1 percent of the surface is covered with stones, areas where 15 to 50 percent of the surface is covered with stones and boulders 1 to more than 10 feet in diameter, and areas of soils that have slopes of more than 15 percent. Included soils make up about 30 percent of this map unit.

The available water capacity of the Buchanan soil is moderate. Permeability is slow in the very firm part of the subsoil. Runoff is rapid or very rapid. Natural fertility is medium. A seasonal high water table about 1½ to 3 feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is strongly acid to extremely acid. The depth to bedrock is more than 60 inches.

Most areas are used as woodland. Some areas have been cleared and are used for pasture or community development.

This very stony soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. The stones and the slope restrict the use of farm machinery. The hazard of erosion is very severe in unprotected areas. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high (fig. 2). Plant competition, the hazard of erosion, and an equipment limitation are management concerns. The equipment limitation is caused by the slope. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Poor logging practices result in severe erosion. Using equipment that can be operated on moderately steep and steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes, controlling the runoff of surface water, and properly locating logging roads and skid trails can reduce the hazard of erosion.

The slope, the seasonal high water table, and the slow permeability are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The moderately steep and steep slopes require additional grading on sites for roads, dwellings, or other structures. Maintaining lawns is difficult. Areas where vertical cuts are made during road construction and site preparation should be shaped and vegetated. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. Increasing the size of septic tank absorption fields, installing the absorption fields on the contour, and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings. The excavation and disposal of large fragments are difficult. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIIs.

CeF—Cedarcreek channery loam, very steep. This soil is very deep and well drained. It is in areas that have been surface mined for coal. It is on the shoulder of ridges and on mountain side slopes in the northwestern part of the county. In most areas the landscape consists of steep and very steep benches, backfilled areas, and out-slopes. In some areas it consists of strongly sloping benches and rock outcrops. Reclaimed areas are generally convex or concave and have slopes of 8 to 65 percent. Stones and boulders cover 1 to 15 percent of the surface in most areas, but the percentage ranges from 0 to 50.

The surface layer is typically dark yellowish brown channery loam about 5 inches thick. The upper 11 inches of the substratum is dark grayish brown very channery loam; the next 14 inches is dark grayish brown extremely channery loam mottled with reddish yellow; and the lower part to a depth of at least 65 inches is brown extremely channery loam mottled with yellowish brown and yellowish red.

Included with this soil in mapping are soils that are less than 60 inches deep over bedrock; a few areas with vertical highwalls of interbedded sandstone, siltstone, shale, and coal that range from 20 to more than 80 feet in height; small areas of rubble land on out-slopes and in cores of valley fills; and small areas of Gilpin, Buchanan, Pineville, and Guyandotte soils near the edges of out-slopes and in coves. Also included are a few small areas of Kaymine and Itmann soils. Included areas make up about 40 percent of this map unit.

The available water capacity of the Cedarcreek soil is low to high. Permeability is moderate or moderately rapid throughout the profile. Natural fertility is low or medium. Runoff is medium or rapid on benches and very rapid on out-slopes. The depth to bedrock is more than 60 inches. Where unlimed, this soil is extremely acid to strongly acid.

Most of the acreage is idle land that has been seeded to grasses and legumes (fig. 3). This soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. Erosion is a severe hazard if pastured areas are overgrazed. Proper stocking rates, timely deferment of grazing, rotation grazing, applications of lime and fertilizer, and selection of desirable species for planting help to maintain forage production and control erosion.

The potential productivity of this soil for trees is moderately high. Plant competition, seedling mortality, an equipment limitation, and the hazard of erosion are the major management concerns. The equipment limitation is caused by the slope. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in very severe erosion. Using equipment that can be operated on very steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion.

This soil has fair potential as habitat for woodland wildlife. The variety of vegetation provides food and cover for deer and wild turkey. Small wet depressions

Figure 3.—An area of Cedarcreek channery loam, very steep, that has been seeded to grasses and legumes.

on benches and in drainage ditches along roads help to provide water.

Some areas are used for underground coal mining. Erosion on roads and around mine sites is a major management concern. Constructing roads on or nearly on the contour, using small sediment basins to collect runoff, and seeding and mulching disturbed areas help to control erosion.

This soil is not suited to community development because of the very steep slopes, large stones, and the potential for differential settling. Onsite investigation and testing are necessary to determine the potential for urban uses and the limitations affecting those uses.

The capability subclass is VIIs.

ChB—Chavies fine sandy loam, 2 to 6 percent slopes. This soil is gently sloping and well drained. It is on high flood plains along the larger streams in the county. It is subject to rare flooding.

The surface layer is typically dark brown fine sandy loam about 6 inches thick. It is underlain by about 5 inches of brown loam. The subsoil extends to a depth of about 42 inches. It is about 5 inches of dark yellowish brown loam, 18 inches of strong brown loam, and 8 inches of yellowish brown loam. The upper 8 inches of the substratum is strong brown sandy loam. The lower part to a depth of about 65 inches is yellowish brown loamy sand.

Included with this soil in mapping are a few small areas of the well drained Craigsville and Pope soils. Also included are a few small areas of soils that have slopes of more than 6 percent. Included soils make up about 15 percent of this map unit.

The available water capacity of the Chavies soil is moderate or high. Permeability is moderately rapid throughout the profile. Runoff is medium. Natural fertility also is medium. Where unlimed, this soil is very strongly acid or strongly acid. The depth to bedrock is more than 60 inches.

Most areas are used for cultivated crops, hay, or community development. Some areas are reverting to woodland.

This soil is suitable for cultivated crops, hay, and pasture. The hazard of erosion is moderate in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes and rotation grazing are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The flooding is the main hazard affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The soil generally is not suitable as a site for dwellings or for septic tank absorption fields unless the site is protected by properly designed flood-control structures. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIe.

CoB—Cotaco silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. It is on terraces along Muddlety Creek, Beaver Creek, Glade Creek, Meadow Creek, and their tributaries.

The surface layer is typically dark brown silt loam about 7 inches thick. The subsoil extends to a depth of about 40 inches. It is about 7 inches of yellowish brown silt loam, 10 inches of brownish yellow silty clay loam, and 16 inches of strong brown silty clay loam mottled with light gray. The substratum to a depth of about 65 inches is gray silty clay loam.

Included with this soil in mapping are a few small areas of the moderately well drained Buchanan and Monongahela soils and the poorly drained Elkins and Purdy soils. Also included are a few small areas of soils that have more sand in the subsoil than the Cotaco soil, soils that are nearly level, and soils that are strongly sloping. Included soils make up about 20 percent of this map unit.

The available water capacity of the Cotaco soil is moderate or high. Permeability is moderate or moderately slow in the subsoil. Runoff is medium. Natural fertility is low. A seasonal high water table about 1½ to 2½ feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is strongly acid or very strongly acid. The depth to bedrock is more than 60 inches.

Most areas are used for cultivated crops, hay, or pasture. Some areas are used for community development.

This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is moderate in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The seasonal high water table is the main limitation affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. Installing septic tank absorption fields on the contour and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIe.

Cr—Craigsville gravelly sandy loam, 0 to 5 percent slopes. This soil is nearly level and well drained. It is on high flood plains and on alluvial fans at the mouth of hollows throughout the county. It is subject to rare flooding.

The surface layer is typically dark brown gravelly sandy loam about 7 inches thick. The subsoil extends to a depth of about 25 inches. It is about 11 inches of yellowish brown extremely gravelly sandy loam and 7 inches of dark yellowish brown very gravelly sandy loam. The substratum to a depth of about 65 inches is yellowish brown extremely gravelly loamy sand.

Included with this soil in mapping are a few small areas of the well drained Chavies and Pope soils and the moderately well drained Buchanan soils. Also included are a few small areas of soils that have more rock fragments than the Craigsville soil. Included soils make up about 15 percent of this map unit.

The available water capacity of the Craigsville soil is low or moderate. Permeability is moderately rapid or rapid in the subsoil. Runoff is slow. Natural fertility is medium. Where unlimed, this soil is very strongly acid or strongly acid. The depth to bedrock is more than 60 inches.

Most areas are wooded. Many cleared areas are reverting to woody species. A few areas are used for hay and pasture.

This soil is suited to cultivated crops and hay. Droughtiness during dry periods is a major management concern. If the soil is cultivated, growing cover crops, applying a system of conservation tillage, including hay in the cropping sequence, and working the residue from the cover crop into the soil improve the available water capacity and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing during dry periods are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition and seedling mortality are management concerns. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

The flooding is the main hazard affecting the use of this soil as a site for dwellings with basements. The soil generally is not suitable as a site for dwellings unless the site is protected by properly designed flood-control structures. The flooding and the rapid permeability are the main limitations on sites for septic tank absorption fields. Properly designed flood-control structures are needed. Less permeable soils should be considered when sites for the absorption fields are selected. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIs.

DeC—Dekalb channery sandy loam, 3 to 15 percent slopes, very stony. This soil is gently sloping or strongly sloping and is well drained. It is on the tops of ridges throughout the county. Stones 10 to 24 inches in diameter cover 3 to 15 percent of the surface.

The surface layer is typically very dark grayish brown channery sandy loam about 3 inches thick. The subsoil extends to a depth of about 20 inches. It is about 4 inches of yellowish brown channery sandy loam and 13 inches of yellowish brown very channery sandy loam. The substratum is yellowish brown, extremely channery sandy loam. It extends to hard sandstone bedrock at a depth of about 24 inches.

Included with this soil in mapping are small areas of the well drained Gilpin and Lily soils. Also included are a few small areas where less than 3 percent of the surface is covered with stones, areas where about 15 to 50 percent of the surface is covered with stones or boulders, soils that have slopes of 15 to 35 percent, and soils having a surface layer that is thicker than that of the Dekalb soil. Included soils make up about 25 percent of this map unit.

The available water capacity of the Dekalb soil is very low or low. Permeability is rapid in the subsoil. Runoff is medium or rapid. Natural fertility is low. Where unlimed, this soil is extremely acid to strongly acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used as woodland. Some areas have been cleared and are used for hay, pasture, or community development.

This very stony soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. The stones restrict the use of farm machinery. The hazard of erosion is severe in unprotected areas. Proper stocking rates that maintain the cover of desirable grasses and legumes and rotation grazing are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderate. Plant competition, seedling mortality, an equipment limitation, and the hazard of erosion are management concerns. The equipment limitation is caused by the stones. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Carefully laying out logging roads and skid trails helps to overcome the equipment limitation and reduces the hazard of erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water also help to control erosion.

The depth to hard sandstone bedrock is the main limitation affecting the use of this soil as a site for dwellings with basements. The depth to bedrock and the rapid permeability are the main limitations on sites for septic tank absorption fields. Selecting the deepest area of the soil, installing the absorption field on the contour, and enlarging the absorption field help to overcome these limitations. Building on the bedrock and landscaping with additional fill help to overcome the depth to bedrock on sites for dwellings. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas can help to control erosion and sedimentation.

The capability subclass is VIs.

DeE—Dekalb channery sandy loam, 15 to 35 percent slopes, very stony. This soil is moderately steep and steep and well drained. It is on the tops of ridges and on hillsides throughout the county. Stones 10 to 24 inches in diameter cover 3 to 15 percent of the surface.

The surface layer is typically very dark grayish brown channery sandy loam about 3 inches thick. The subsoil extends to a depth of about 20 inches. It is about 4 inches of yellowish brown channery sandy loam and 13 inches of yellowish brown very channery sandy loam. The substratum is yellowish brown extremely channery sandy loam. It extends to sandstone bedrock at a depth of about 24 inches.

Included with this soil in mapping are areas of the well drained Gilpin, Guyandotte, and Lily soils. Also included are a few small areas where less than 3 percent of the surface is covered with stones, areas where about 15 to 50 percent of the surface is covered with stones and boulders, soils that have slopes of 3 to 15 percent or 35 to 70 percent, and areas of rock outcrop. Included areas make up about 25 percent of this map unit.

The available water capacity of the Dekalb soil is very low or low. Permeability is rapid in the subsoil. Runoff is very rapid. Natural fertility is low. Where unlimed, this soil is extremely acid to strongly acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used as woodland. A few areas have been cleared and are used as pasture.

This very stony soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. The stones and the slope restrict the use of farm machinery. The hazard of erosion is very severe in unprotected areas. Proper stocking rates that maintain the cover of desirable grasses and legumes and rotation grazing are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high on north aspects and moderate on south aspects. Plant competition, seedling mortality, an equipment limitation, and the hazard of erosion are management concerns. The equipment limitation is caused by the stones and the slope. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Planting the seedlings on north-facing slopes is preferable to planting on south-facing slopes. Poor logging practices result in severe erosion. Carefully laying out logging roads and skid trails helps to overcome the equipment limitation and reduces the hazard of erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion.

The depth to bedrock and the slope are the main limitations affecting the use of this soil as a site for dwellings with basements. The slope, the depth to bedrock, and the rapid permeability are the main limitations on sites for septic tank absorption fields. The moderately steep and steep slopes require additional grading on sites for roads, dwellings, or other structures. Maintaining lawns is difficult. Building on the bedrock and landscaping with additional fill help to overcome the depth to bedrock. Selecting the deepest area of the soil, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock, the slope, and the rapid permeability on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas can help to control erosion and sedimentation.

The capability subclass is VIIs.

DeF—Dekalb channery sandy loam, 35 to 70 percent slopes, very stony. This soil is very steep and well drained. It is on narrow ridgetops and hillsides throughout the county. Stones 10 to 24 inches in diameter cover 3 to 15 percent of the surface.

The surface layer is typically very dark grayish brown channery sandy loam about 3 inches thick. The subsoil extends to a depth of about 20 inches. It is about 4 inches of yellowish brown channery sandy loam and 13 inches of yellowish brown very channery sandy loam. The substratum is yellowish brown extremely channery sandy loam. It extends to sandstone bedrock at a depth of about 24 inches.

Included with this soil in mapping are areas of the well drained Gilpin, Guyandotte, Lily, and Pineville soils and a few small areas of the moderately well drained Buchanan soils. Also included are a few small areas where less than 3 percent of the surface is covered with stones, areas where about 15 to 50 percent of the surface is covered with stones or boulders, soils that have slopes of 15 to 35 percent, and areas of rock outcrop. Included areas make up about 20 percent of this map unit.

The available water capacity of the Dekalb soil is very low or low. Permeability is rapid in the subsoil. Runoff is very rapid. Natural fertility is low. Where unlimed, this soil is extremely acid to strongly acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are wooded. The potential productivity of this soil for trees is moderately high on north aspects and moderate on south aspects. An equipment limitation, plant competition, seedling mortality, and the hazard of erosion are the major management concerns. The equipment limitation is caused by the slope. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Planting the seedlings on north-facing slopes is preferable to planting on south-facing slopes. Poor logging practices result in very severe erosion. Carefully laying out logging roads and skid trails on or nearly on the contour helps to overcome the equipment limitation and reduces the hazard of erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion. On slopes of more than 55 percent, conventional skidder harvesting is not recommended.

The slope and the depth to bedrock are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The rapid permeability is an additional limitation on sites for septic tank absorption fields. The soil generally is not used for urban development because of the slope. If the surface is disturbed, establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIIs.

DRF—Dekalb-Buchanan-Rock outcrop association, very steep. This map unit consists of well drained and moderately well drained soils and areas of Rock outcrop on side slopes, on foot slopes, and in coves along the Meadow River (fig. 4), the Gauley River, and their tributaries. The Dekalb soil is typically on the convex upper slopes above massive rock outcrops. The Buchanan soil is typically on the concave middle and lower slopes and in coves below the rock outcrops. The rock outcrops are mostly sandstone. They are 15 to 150 feet high. Stones and boulders about 2 to 10 feet apart cover 50 percent of the surface. Slope ranges from 15 to 55 percent. This unit is about 40 percent Dekalb soil, 30 percent Buchanan soil, 15 percent Rock outcrop, and 15 percent included soils.

The surface layer of the Dekalb soil is typically very dark grayish brown channery sandy loam about 3 inches thick. The subsoil extends to a depth of about 20 inches. It is about 4 inches of yellowish brown channery sandy loam and 13 inches of yellowish brown very channery sandy loam. The substratum is yellowish brown extremely channery sandy loam. It extends to sandstone bedrock at a depth of about 24 inches.

The surface layer of the Buchanan soil is typically very dark grayish brown and brown channery fine sandy loam about 7 inches thick. The subsoil extends to a depth of about 60 inches. The upper 13 inches is yellowish brown channery loam. The lower 40 inches is firm or very firm and is brittle. It is 8 inches of yellowish brown channery loam mottled with light brownish gray and 32 inches of yellowish brown very channery loam mottled with light brownish gray. The substratum to a depth of at least 65 inches is light yellowish brown very channery sandy loam.

Included in this unit in mapping are a few small areas of Gilpin soils on uplands and Pineville soils on foot slopes. Also included are a few small areas of Chavies soils along streams and small areas of soils that have slopes of more than 55 percent. Included soils make up about 15 percent of this map unit.

The available water capacity of the Dekalb soil is very low or low. Permeability is rapid in the subsoil. Runoff is very rapid. Natural fertility is low. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

The available water capacity of the Buchanan soil is moderate. Permeability is slow in the very firm part of the subsoil. Runoff is rapid or very rapid. Natural fertility is medium. A seasonal high water table about 1½ to 3 feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is strongly acid to extremely acid. The depth to bedrock is more than 60 inches.

Most areas of the Delkalb and Buchanan soils are wooded. The potential productivity of the Dekalb soil for trees is moderately high on north aspects and moderate on south aspects. The potential productivity of the Buchanan soil is moderately high. An equipment limitation, plant competition, the hazard of erosion, and seedling mortality are the major management concerns. The equipment limitation is caused by the slope. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to

Figure 4.—An area of Dekalb-Buchanan-Rock outcrop association, very steep, along the Meadow River.

be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Planting the seedlings on north-facing slopes is preferable to planting on south-facing slopes. Poor logging practices result in very severe erosion. Carefully laying out logging roads and skid trails on or nearly on the contour helps to overcome the equipment limitation and reduces the hazard of erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion. On slopes of more than 55 percent, conventional skidder harvesting is not recommended. Because of the massive rock outcrops, access across this unit is difficult.

The slope, stones, and boulders in areas of the Dekalb soil and the slope, seasonal high water table, and slow permeability in areas of the Buchanan soil are the main limitations affecting urban development. This unit generally is not used as a site for dwellings with basements or for septic tank absorption fields. If the surface is disturbed, establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIIs.

Ed—Elkins silt loam, drained. This soil is nearly level and poorly drained. It is on flood plains along Muddlety Creek, Beaver Creek, Glade Creek, Meadow Creek, and their tributaries. It is occasionally flooded.

The surface layer is typically very dark gray silt loam about 8 inches thick. The subsoil extends to a depth of about 36 inches. It is gray silt loam mottled with strong brown. The substratum extends to a depth of at least 65 inches. It is about 20 inches of light gray silt loam mottled with strong brown and 9 inches of light gray fine sandy loam.

Included with this soil in mapping are a few small areas of the well drained Craigsville and Pope soils, the moderately well drained Cotaco soils, and the poorly drained Purdy soils. Also included are a few small areas of soils that are similar to the Elkins soil but do not have a dark surface layer, soils that have a surface layer of loam and a subsoil of sandy loam, areas that are subject to ponding, and areas that are only rarely flooded. Included soils make up about 25 percent of this map unit.

The available water capacity of the Elkins soil is high. Permeability is slow in the subsoil. Runoff is slow. Natural fertility is medium. Where unlimed, this soil is very strongly acid or extremely acid. A seasonal high water table at or near the surface restricts the roots of water-sensitive plants. The depth to bedrock is more than 60 inches.

Most areas are used for hay and pasture. The suitability of this soil for cultivated crops is limited. The soil is better suited to hay and pasture plants that are tolerant of wetness. A drainage system has been installed. Maintaining the drainage system is a major management concern. If the soil is cultivated, including hay in the cropping sequence, delaying tillage until the soil is reasonably dry, and returning crop residue to the soil help to maintain tilth and fertility. Flooding is a hazard in the areas used for crops. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing until the surface of the soil is firm are the major management needs in pastured areas.

The potential productivity of this soil for trees that are tolerant of wetness is moderately high. Plant competition, seedling mortality, and an equipment limitation are management concerns. The equipment limitation is caused by wetness. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Carefully laying out logging roads and skid trails helps to overcome the equipment limitation. Stones are needed as a suitable base for the roads, particularly during wet periods.

The flooding, the seasonal high water table, and the slow permeability are the main limitations affecting the use of this soil for urban development. The soil generally is not suitable as a site for dwellings with basements or for septic tank absorption fields unless properly designed flood-control structures and sewage treatment systems are installed. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control stream scouring, erosion, and sedimentation.

The capability subclass is IIIw.

Ep—Elkins silt loam, ponded. This soil is nearly level and very poorly drained. It is on flood plains along Muddlety Creek, Beaver Creek, Glade Creek, Meadow Creek, and their tributaries. It is frequently flooded. It is ponded for most of the year (fig. 5).

The surface layer is typically very dark gray silt loam about 8 inches thick. The subsoil extends to a depth of about 36 inches. It is gray silt loam mottled with strong brown. The substratum extends to a depth of at least 65 inches. It is about 20 inches of light gray silt loam mottled with strong brown and 9 inches of light gray fine sandy loam.

Included with this soil in mapping are a few small areas of the well drained Craigsville and Pope soils, the moderately well drained Cotaco soils, and the poorly drained Purdy soils. Also included are soils that are similar to the Elkins soil but do not have a dark surface layer and a few small areas of soils that have a surface layer of loam and a subsoil of sandy loam. Included soils make up about 15 percent of this map unit.

The available water capacity of the Elkins soil is high. Permeability is slow in the subsoil. Runoff is slow. Natural fertility is medium. The soil is extremely acid or very strongly acid. Water on or near the surface restricts the roots of water-sensitive plants. The depth to bedrock is more than 60 inches.

Most of the acreage is idle land. This soil is not suited to cultivated crops or to hay and pasture. Because of the ponding, it is best suited to wetland wildlife habitat and natural wetland areas.

The potential productivity of this soil for trees that are tolerant of wetness is moderately high. The use of equipment is restricted because water ponds on the surface. Plant competition and seedling mortality are other management concerns. The soil cannot be easily managed for woodland because of the ponding.

The ponding, the slow permeability, and the flooding are the main limitations affecting the use of this soil for building site development. A better suited soil should be considered.

The capability subclass is Vw.

FeB—Fenwick silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. It is on broad ridgetops and benches throughout the county.

The surface layer is typically very dark brown and dark yellowish brown silt loam about 8 inches thick. The

Figure 5.—Typical area of Elkins silt loam, ponded.

subsoil extends to a depth of about 33 inches. It is about 10 inches of yellowish brown loam and 15 inches of light yellowish brown loam mottled with light brownish gray and yellowish red. The substratum is light yellowish brown and light brownish gray loam. It extends to bedrock at a depth of about 38 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb, Gilpin, and Lily soils and the moderately well drained Buchanan soils. Also included are a few small areas of soils that have a clayey subsoil, soils that are somewhat poorly drained, soils that have a surface layer of loam, areas where 1 to 3 percent of the surface is covered with stones, soils that have slopes of 0 to 3 percent or 8 to 15 percent, and soils that are more than 40 inches deep over bedrock. Included soils make up about 15 percent of this map unit.

The available water capacity of the Fenwick soil is moderate or high. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum. Runoff is medium. Natural fertility is low or medium. A seasonal high water table about 1½ to 2½ feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is strongly acid or very strongly acid. The depth to bedrock ranges from 20 to 40 inches.

Most areas are used for cultivated crops, hay, pasture, or community development. Some areas are in the Monongahela National Forest.

This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is moderate in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The seasonal high water table and the moderate or moderately slow permeability are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. Increasing the size of septic tank absorption fields, installing the absorption fields on the contour, and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIe.

FeC—Fenwick silt loam, 8 to 15 percent slopes. This soil is strongly sloping and moderately well drained. It is on broad ridgetops and benches throughout the county.

The surface layer is typically very dark brown and dark yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of about 33 inches. It is about 10 inches of yellowish brown loam and 15 inches of light yellowish brown loam mottled with light brownish gray and yellowish red. The substratum is light yellowish brown and light brownish gray loam. It extends to bedrock at a depth of about 38 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb, Gilpin, and Lily soils and the moderately well drained Buchanan soils. Also included are a few small areas of soils that have a clayey subsoil, soils that are somewhat poorly drained, soils that have a surface layer of loam, areas where 1 to 3 percent of the surface is covered with stones, soils that have slopes of 3 to 8 percent or 15 to 25 percent, and soils that are more than 40 inches deep over bedrock. Included soils make up about 15 percent of this map unit.

The available water capacity of the Fenwick soil is moderate or high. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum. Runoff is rapid. Natural fertility is low or medium. A seasonal high water table about 1½ to 2½ feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is strongly acid or very strongly acid. The depth to bedrock ranges from 20 to 40 inches.

Most areas are used for cultivated crops, hay, pasture, or community development. Some areas are in the Monongahela National Forest.

This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is severe in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Common tree species include yellow poplar, red oak, and white oak. The use of equipment is restricted during wet periods because the soil is soft when wet. Plant competition and erosion on logging roads and skid trails are management concerns. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Constructing logging roads and skid trails on or nearly on the contour, diverting surface water from roads, and establishing and maintaining vegetation on roadbanks can help to control erosion.

The seasonal high water table and the moderate or moderately slow permeability are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. Increasing the size of septic tank absorption fields, installing the absorption fields on the contour, and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings.

Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIIe.

FvB—Fiveblock channery sandy loam, 3 to 8 percent slopes. This soil is gently sloping and somewhat excessively drained. It is in areas that have been surface mined for coal. It is on the tops of ridges and on benches, mainly in the northwestern and central parts of the county. Stones cover 1 to 15 percent of the surface in most areas, but the percentage ranges from 0 to 50.

The surface layer is typically yellowish brown channery sandy loam about 4 inches thick. The upper 23 inches of the substratum is yellowish brown very channery sandy loam. The lower part of the substratum to a depth of at least 65 inches is yellowish brown extremely channery sandy loam. Sandstone makes up about 90 percent of the total content of rock fragments and siltstone and coal about 10 percent.

Included with this soil in mapping are soils that are less than 60 inches deep over bedrock, small areas of Kaymine soils, a few small areas of soils that have more sand in the surface layer and substratum than the Fiveblock soil, a few small areas of wet soils, and a few soils that have slopes of 8 to 15 percent. Also included are a few small areas of rock outcrop and areas of soils that have a very strongly acid or extremely acid substratum. Included areas make up about 20 percent of this map unit.

The available water capacity of the Fiveblock soil is low or moderate. Permeability is rapid or moderately rapid throughout the profile. Runoff is medium. Natural fertility is medium or high. Where unlimed, this soil ranges from moderately acid to mildly alkaline. Some areas that have been reclaimed with stockpiled soil material have strongly acid surface layers. The depth to bedrock is more than 60 inches.

Most of the acreage is idle land that has been seeded to grasses and legumes. This soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. Pasture clipping should be higher than usual to allow machinery to clear stones. The stones on the surface may restrict the movement of some farm machinery. The hazard of erosion is moderate in unprotected areas. Timely deferment of grazing, rotation grazing, and applications of lime and fertilizer help to maintain good forage production and control erosion.

The potential productivity of this soil for trees is moderately high. Plant competition and seedling mortality are management concerns. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

This soil has fair potential as habitat for woodland wildlife. The variety of vegetation provides fair food and cover for deer and wild turkey. Small wet depressions help to provide water.

The suitability of this soil for community development is limited because of large stones and the potential for differential settling. Onsite investigation and testing is needed for determining soil limitations and potential for urban uses.

The capability subclass is VIIs.

FvF—Fiveblock channery sandy loam, very steep. This soil is very steep and somewhat excessively drained. It is in areas that have been surface mined for coal and on the upper side slopes in the northwestern and central parts of the county. The landscape consists of strongly sloping to very steep benches, backfilled areas, out-slopes, and valley fills (fig. 6). Reclaimed areas are generally convex or concave and have slopes of 35 to 55 percent. Stones and boulders cover 1 to 15 percent of the surface in most areas, but the percentage ranges from 0 to 50.

The surface layer is typically yellowish brown channery sandy loam about 4 inches thick. The upper 23 inches of the substratum is yellowish brown very channery sandy loam. The lower part to a depth of at least 65 inches is yellowish brown extremely channery sandy loam. Sandstone makes up about 90 percent of the total content of rock fragments and siltstone and coal about 10 percent.

Included with this soil in mapping are soils that are less than 60 inches deep over bedrock; small areas of rubble land; a few small areas of Buchanan, Dekalb, Gilpin, and Kaymine soils; a few small areas of rock outcrop; and soils that are similar to the Fiveblock soil but have a very strongly acid or extremely acid substratum. Also included are a few small wet depressions on benches and a few areas of soils that are loamy sand throughout. Included areas make up about 30 percent of this map unit.

The available water capacity of the Fiveblock soil is low or moderate. Permeability is rapid or moderately rapid throughout the profile. Runoff is rapid or very rapid. Natural fertility is medium or high. Where unlimed, this soil ranges from moderately acid to mildly alkaline. Some areas that have been reclaimed with

Figure 6.—Typical area of Fiveblock channery sandy loam, very steep.

stockpiled soil material have a strongly acid surface layer. The depth to bedrock is more than 60 inches.

Most of the acreage is idle land that has been seeded to grasses and legumes. This soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. The hazard of erosion is severe in unprotected areas. Timely deferment of grazing, rotation grazing, and applications of lime and fertilizer help to maintain good forage production and control erosion.

The potential productivity of this soil for trees is moderately high. Plant competition, seedling mortality, an equipment limitation, and the hazard of erosion are the major management concerns. The equipment limitation is caused by the slope. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in very severe erosion. Constructing logging roads and skid trails on or nearly on the contour and using equipment that can be operated on very steep slopes help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes, controlling the runoff of surface water, and constructing logging roads and skid trails on or nearly on the contour can reduce the hazard of erosion.

This soil has fair potential as habitat for woodland wildlife. The variety of vegetation provides food and cover for deer and wild turkey. Small wet depressions on benches and drainage ditches along roads help to provide water.

This soil is not suited to community development because of the slope, large stones, and the potential for differential settling. Onsite investigation and testing are necessary to determine the potential for urban uses and the limitations affecting those uses.

The capability subclass is VIIs.

GIB—Gilpin silt loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. It generally is on the tops of ridges throughout the county.

The surface layer is typically dark brown silt loam about 7 inches thick. The subsoil extends to a depth of about 31 inches. It is about 10 inches of yellowish brown silt loam, 8 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb and Lily soils and the moderately well drained Fenwick soils. Also included are a few small areas of moderately well drained soils that have more clay in the lower part than the Gilpin soil, areas where more than 75 percent of the original topsoil has been lost through erosion, and areas of soil that have slopes of less than 3 percent or more than 8 percent. Included soils make up about 25 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is medium. Natural fertility also is medium. Where unlimed, this soil ranges from strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used for cultivated crops, hay, pasture, or community development. This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is moderate in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The depth to bedrock is the main limitation affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Even though it is generally rippable, the bedrock may hinder excavation. In places it is hard sandstone. Building on the bedrock and landscaping with additional fill help to overcome this limitation. Selecting areas where the soil is deeper, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas can help to control erosion and sedimentation.

The capability subclass is IIe.

GlC—Gilpin silt loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. It is on the tops of ridges and on benches throughout the county.

The surface layer is typically dark brown silt loam about 5 inches thick. The subsoil extends to a depth of about 29 inches. It is about 10 inches of yellowish brown silt loam, 8 inches of yellowish brown, friable channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb and Lily soils and the moderately well drained Fenwick soils. Also included are a few small areas of moderately well drained soils that have more clay in the lower part than the Gilpin soil, areas where more than 75 percent of the original topsoil has been lost thorugh erosion, areas of soils that have slopes of less than 8 percent or more than 15 percent, and a few small areas where 1 to 3 percent of the surface is covered with stones. Included soils make up about 25 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is rapid. Natural fertility is medium. Where unlimed, this soil ranges from strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used for cultivated crops, hay, pasture, or community development.

This soil is suited to cultivated crops, hay (fig. 7), and pasture. The hazard of erosion is severe in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

Figure 7.—Alfalfa hay in an area of Gilpin silt loam, 8 to 15 percent slopes.

The depth to bedrock is the main limitation affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Even though it generally is rippable, the bedrock may hinder excavation. In places it is hard sandstone. Building on the bedrock and landscaping with additional fill help to overcome this limitation. Selecting areas where the soil is deeper, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas can help to control erosion and sedimentation.

The capability subclass is IIIe.

GlD—Gilpin silt loam, 15 to 25 percent slopes. This soil is moderately steep and well drained. It is on the tops of ridges and on hillsides and benches throughout the county.

The surface layer is typically dark brown silt loam about 4 inches thick. The subsoil extends to a depth of about 28 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb and Lily soils and the moderately well drained Buchanan soils. Also included are a few small areas where more than 75 percent of the original topsoil has been lost through erosion and areas where as much as 3 percent of the surface is covered with stones or channers. Included soils make up about 25 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is rapid. Natural fertility is medium. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used for hay and pasture. A few areas are wooded.

The suitability of this soil for cultivated crops is limited. The soil is better suited to hay and pasture. The hazard of erosion is severe in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in severe erosion. Using equipment that can be operated on moderately steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion.

The slope and the depth to bedrock are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Even though it generally is rippable, the bedrock may hinder excavation. In places it is hard sandstone. The moderately steep slopes require additional grading on sites for roads, dwellings, or other structures. Maintaining lawns is difficult. Building on the bedrock and landscaping with additional fill help to overcome the depth to bedrock. Dwellings should be built in areas where the soil is less sloping or should be designed so that they conform to the natural slope of the land. Selecting areas where the soil is deeper and less sloping, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock and the slope on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IVe.

GlE—Gilpin silt loam, 25 to 35 percent slopes. This soil is steep and well drained. It is on hillsides, benches, and narrow ridgetops throughout the county.

The surface layer is typically dark brown silt loam about 3 inches thick. The subsoil extends to a depth of about 27 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb, Lily, and Pineville soils and the moderately well drained Buchanan soils. Also included are a few small areas where more than 75 percent of the original topsoil has been lost through erosion, areas where as much as 15 percent of the surface is covered with stones or channers, and areas of soils that have slopes of less than 25 percent or more than 35 percent. Included soils make up about 25 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is very rapid. Natural fertility is medium. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used for hay and pasture. A few areas are wooded.

This soil is not suited to cultivated crops or hay. It is suited to pasture. A very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are the major management concerns. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in severe erosion. Using equipment that can be operated on steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Controlling the runoff of surface water can reduce the hazard of erosion.

The slope and the depth to bedrock are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Even though it generally is rippable, the bedrock may hinder excavation. In places it is hard sandstone. The steep slopes require additional grading on sites for roads, dwellings, or other structures. Lawns cannot be easily established and maintainied. Building on the bedrock and landscaping with additional fill help to overcome the depth to bedrock. Dwellings should be built in areas where the soil is less sloping or should be designed so that they conform to the natural slope of the land. Selecting areas where the soil is deeper and less sloping, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock and the slope on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIe.

GIF—Gilpin silt loam, 35 to 70 percent slopes. This soil is very steep and well drained. It is on hillsides and narrow ridgetops in the central part of the county.

The surface layer is typically dark brown silt loam about 3 inches thick. The subsoil extends to a depth of about 27 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb, Guyandotte, Pineville, and Lily soils and the moderately well drained Buchanan soils. Also included are a few small areas where more than 75 percent of the original topsoil has been lost through erosion, areas where as much as 15 percent of the surface is covered with stones or channers, and areas of soils that have slopes of 25 to 35 percent. Included soils make up about 30 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is very rapid. Natural fertility is medium. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are wooded. A few areas are used as pasture or are surface mined for coal.

The potential productivity of this soil for trees is moderately high. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are the major management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in very severe erosion. Using equipment that can be operated on very steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion. On slopes of more than 55 percent, conventional skidder harvesting is not recommended.

This soil generally is not used as a site for dwellings or for septic tank absorption fields because of the slope and the depth to bedrock. If the surface is disturbed, establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIIe.

GnC—Gilpin silt loam, 3 to 15 percent slopes, stony. This soil is gently sloping and strongly sloping and is well drained. It is on the tops of ridges and on benches throughout the county. Stones 10 to 24 inches in diameter cover 1 to 3 percent of the surface.

The surface layer is typically dark brown silt loam about 5 inches thick. The subsoil extends to a depth of about 29 inches. It is about 10 inches of yellowish brown silt loam, 8 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb and Lily soils and the moderately well drained Fenwick soils. Also included are a few small areas of moderately well drained soils that have more clay in the lower part than the Gilpin soil, soils that have slopes of less than 3 percent or more than 15 percent, and areas where more than 3 percent of the surface is covered with stones. Included soils make up about 25 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is medium or rapid. Natural fertility is medium. Where unlimed, this soil ranges from strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are wooded. A few areas have been cleared and are used for hay, pasture, or community development.

This stony soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. The stones restrict the use of farm machinery. The hazard of erosion is severe in unprotected areas. Proper stocking rates that maintain grasses and legumes and rotation grazing are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The depth to bedrock is the main limitation affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Even though it is rippable, the bedrock may hinder excavation. In places it is hard sandstone. Building on the bedrock and landscaping with additional fill help to overcome this limitation. Selecting areas where the soil is deeper, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas can help to control erosion and sedimentation.

The capability subclass is VIs.

GnE—Gilpin silt loam, 15 to 35 percent slopes, stony. This soil is moderately steep and steep and is well drained. It is on hillsides, benches, and narrow ridgetops throughout the county. Stones 10 to 24 inches in diameter cover 1 to 3 percent of the surface.

The surface layer is typically dark brown silt loam about 3 inches thick. The subsoil extends to a depth of about 27 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb, Lily, and Pineville soils and the moderately well drained Buchanan soils. Also included are a few small areas where 3 to 15 percent of the surface is covered with stones, areas of rock outcrop, and a few small areas of soils that have slopes of less than 15 percent or more than 35 percent. Included areas make up about 25 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is very rapid. Natural fertility is medium. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are wooded. A few areas have been cleared and are used as pasture.

This stony soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. The stones and the slope restrict the use of farm machinery. A very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are the major management concerns. Proper stocking rates that maintain the cover of desirable grasses and legumes and rotation grazing are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in severe erosion. Using equipment that can be operated on moderately steep and steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Controlling the runoff of surface water can reduce the hazard of erosion.

The slope and the depth to bedrock are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. Even though it generally is rippable, the bedrock may hinder excavation. In places it is hard sandstone. The moderately steep and steep slopes require additional grading on sites for roads, dwellings, or other structures. Lawns cannot be easily established and maintained. Building on the bedrock and landscaping with additional fill help to overcome the depth to bedrock. Dwellings should be built in areas where the soil is less sloping or should be designed so that they conform to the natural slope of the land. Selecting areas where the soil is deeper and less sloping, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock and the slope on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIIs.

GnF—Gilpin silt loam, 35 to 70 percent slopes, stony. This soil is very steep and well drained. It is on hillsides and narrow ridgetops throughout the county. Stones 10 to 24 inches in diameter cover 1 to 3 percent of the surface.

The surface layer is typically dark brown silt loam about 3 inches thick. The subsoil extends to a depth of about 27 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb, Guyandotte, Lily, and Pineville soils and the moderately well drained Buchanan soils. Also included are a few small areas where 3 to 15 percent of the surface is covered with stones and channers, areas of rock outcrop, and areas of soils that have slopes of less than 35 percent. Included areas make up about 30 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is very rapid. Natural fertility is medium. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are wooded. Some areas are used as pasture or are surface mined for coal. This soil is not suited to cultivated crops, hay, or pasture. The stones and the slope restrict the use of farm machinery.

The potential productivity of this soil for trees is moderately high. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are the major management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in very severe erosion. Using equipment that can be operated on very steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion. On slopes of more than 55 percent, conventional skidder harvesting is not recommended.

The slope and the depth to bedrock are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The soil generally is not used for urban development because of the slope. If the surface is disturbed, establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIIs.

GoF—Gilpin-Buchanan complex, 35 to 70 percent slopes, very stony. These very steep, well drained and moderately well drained soils are on side slopes and benches in the southeastern part of the county. The Gilpin soil is typically in the convex upper areas where slopes range from 35 to 70 percent. The Buchanan soil is typically on the concave middle and lower side slopes and in coves and has slopes of 35 to 45 percent. Stones 10 to 24 inches in diameter cover 3 to 15 percent of the surface. The two soils occur as areas so intermingled that it was not practical to map them separately. The complex is about 60 percent Gilpin silt loam, 25 percent Buchanan channery fine sandy loam, and 15 percent included soils.

The surface layer of the Gilpin soil is typically dark brown silt loam about 3 inches thick. The subsoil extends to a depth of about 27 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

The surface layer of the Buchanan soil is typically very dark grayish brown and brown channery fine sandy loam about 7 inches thick. The subsoil extends to a depth of about 60 inches. The upper 13 inches is yellowish brown channery loam. The lower 40 inches is firm or very firm and is brittle. It is 8 inches of yellowish brown channery loam mottled with light brownish gray and strong brown and 32 inches of yellowish brown very channery loam mottled with light brownish gray. The substratum to a depth of about 65 inches is light yellowish brown very channery sandy loam.

Included with these soils in mapping are areas of the well drained Dekalb, Guyandotte, Lily, and Pineville soils. Also included are areas of soils that have a subsoil of reddish brown channery silty clay loam, areas of rock outcrop, areas of soils that have slopes of less than 35 percent, and areas where less than 3 percent or more than 15 percent of the surface is covered with stones and boulders. Included areas make up about 15 percent of this map unit.

The available water capacity of the Gilpin and Buchanan soils is moderate. Permeability is moderate in the Gilpin soil and slow in the very firm part of the Buchanan soil. Runoff is very rapid on both soils. Natural fertility is medium. Where unlimed, both soils are extremely acid to strongly acid. A seasonal high water table about 1½ to 3 feet below the surface of the Buchanan soil restricts the roots of water-sensitive plants. Bedrock at a depth of 20 to 40 inches in the Gilpin soil restricts the roots of deep-rooted plants. The depth to bedrock is more than 60 inches in the Buchanan soil.

Most areas are wooded. The potential productivity of these soils for trees is moderately high. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are the major management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes in areas of the Gilpin soil. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in very severe erosion. Using equipment that can be operated on very steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion. On slopes of more than 55 percent, conventional skidder harvesting is not recommended.

The slope, the depth to bedrock, the slow permeability, and the seasonal high water table are the main limitations affecting the use of these soils as sites for dwellings with basements or for septic tank absorption fields. The soils are generally not used for building site development because of the slope. If the surface is disturbed, establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIIs.

GPF—Gilpin-Pineville-Guyandotte association, very steep, very stony. These well drained soils are on mountain side slopes in the western and northern parts of the county. The Gilpin soil is typically on the convex upper and middle slopes. The Pineville soil is typically on the lower side slopes, in south-facing coves, and on foot slopes. The Guyandotte soil is on concave, north-facing side slopes, in coves, and on foot slopes. Slope dominantly ranges from 35 to 70 percent, and the landscape is dissected by numerous drainageways. Stones cover 3 to 15 percent of the surface. This unit is about 40 percent Gilpin and similar soils, 30 percent Pineville and similar soils, 15 percent Guyandotte and similar soils, and 15 percent soils of minor extent.

The Gilpin soil is moderately deep. The surface layer is typically dark brown silt loam about 3 inches thick. The subsoil extends to a depth of about 27 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

The Pineville soil is very deep. The surface layer is typically dark brown channery silt loam about 4 inches thick. The subsoil extends to a depth of about 53 inches. It is about 38 inches of yellowish brown channery loam and 11 inches of yellowish brown very channery loam. The substratum to a depth of about 65 inches is yellowish brown and brownish yellow very channery loam mottled with light brownish gray.

The Guyandotte soil is very deep. The surface layer is typically very dark brown and dark brown channery silt loam about 11 inches thick. The subsoil extends to a depth of about 65 inches. It is about 3 inches of dark yellowish brown very channery loam, 38 inches of yellowish brown very channery loam, and 13 inches of yellowish brown extremely channery loam.

Included with these soils in mapping are small areas of the well drained Dekalb and Lily soils and the moderately well drained Buchanan soils. Dekalb soils make up the largest percentage of the inclusions. They generally are on the shoulder of ridges. Also included are areas of rock outcrop, soils that have slopes of less than 35 percent, and areas where less than 3 percent or more than 15 percent of the surface is covered with stones and boulders. Included areas make up about 15 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. Runoff is very rapid. Natural fertility is medium. Reaction ranges from strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

The available water capacity of the Pineville soil is moderate or high. Permeability is moderate in the subsoil. Runoff is very rapid. Natural fertility is medium. Reaction is very strongly acid or strongly acid. The depth to bedrock is more than 60 inches.

The available water capacity of the Guyandotte soil is low to high. Permeability is moderate or moderately rapid throughout the profile. Runoff is very rapid. Natural fertility is medium. Reaction ranges from very strongly acid to neutral in the surface layer and from very strongly acid to moderately acid in the subsoil and substratum. The depth to bedrock is more than 60 inches.

Most areas are wooded. A few small areas have been cleared and are used as pasture. Some areas have been surface mined for coal.

The potential productivity of these soils for trees is moderately high. Plant competition, an equipment limitation, and the hazard of erosion are the major management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes in areas of the Gilpin soil and on north- and south-facing slopes in areas of the Guyandotte soil. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in very severe erosion. Using equipment that can be operated on very steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion. On slopes of more than 55 percent, conventional skidder harvesting is not recommended.

These soils are suited to woodland wildlife habitat. Most areas have moderate populations of white-tailed deer, black bear, wild turkey, ruffed grouse, and gray squirrel.

These soils generally are not used for building site development because of the very steep slopes. Extensive grading and leveling are necessary on construction sites. The hazard of erosion is very severe on these sites. If the surface is disturbed, establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIIs.

GuD—Gilpin-Upshur silt loams, 15 to 25 percent slopes. These moderately steep, well drained soils are on the tops of ridges and on benches in the extreme northern part of the county. The benches are commonly dissected by drainageways, and landslips occur in places. The two soils occur as areas so intermingled that it was not practical to map them separately. The complex is about 70 percent Gilpin silt loam, 15 percent Upshur silt loam, and 15 percent included soils.

The surface layer of the Gilpin soil is typically dark brown silt loam about 4 inches thick. The subsoil extends to a depth of about 28 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

The surface layer of the Upshur soil is typically dark grayish brown silt loam about 5 inches thick. The subsoil extends to a depth of about 36 inches. It is about 10 inches of reddish brown silty clay, 12 inches of dark reddish brown clay, and 9 inches of reddish brown channery silty clay. The substratum is dark reddish brown channery silty clay. It extends to bedrock at a depth of about 47 inches.

Included with these soils in mapping are small areas of the well drained Dekalb and Lily soils and the moderately well drained Fenwick soils. Also included are a few small areas where as much as 3 percent of the surface is covered with stones and areas of soils that have slopes of less than 15 percent or more than 25 percent. Included soils make up about 15 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. The available water capacity of the Upshur soil is moderate or high, and permeability is slow in the subsoil. Runoff is rapid on both soils. Natural fertility is medium in the Gilpin soil and medium or high in the Upshur soil. Where unlimed, the Gilpin soil is extremely acid to strongly acid. The Upshur soil is very strongly acid to slightly acid in the upper part and strongly acid to slightly acid in the substratum. Bedrock at a depth of 20 to 40 inches in the Gilpin soil restricts the roots of deep-rooted plants. The Upshur soil is 40 to 60 inches deep over bedrock. It has a high shrink-swell potential in the subsoil. It is susceptible to landslips.

Most areas are wooded. A few areas have been cleared and are used as pasture.

The suitability of these soils for cultivated crops is limited. The soils are better suited to hay and pasture (fig. 8). The hazard of erosion is severe in unprotected areas. If the soils are cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, maintaining sod in shallow drainageways, and returning crop residue to the soils help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soils is reasonably firm are the major management needs in pastured areas.

The potential productivity of the Gilpin soil for trees is moderately high. That of the Upshur soil is moderately high on north aspects and moderate on south aspects. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes in areas of the Gilpin soil. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is

Figure 8.—An area of Gilpin-Upshur silt loams, 15 to 25 percent slopes, used for hay and pasture.

typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in severe erosion. Using equipment that can be operated on moderately steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion.

The slope and the depth to bedrock are the main limitations affecting the use of the Gilpin soil as a site for dwellings with basements or for septic tank absorption fields. Even though it generally is rippable, the bedrock underlying this soil may hinder excavation. In places it is hard sandstone. Building on the bedrock and landscaping with additional fill help to overcome the depth to bedrock. Selecting areas where the soil is deeper and less sloping, installing the absorption field on the contour, and enlarging the absorption field help to overcome the slope and the depth to bedrock on sites for septic tank absorption fields.

The slope, the slow permeability, a high shrink-swell potential, and the hazard of slippage are the main limitations if the Upshur soil is used as a site for dwellings with basements or for septic tank absorption fields. Dwellings should be built in areas where the soil is less sloping or should be designed so that they conform to the natural slope of the land. Backfilling with porous material, using wide, reinforced footings, and installing a drainage system help to prevent the structural damage caused by shrinking and swelling. Installing large absorption fields on the contour helps to overcome the slope. Selecting areas where the soil is less clayey helps to overcome the slow permeability. Better suited soils or an alternative disposal system should be considered.

Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IVe.

GuE—Gilpin-Upshur silt loams, 25 to 35 percent slopes. These steep, well drained soils are on the tops of ridges and on benches and the upper side slopes in the extreme northern part of the county. The benches are commonly dissected by drainageways, and landslips occur in places. The two soils occur as areas so intermingled that it was not practical to map them separately. The complex is about 70 percent Gilpin silt loam, 15 percent Upshur silt loam, and 15 percent included soils.

The surface layer of the Gilpin soil is typically dark brown silt loam about 3 inches thick. The subsoil extends to a depth of about 27 inches. It is about 8 inches of yellowish brown silt loam, 10 inches of yellowish brown channery silt loam, and 6 inches of yellowish brown channery loam. The substratum is yellowish brown very channery loam. It extends to bedrock at a depth of about 34 inches.

The surface layer of the Upshur soil is typically dark grayish brown silt loam about 5 inches thick. The subsoil extends to a depth of about 36 inches. It is about 10 inches of reddish brown silty clay, 12 inches of dark reddish brown clay, and 9 inches of reddish brown channery silty clay. The substratum is dark reddish brown channery silty clay. It extends to bedrock at a depth of about 47 inches.

Included with these soils in mapping are small areas of the well drained Dekalb and Lily soils and the moderately well drained Fenwick soils. Also included are a few small areas where as much as 3 percent of the surface is covered with stones and areas of soils that have slopes of less than 25 percent or more than 35 percent. Included soils make up about 15 percent of this map unit.

The available water capacity and permeability are moderate in the Gilpin soil. The available water capacity of the Upshur soil is moderate or high, and permeability is slow in the subsoil. Runoff is very rapid on both soils. Natural fertility is medium in the Gilpin soil and medium or high in the Upshur soil. Where unlimed, the Gilpin soil is extremely acid to strongly acid. The Upshur soil is very strongly acid to slightly acid in the upper part and strongly acid to slightly acid in the substratum. Bedrock at a depth of 20 to 40 inches in the Gilpin soil restricts the roots of deep-rooted plants. The Upshur soil is 40 to 60 inches deep over bedrock. It has a high shrink-swell potential in the subsoil. It is susceptible to landslips.

Most areas are wooded. A few areas have been cleared and are used as pasture.

These soils are not suited to cultivated crops or hay. They are suited to pasture. A very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are the major management concerns. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soils is reasonably firm are the major management needs in pastured areas.

The potential productivity of the Gilpin soil for trees is moderately high. That of the Upshur soil is moderately high on north aspects and moderate on south aspects. Plant competition, an equipment limitation, and the hazard of erosion on logging roads and skid trails are the major management concerns. The equipment limitation is caused by the slope. Seedling mortality is an additional management concern on south-facing slopes in areas of the Gilpin soil. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Poor logging practices result in severe erosion. Using equipment that can be operated on steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion.

These soils are not suited to most urban uses. The main limitations are the depth to bedrock in the Gilpin soil; the slow permeability, shrink-swell potential, and hazard of slippage in areas of the Upshur soil; and the slope of both soils. If the surface is disturbed, establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is VIe.

ItF—Itmann channery sandy loam, very steep. This somewhat excessively drained soil is in areas of waste material derived from the processing of coal. It is on hillsides, ridgetops, and bottom land throughout the county. Slope is dominantly 35 to 55 percent but ranges from 0 to 80 percent. In most areas the mounds of mine waste have steep or very steep side slopes. Some areas have been graded and are nearly level or gently sloping. The steep and very steep side slopes make up about 60 percent of the unit. Most areas are barren, but many areas have been covered with lighter colored soil material during reclamation.

The surface layer is typically very dark gray and very dark grayish brown channery sandy loam about 4 inches thick. The substratum extends to a depth of about 65 inches. It is about 12 inches of black very channery sandy loam and 49 inches of black extremely channery sandy loam mottled with yellow and red.

Included with this soil in mapping are areas of Itmann soils that have been covered with topsoil and areas of Gilpin, Dekalb, Buchanan, Cedarcreek, and Kaymine soils. Also included are areas of soils that are similar to the Itmann soil but are moderately acid, some areas that have burned or are burning, and a few small areas of impounded water. The burned areas are used as a source of road-surfacing or fill material. Included areas make up about 30 percent of this map unit.

The available water capacity of the Itmann soil is very low to moderate. Permeability is moderately rapid or rapid in the substratum. Natural fertility is low. This soil is less dense and more porous than the adjacent natural soils. Runoff is slow to very rapid. Where unlimed, the soil is strongly acid to extremely acid. The depth to bedrock is more than 60 inches.

Most of the acreage is idle land that supports few or no plants. This soil is not suited to cultivated crops, hay, pasture, or woodland. Reclaimed areas may be best suited to wildlife habitat. The dark surface layer absorbs heat, which can damage or destroy seedlings. Mulching with straw or hay helps to prevent this damage. If a plant cover is to be quickly established in bare areas, adequate amounts of lime and fertilizer and a minimum of 6 inches of lighter colored soil material are needed. The hazard of erosion is very severe in unprotected areas (fig. 9). A cover of grasses, legumes, and trees and a proper disposal system for surface water can help to control erosion and sedimentation.

The invading plant species on this soil are mainly black locust, autumn olive, European black alder, and white pine. Areas that have been seeded to grasses and legumes support various combinations of tall fescue, birdsfoot trefoil, redtop, lespedeza, and alsike clover.

Onsite investigation and testing are needed to determine the potential of this soil for most uses and the limitations that affect those uses.

The capability subclass is VIIs.

KaB—Kaymine channery loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. It is in areas that have been surface mined for coal. It is dominantly on ridgetops but is also on mountain side slopes and foot slopes. Stones and boulders cover 1 to 15 percent of the surface in most areas, but the percentage ranges from 0 to 50.

The surface layer is typically dark yellowish brown channery loam about 2 inches thick. The substratum to a depth of at least 65 inches is yellowish brown very channery loam mottled with yellowish red and gray. Siltstone makes up about 55 percent of the total content of rock fragments and sandstone about 45 percent.

Included with this soil in mapping are soils that are less than 60 inches deep over bedrock, soils that have slopes of more than 8 percent, small wet depressions, small areas of rubble land on out-slopes and in rock drains, and a few areas of rock outcrop in highwalls. Also included are a few small areas of Dekalb, Gilpin, and Lily soils on ridgetops and side slopes and Buchanan soils on foot slopes and in coves. Included areas make up about 30 percent of this map unit.

The available water capacity of the Kaymine soil is low to high. Permeability is moderate or moderately rapid throughout the profile. Natural fertility is medium or high. Runoff is medium. Reaction ranges from moderately acid to neutral. The depth to bedrock is more than 60 inches.

Most of the acreage is idle land that has been seeded to grasses and legumes. This soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. Pasture clipping is restricted by the surface stones and boulders. Erosion is a severe hazard if pastured areas are overgrazed. Proper stocking rates, timely deferment of grazing, rotation grazing, and applications of lime and fertilizer help to maintain desirable forage production and control erosion.

The potential productivity of this soil for trees is moderately high. Plant competition and seedling mortality are management concerns. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate.

This soil has fair potential as habitat for woodland wildlife. The variety of grasses and legumes provides a fair amount of food and cover for deer and wild turkey. Small wet depressions help to provide water.

The suitability of this soil for community development is limited because of large stones and boulders and the potential for differential settling. Onsite investigation and testing are necessary to determine the potential for urban uses and the limitations affecting those uses.

The capability subclass is VIIs.

KaF—Kaymine channery loam, very steep. This soil is very steep and well drained. It is in areas that have been surface mined for coal. It is on mountain side slopes and foot slopes throughout the county. The landscape consists of very steep benches, backfilled areas, out-slopes, and rock outcrops. Reclaimed areas are generally convex or concave and have slopes of 25 to 50 percent. Stones and boulders cover 1 to 15

Figure 9.—An area of Itmann channery sandy loam, very steep. Erosion is a very severe hazard in unprotected areas of this soil.

percent of the surface in most areas, but the percentage ranges from 0 to 50.

The surface layer is typically dark yellowish brown channery loam about 2 inches thick. The substratum to a depth of at least 65 inches is yellowish brown, very channery loam mottled with yellowish red and gray. Siltstone makes up about 55 percent of the total content of rock fragments and sandstone about 45 percent.

Included with this soil in mapping are soils that are less than 60 inches deep over bedrock, vertical highwalls that range from 20 to more than 80 feet in height, and small areas of rubble land on out-slopes and in coves of valley fills. Also included are a few small areas of Buchanan, Cedarcreek, Dekalb, Fiveblock, Gilpin, and Itmann soils. Included areas make up about 40 percent of this map unit.

The available water capacity of the Kaymine soil is low to high. Permeability is moderate or moderately rapid throughout the profile. Natural fertility is medium or high. Runoff is very rapid. Reaction ranges from moderately acid to neutral. The depth to bedrock is more than 60 inches.

Most of the acreage is idle land that has been seeded to grasses and legumes (fig. 10). Some areas have been planted to trees. This soil is not suited to cultivated crops or hay and cannot be easily managed for pasture. Erosion is a severe hazard if pastured areas are overgrazed. Proper stocking rates, timely deferment of grazing, rotation grazing, and applications of lime and fertilizer help to maintain desirable forage production and control erosion.

The potential productivity of this soil for trees is moderately high. Plant competition, seedling mortality, an equipment limitation, and the hazard of erosion are the major management concerns. The equipment limitation is caused by the slope. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site

Figure 10.—An area of Kaymine channery loam, very steep, that has been seeded to grasses and legumes.

preparation and immediate reforestation after harvesting help to reduce the seedling mortality rate. Poor logging practices result in very severe erosion. Using equipment that can be operated on very steep slopes and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion. Seeding bare areas to grasses and legumes and controlling the runoff of surface water can reduce the hazard of erosion.

This soil has fair potential as habitat for woodland wildlife. The variety of vegetation provides a fair amount of food and cover for deer and wild turkey. Small wet depressions on benches and in drainage ditches along roads help to provide water.

Some areas are used as mine openings for underground coal mines. Erosion on roads and around mine sites is a major management concern. It can be controlled by constructing the roads on the contour, using small sediment basins to collect runoff, and seeding and mulching disturbed areas.

This soil is not suited to community development because of the slope, the vertical highwalls, the stones and boulders, and the potential for differential settling. Onsite investigation and testing are necessary to determine the potential for urban uses and the limitations affecting those uses.

The capability subclass is VIIs.

LlB—Lily loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. It is on the tops of ridges in the Mt. Nebo and Mt. Lookout areas.

The surface layer is typically dark grayish brown loam about 7 inches thick. The subsoil extends to a depth of about 25 inches. It is about 7 inches of yellowish brown loam, 4 inches of strong brown loam, and 7 inches of yellowish brown channery loam. The substratum is brownish yellow very channery loam. It extends to sandstone bedrock at a depth of about 28 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb and Gilpin soils and the moderately well drained Fenwick soils. Also included are a few small areas where as much as 3 percent of the surface is covered with stones or channers and areas of soils that have slopes of less than 3 percent or more than 15 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of the Lily soil is low or moderate. Permeability is moderately rapid in the subsoil. Runoff is medium. Natural fertility is low. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used for cultivated crops, hay, pasture, or community development. This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is moderate in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Seeding bare areas to grasses and legumes can help to control erosion.

The depth to bedrock is the main limitation affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The bedrock may hinder excavation. Building on the bedrock and landscaping with additional fill help to overcome this limitation. Selecting areas where the soil is deeper, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas can help to control erosion and sedimentation.

The capability subclass is IIe.

LlC—Lily loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. It is on the tops of ridges throughout the county.

The surface layer is typically dark grayish brown loam about 7 inches thick. The subsoil extends to a depth of about 25 inches. It is about 7 inches of yellowish brown loam, 4 inches of strong brown loam, and 7 inches of yellowish brown channery loam. The substratum is brownish yellow very channery loam. It extends to sandstone bedrock at a depth of about 28 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb and Gilpin soils and the moderately well drained Fenwick soils. Also included are a few small areas where as much as 3 percent of the surface is covered with stones or channers and areas of soils that have slopes of less than 8 percent or more than 15 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of the Lily soil is low or moderate. Permeability is moderately rapid in the subsoil. Runoff is rapid. Natural fertility is low. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used for cultivated crops, hay, pasture, or community development. This soil is suited to cultivated crops, hay, and pasture (fig. 11). The hazard of erosion is severe in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Seeding bare areas to grasses and legumes can help to control erosion.

The depth to bedrock is the main limitation affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The bedrock may hinder excavation. Building on the bedrock and landscaping with additional fill help to overcome this limitation. Selecting areas where the soil is deeper, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas can help to control erosion and sedimentation.

The capability subclass is IIIe.

LlD—Lily loam, 15 to 25 percent slopes. This soil is moderately steep and well drained. It is on the tops of ridges throughout the county.

The surface layer is typically dark grayish brown

Figure 11.—Pasture in an area of Lily loam, 8 to 15 percent slopes.

loam about 5 inches thick. The subsoil extends to a depth of about 23 inches. It is about 7 inches of yellowish brown loam, 4 inches of strong brown loam, and 7 inches of yellowish brown channery loam. The substratum is brownish yellow very channery loam. It extends to sandstone bedrock at a depth of about 26 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb and Gilpin soils and the moderately well drained Fenwick soils. Also included are a few small areas where as much as 3 percent of the surface is covered with stones or channers and areas of soils that have slopes of less than 15 percent or more than 25 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of the Lily soil is low or moderate. Permeability is moderately rapid in the subsoil. Runoff is rapid. Natural fertility is low. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are used for hay and pasture. Some areas are wooded.

The suitability of this soil for cultivated crops is limited. The soil is better suited to hay and pasture. The hazard of erosion is severe in unprotected areas. If the soil is cultivated, farming on the contour, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. The hazard of erosion and an equipment limitation are management concerns. The equipment limitation is caused by the slope. Poor logging practices result in severe erosion. Seeding grasses and legumes in bare areas, controlling the runoff of surface water, and constructing logging roads and skid trails on or nearly on the contour help to overcome the equipment limitation and control erosion.

The depth to bedrock and the slope are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The bedrock may hinder excavation. The moderately steep slopes require additional grading. Maintaining lawns is difficult. Building on the bedrock and landscaping with additional fill help to overcome the depth to bedrock. Dwellings should be built in areas where the soil is less sloping or should be designed so that they conform to the natural slope of the land. Selecting areas where the soil is deeper and less sloping, installing the absorption field on the contour, and enlarging the absorption field help to overcome the depth to bedrock and the slope on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IVe.

LlE—Lily loam, 25 to 35 percent slopes. This soil is steep and well drained. It is on the tops of ridges throughout the county.

The surface layer is typically dark grayish brown loam about 5 inches thick. The subsoil extends to a depth of about 23 inches. It is about 7 inches of yellowish brown loam, 4 inches of strong brown loam, and 7 inches of yellowish brown channery loam. The substratum is brownish yellow very channery loam. It extends to sandstone bedrock at a depth fo 26 inches.

Included with this soil in mapping are a few small areas of the well drained Dekalb and Gilpin soils. Also included are a few small areas where as much as 3 percent of the surface is covered with stones and areas of soils that have slopes of less than 25 percent or more than 35 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of the Lily soil is low or moderate. Permeability is moderately rapid in the subsoil. Runoff is very rapid. Natural fertility is low. Where unlimed, this soil is strongly acid to extremely acid. Bedrock at a depth of 20 to 40 inches restricts the roots of deep-rooted plants.

Most areas are wooded. Some areas have been cleared and are used as pasture.

This soil is not suited to cultivated crops or hay. It is suited to pasture. A very severe hazard of erosion in unprotected areas and overgrazing in pastured areas are the major management concerns. Proper stocking rates that maintain the cover of desirable grasses and legumes and rotation grazing are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Common tree species include red oak, white oak, and hickory. Erosion on logging roads and skid trails is a management concern. Constucting logging roads and skid trails on the contour, diverting surface water from the roads, crowning the roads, and establishing and maintaining vegetation on roadbanks can help to control erosion.

The slope and the depth to bedrock are the main limitations affecting the use of this soil as a site for dwellings with basements or for septic tank absorption fields. The steep slopes require additional grading. Maintaining lawns is difficult. Building on the bedrock, landscaping with additional fill, selecting areas where the soil is less sloping, and designing dwellings so that they conform to the natural slope of the land help to overcome the limitations that affect building site development. Selecting areas where the soil is deeper, installing the absorption field on the contour, and enlarging the absorption field help to overcome the limitations on sites for septic tank absorption fields. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas can help to control erosion and sedimentation.

The capability subclass is VIe.

MoB—Monongahela silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. It is on terraces along Peters Creek, Muddlety Creek, Beaver Creek, Glade Creek, Meadow Creek, and their tributaries.

The surface layer is typically dark brown silt loam about 8 inches thick. The subsoil extends to a depth of at least 65 inches. The upper 15 inches is yellowish brown silt loam and silty clay loam. The next 6 inches is yellowish brown silty clay loam mottled with light brownish gray. The lower 36 inches is firm or very firm and is brittle. It is 10 inches of brownish yellow silt loam mottled with light brownish gray and yellowish brown and 26 inches of brownish yellow silt loam mottled with light brownish gray and yellowish red.

Included with this soil in mapping are a few small areas of the moderately well drained Buchanan and Cotaco soils. Also included are a few small areas of soils that are well drained, soils that do not have a firm and brittle layer in the subsoil, soils that have bedrock at a depth of 30 to 40 inches, and soils that have slopes of less than 3 percent or more than 8 percent. Included soils make up about 10 percent of this map unit.

The available water capacity of the Monongahela soil is moderate. Permeability is moderately slow or slow in the brittle layer. Runoff is medium. Natural fertility also is medium. A seasonal high water table about 1½ to 3 feet below the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is very strongly acid or strongly acid. The depth to bedrock is more than 60 inches.

Most areas are used for cultivated crops, hay, or pasture. Some areas are used for community development.

This soil is suited to cultivated crops, hay, and pasture. The hazard of erosion is moderate in unprotected areas. If the soil is cultivated, applying a system of conservation tillage, growing crops in contour strips, including hay in the cropping sequence, and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees is moderately high. Plant competition is a major management concern. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The seasonal high water table is the main limitation affecting the use of this soil as a site for dwellings with basements. Sealing foundation walls, installing foundation drains, backfilling with porous material, and constructing diversions to intercept water from the higher areas help to keep basements dry. The seasonal high water table and the moderately slow or slow permeability are the main limitations on sites for septic tank absorption fields. Increasing the size of the absorption fields, installing the absorption fields on the contour, and constructing diversions to intercept water from the higher areas help to keep effluent from seeping to the surface or from backing up in dwellings. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIe.

Pc—Pope-Craigsville complex. These nearly level, well drained soils are on flood plains along rapidly flowing streams. They are frequently flooded, mainly during periods outside the growing season. The two soils occur as areas so intermingled that it was not practical to map them separately. The complex is about 50 percent Pope sandy loam, 35 percent Craigsville gravelly sandy loam, and 15 percent included soils.

The surface layer of the Pope soil is typically dark brown sandy loam about 7 inches thick. The subsoil is sandy loam about 25 inches thick. It is dark yellowish brown in the upper 5 inches, dark brown in the next 8 inches, and yellowish brown in the lower 12 inches. The substratum to a depth of about 65 inches is yellowish brown very gravelly sandy loam.

The surface layer of the Craigsville soil is typically dark brown gravelly sandy loam about 7 inches thick. The subsoil extends to a depth of about 25 inches. It is about 11 inches of yellowish brown extremely gravelly sandy loam and 7 inches of dark yellowish brown very gravelly sandy loam. The substratum to a depth of about 65 inches is yellowish brown extremely gravelly loamy sand.

Included with these soils in mapping are a few small areas of the well drained Chavies and poorly drained Elkins soils. Also included are a few small areas of soils that are similar to the Pope and Craigsville soils but are moderately well drained, a few sand and gravel bars directly adjacent to the streams, and a few areas of soils that are occasionally flooded. Included areas make up about 15 percent of this map unit.

The available water capacity is moderate or high in the Pope soil and low or moderate in the Craigsville soil. Permeability is moderate or moderately rapid in the subsoil of the Pope soil and rapid or moderately rapid in the subsoil of the Craigsville soil. Runoff is slow on both soils. Natural fertility is medium. Where unlimed, the Pope soil is very strongly acid or extremely acid and the Craigsville soil is strongly acid or very strongly acid. The depth to bedrock is more than 60 inches in both soils.

Most areas are wooded. Some areas are used for hay and pasture. These soils are suited to cultivated crops, hay, and pasture. Droughtiness during dry periods is a major management concern. If the soils are cultivated, growing cover crops, including hay in the cropping sequence, and working the residue from the cover crop into the soil improve the available water capacity and maintain fertility and tilth. In places crops can be damaged by floodwater. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing during dry periods are the major management needs in pastured areas.

The potential productivity of these soils for trees is moderately high. Plant competition is a management concern on both soils. Seedling mortality is an additional concern on the Craigsville soil. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the

Figure 12.—An area of Udorthents, smoothed, along U.S. Route 19.

seedling mortality rate. Flooding may hinder logging activities during wet periods.

The flooding is the main hazard affecting the use of these soils as sites for dwellings with basements or for septic tank absorption fields. The soils generally are not suitable for these uses unless the site is protected by properly designed flood-control structures. A better suited soil should be considered. If vegetation is removed, establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IIIw.

Pu—Purdy silt loam, 0 to 5 percent slopes. This soil is nearly level and gently sloping and is poorly drained and very poorly drained. It is on terraces, mainly along Muddlety Creek, Beaver Creek, Glade Creek, and Meadow Creek.

The surface layer is typically dark grayish brown silt loam about 8 inches thick. The subsoil extends to a depth of about 40 inches. It is about 4 inches of grayish brown silt loam mottled with olive yellow and strong brown and 28 inches of olive gray silty clay mottled with strong brown. The substratum to a depth of at least 65 inches is olive gray silty clay mottled with strong brown.

Included with this soil in mapping are a few small areas of the poorly drained and very poorly drained Elkins soils and the moderately well drained Monongahela and Cotaco soils. Also included are a few small areas of soils that have slopes of more than 5 percent and soils that are somewhat poorly drained. Included soils make up about 15 percent of this map unit.

The available water capacity of the Purdy soil is high. Permeability is slow in the subsoil. Runoff is slow, and water ponds in some areas. Natural fertility is low. A seasonal high water table on or near the surface restricts the roots of water-sensitive plants. Where unlimed, this soil is very strongly acid or extremely acid. The depth to bedrock is more than 60 inches.

Most areas are used for hay and pasture. Some areas are used for cultivated crops or community development.

This suitability of this soil for cultivated crops is limited. The soil is better suited to hay and pasture. It cannot be easily worked and puddles when wet. Draining the soil and maintaining drainage systems are difficult. If the soil is cultivated, including hay in the cropping sequence and returning crop residue to the soil help to control erosion and maintain fertility and tilth. Proper stocking rates that maintain the cover of desirable grasses and legumes, rotation grazing, and deferment of grazing in the spring until the surface of the soil is reasonably firm are the major management needs in pastured areas.

The potential productivity of this soil for trees that are tolerant of wetness is moderately high. An equipment limitation, seedling mortality, and plant competition are the major management concerns. The equipment limitation is caused by wetness. Carefully laying out logging roads and skid trails and using stone as a base for the roads help to overcome the equipment limitation. Planting nursery stock that is larger than is typical or planting containerized seedlings reduces the seedling mortality rate. Intensive management that restricts the growth of undesirable plants is needed if a desirable stand is to be established. Site preparation and immediate reforestation after harvesting minimize plant competition.

The seasonal high water table is the main limitation affecting the use of this soil as a site for dwellings with basements. Sealing foundation walls, installing foundation drains, and backfilling with porous material help to keep basements dry. The seasonal high water table and the slow permeability are the main limitations on sites for septic tank absorption fields. Increasing the size of the absorption fields and installing the absorption fields on the contour help to keep effluent from seeping to the surface or from backing up in dwellings. A better suited soil should be considered. Removal of the vegetative cover should be held to a minimum on construction sites. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

The capability subclass is IVw.

Ud—Udorthents, smoothed. These nearly level to very steep, well drained soils consist of mixed soil material and rock fragments in areas that have been disturbed by excavation, filling, grading, or other earth-moving activities. The soils are throughout the county but are mainly in the vicinity of the Summersville Dam, in the towns of Summersville and Richwood, and along U.S. Route 19 (fig. 12).

The area near the Summersville Dam has been used mostly as a borrow site. The depth to sandstone bedrock ranges from 2 to about 18 inches in most places. The soil material is yellowish brown sandy loam, loam, or clay loam. The rock fragments are dominantly sandstone of various sizes.

Other areas of this unit consist of soil material that has been moved several hundred yards from the cut area to the fill site. The depth of the soils in most of these areas ranges from 4 or 5 feet to more than 80 feet. The soil material is mostly yellowish brown sandy loam to silty clay loam. The rock fragments vary in kind, size, and amount. In all areas the original soil features have been altered or obscured. Areas where soil profiles can be identified make up less than 20 percent of the unit.

Included with these soils in mapping are a few small areas of the well drained Dekalb, Gilpin, Guyandotte, Lily, and Pineville soils. These included soils make up about 15 percent of this map unit.

The available water capacity of the Udorthents generally is very low to moderate. Natural fertility is low. Runoff is dominantly medium or rapid. The depth to bedrock ranges from 0 to 18 inches near the Summersville Dam and is more than 80 feet in some areas along U.S. Route 19.

Most of the acreage is idle land. These soils are not suited to cultivated crops or hay. The suitability for pasture is limited. The potential productivity for trees is low. The soils are severely limited as sites for urban uses because of the depth to bedrock, the potential for differential settling, and the slope. They are better suited to the development of wildlife habitat. Careful onsite investigation and testing are necessary to determine the suitability for proposed uses and the limitations affecting those uses. Removal of the vegetative cover should be held to a minimum. Establishing a plant cover in unprotected areas and providing a proper disposal system for surface water can help to control erosion and sedimentation.

No capability subclass is assigned.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 16,140 acres in the survey area, or nearly 3.9 percent of the total acreage, meets the soil requirements for prime farmland. This land is mainly in the central part of the county.

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

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 behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other 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 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 to all soils suitable for farm crops and pasture, though individual soils or groups of soils require different kinds of management. The general principles are described in the following paragraphs.

Most of the soils in Nicholas County have a low or moderate supply of basic nutrients. As a result, applications of lime and fertilizer are necessary. The amounts to be applied depend on the kind of soil, the cropping history, the type of crop to be grown, and the desired level of yields and should be determined by the results of laboratory analysis of soil samples.

The organic matter content is low in most of the soils in the county. Increasing the content is not feasible. The content can be maintained, however, by adding manure, by returning crop residue to the soil, and by growing sod crops, cover crops, and green-manure crops.

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

Runoff and erosion occur mainly while a cultivated crop is growing or soon after it has been harvested. If cultivated, all of the gently sloping and steeper soils in the county are subject to erosion. A suitable cropping system that helps to control erosion is needed on these soils. The main management needs are the proper crop rotation, conservation tillage, mulch planting, crop residue management, cover crops and green-manure crops, and applications of lime and fertilizer. Other major erosion-control measures are contour farming, contour stripcropping, and grassed waterways. The effectiveness of a particular combination of these measures differs from one soil to another. Different combinations can be equally effective on the same soil.

Using the soils for pasture is effective in controlling erosion in most areas. A high level of pasture management, including applications of fertilizer, controlled grazing, and careful selection of forage species, is needed to prevent excessive erosion on most soils. Grazing is controlled by rotating livestock from one pasture to another and by providing rest periods, which allow for regrowth of the plants. On some soils the pasture species that require the least renovation are needed to maintain a good ground cover and to provide forage for grazing.

The local office of the Soil Conservation Service can provide information about management of the soils for crops and pasture.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 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 *(10)*. 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.

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 hazard is the risk of erosion unless close-growing plant cover is maintained;

w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 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, helped prepare this section.

About 337,300 acres in Nicholas County, or 81 percent of the toal acreage, is used as woodland. The wooded areas range from small private woodlots to corporate-owned tracts several thousand acres in size. The Monongahela National Forest makes up about 23,540 acres in the eastern part of the county. The most common forest types, or natural associations of tree species, and their percentage in the wooded tracts are the oak-hickory type, about 65 percent; the maple-beech-birch type, 25 percent; other hardwood types, 3 percent; and pine types, 3 percent *(3)*. Several small Christmas tree plantations are throughout the county.

About 42 percent of the woodland in the county is suitable for sawtimber. Several permanent sawmills are throughout the county. Most of the sawtimber is hauled to Richwood, Nettie, the Birch River, or Mt. Nebo.

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. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

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

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope and the erosion factor K, which is shown in table 16. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are the depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Average annual growth of some of the common trees is given in cubic feet, board feet, and cords per acre.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

The aspects of some soils, generally those that have slopes of more than 15 percent, are shown in table 8. North aspects are those that face in any compass direction from 315 to 135 degrees. South aspects are those that face in any compass direction from 135 to 315 degrees. Aspect affects the potential productivity of the more sloping soils. The soils on north aspects generally are more moist than those on south aspects and are usually rated one site class higher. Aspect also affects the kind of tree species and the degree of soil limitations to be considered in management.

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 sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for 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, state biologist, Soil Conservation Service, helped prepare this section.

Approximately 81 percent of the acreage in Nicholas County is wooded. The dominant wildlife species are those that thrive in areas of woodland habitat. The county provides good or excellent habitat for white-tailed deer, eastern wild turkey, gray squirrel, and ruffed grouse. It also provides some of the best habitat for black bear in West Virginia. The songbirds, small mammals, reptiles, and amphibians adapted to forested areas are numerous throughout the county.

In most areas of the county, the wildlife species that prefer openland habitat, such as cottontail rabbit, woodchuck, and meadowlark, are not so common as those that prefer woodland habitat. The openland species are abundant, however, in the more heavily farmed areas and in areas having numerous reclaimed surface mines. Some areas support limited numbers of waterfowl.

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 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, timothy, bromegrass, clover, and alfalfa.

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

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, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood and crabapple.

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

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, arrowhead, burreed, pickerelweed, cordgrass, rushes, and sedges.

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. Wildlife attracted to these areas include bobwhite quail, meadow vole, 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, and deer.

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

Engineering

John I. Eddy, conservation engineer, Soil Conservation Service, helped 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 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the 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 evaluate the potential of areas for residential, commercial, industrial, and recreation uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

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

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

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, 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 or 6 feet are not considered.

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

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

Sanitary Facilities

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

Table 12 also shows the suitability of the soils for use as daily cover for 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 resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

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

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

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench 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 wind erosion.

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

Construction Materials

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

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

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

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

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and depth to the water table is less than 1 foot. These soils 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 and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. 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.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large 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 classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

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

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

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

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard

Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

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

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

Physical and Chemical Properties

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

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, 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 ⅓ 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 in 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 infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have 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 estimates of the frequency of flooding. The frequency 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 (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year).

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. 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 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. 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.

Two numbers in the column showing depth to the water table 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 it is within a depth of 6 feet 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 *(11)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

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

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

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

Soil Series and Their Morphology

Dr. John C. Sencindiver, associate professor of agronomy, West Virginia Agricultural and Forestry Experiment Station, helped 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 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" *(9)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(11)*. 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."

Buchanan Series

The Buchanan series consists of very deep, moderately well drained soils that formed in acid colluvial material that moved downslope from areas on uplands. These soils are on colluvial fans, on foot slopes, on side slopes, on benches, in coves, and along drainageways throughout the county. Slope ranges from 3 to 45 percent.

Buchanan soils are on the landscape with the somewhat excessively drained Itmann soils and the well drained Cedarcreek, Dekalb, Gilpin, Guyandotte, Kaymine, and Pineville soils. The associated soils do not have a fragipan. Itmann, Cedarcreek, Dekalb, Guyandotte, and Kaymine soils are loamy-skeletal.

Typical pedon of Buchanan channery fine sandy loam, 15 to 35 percent slopes, very stony, in a wooded area, 10 feet north of County Road 94/4, about 1.1 miles northeast of West Virginia Route 20 and the confluence of the Cherry River and the Gauley River:

Oi—4 inches to 1 inch; hardwood leaf litter.

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

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) channery fine sandy loam; moderate fine and medium granular structure; very friable; many fine and medium roots; about 20 percent rock fragments; very strongly acid; abrupt wavy boundary.

A2—3 to 7 inches; brown (10YR 4/3) channery fine sandy loam; moderate fine and medium granular structure; very friable; many fine and medium roots; about 20 percent rock fragments; very strongly acid; abrupt wavy boundary.

Bt1—7 to 12 inches; yellowish brown (10YR 5/6) channery loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; few clay films on faces of peds; about 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—12 to 20 inches; yellowish brown (10YR 5/6) channery loam; common medium light gray (10YR 7/2) and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; many fine and medium roots; common clay films on faces of peds and around pores; about 25 percent rock fragments; extremely acid; gradual wavy boundary.

Btx1—20 to 28 inches; yellowish brown (10YR 5/6) channery loam; few fine light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; firm; brittle; few clay films on faces of peds; about 30 percent rock fragments; extremely acid; abrupt wavy boundary.

Btx2—28 to 60 inches; yellowish brown (10YR 5/6) very channery loam; many coarse light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; very firm; brittle; few clay films on faces of peds; about 40 percent rock fragments; extremely acid; gradual wavy boundary.

C—60 to 65 inches; light yellowish brown (10YR 6/4) very channery sandy loam; common medium reddish yellow (5YR 6/8) mottles; massive; firm; about 45 percent rock fragments; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. Rock fragments, mainly sandstone, make up 5 to 30 percent of the part of the profile above the fragipan and 10 to 60 percent of the fragipan and the C horizon. In unlimed areas reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. It is fine sandy loam or loam in the fine-earth fraction.

The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. It is loam or clay loam in the fine-earth fraction. The Bt horizon has weak or moderate fine or medium subangular blocky structure. It is friable or firm. The Btx horizon is firm or very firm.

The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 6. It is sandy loam or clay loam in the fine-earth fraction. It is friable or firm.

Cedarcreek Series

The Cedarcreek series consists of very deep, well drained soils that formed in material partially weathered from acid sandstone, siltstone, shale, and coal in surface-mined areas. These strongly sloping to very steep soils are on benches and side slopes in the northwestern part of the county. They are associated with the Lower Freeport, Upper Kittaning, and Middle Kittaning coals of the Allegheny Formation. Slope ranges from 8 to 65 percent.

Cedarcreek soils are on the landscape with the somewhat excessively drained Itmann soils; the well drained Dekalb, Gilpin, Kaymine, and Lily soils; and the moderately well drained Buchanan soils. Cedarcreek soils have fewer carbolithic rock fragments throughout than Itmann soils. They are deeper than Dekalb soils. Gilpin, Lily, and Buchanan soils are fine-loamy. Kaymine soils do not have a strongly acid to extremely acid C horizon.

Typical pedon of Cedarcreek channery loam, very steep, in an idle field about 0.7 mile north of Enoch Branch and 0.6 mile west of Puddy Run:

A—0 to 5 inches; dark yellowish brown (10YR 4/6) channery loam; weak fine and medium granular structure; very friable; many fine and medium roots; about 30 percent rock fragments (80 percent sandstone, 10 percent siltstone, and 10 percent coal fragments); strongly acid; clear smooth boundary.

C1—5 to 16 inches; dark grayish brown (10YR 4/2) very channery loam; massive; friable; common fine and medium roots; about 45 percent rock fragments (50 percent sandstone, 40 percent siltstone, and 10 percent coal fragments); very strongly acid; gradual wavy boundary.

C2—16 to 30 inches; dark grayish brown (10YR 4/2) extremely channery loam; common medium reddish yellow (5YR 6/6) lithochromic mottles; massive; firm; about 65 percent rock fragments (50 percent sandstone, 40 percent siltstone, and 10 percent coal fragments); strongly acid; gradual wavy boundary.

C3—30 to 65 inches; brown (10YR 5/3) extremely channery loam; common medium yellowish brown (10YR 5/4) and yellowish red (5YR 5/6) lithochromic mottles; massive; firm; about 65 percent rock fragments (50 percent siltstone, 40 percent sandstone, and 10 percent coal fragments); strongly acid.

The depth to bedrock is more than 5 feet. In unlimed areas reaction ranges from strongly acid to extremely acid. The content of rock fragments ranges from 30 to 65 percent, by volume, throughout the profile. These fragments are sandstone, siltstone, shale, or coal. The percentage of each is less than 65 percent of the total content of rock fragments in the control section. The fragments are mostly channers, but stones and boulders are in some pedons.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 1 to 6. The C horizon has hue of 7.5YR to 5Y, value of 2 to 6, and chroma of 1 to 8. It is friable or firm.

Chavies Series

The Chavies series consists of very deep, well drained soils that formed in alluvial material washed from acid soil material on uplands. These soils are on high flood plains along the major streams in the county. Slope ranges from 2 to 6 percent.

Chavies soils are on the landscape with the well drained Craigsville and Pope soils and the moderately well drained Monongahela soils. Craigsville soils are loamy-skeletal, and Monongahela soils are fine-loamy. Pope soils are flooded more frequently than the Chavies soils.

Typical pedon of Chavies fine sandy loam, 2 to 6 percent slopes, in an idle field 50 feet north of Peters Creek, about ¼ mile east of Otter Creek Grade School, and 300 feet south of West Virginia Route 39:

Ap1—0 to 6 inches; dark brown (10YR 3/3) fine sandy loam; moderate medium granular structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.

Ap2—6 to 11 inches; brown (10YR 4/3) loam; moderate medium subangular blocky structure parting to moderate fine and medium granular; friable; many fine roots; strongly acid; abrupt wavy boundary.

Bt1—11 to 16 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; many fine roots; few clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—16 to 34 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; many fine roots; few clay films on faces of peds; strongly acid; clear wavy boundary.

BC—34 to 42 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine roots; strongly acid; gradual wavy boundary.

C1—42 to 50 inches; strong brown (7.5YR 5/6) sandy loam; massive; friable; few fine roots; strongly acid; gradual wavy boundary.

C2—50 to 65 inches; yellowish brown (10YR 5/6) loamy sand; single grained; loose; strongly acid.

The thickness of the solum ranges from 30 to 45 inches. The depth to bedrock is more than 60 inches. Rounded gravel makes up 0 to 10 percent of the solum and 0 to 30 percent of the C horizon. In unlimed areas reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR and value and chroma of 3 or 4. It is fine sandy loam or loam in the fine-earth fraction.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loam or fine sandy loam in the fine-earth fraction. It has moderate or medium subangular blocky structure.

The C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 3 to 6. It is sandy loam or loamy sand in the fine-earth fraction. It is friable or loose.

Cotaco Series

The Cotaco series consists of very deep, moderately well drained soils that formed in acid alluvial deposits that washed from areas on uplands. These soils are on terraces, mainly along Muddlety Creek, Beaver Creek, Glade Creek, and Meadow Creek. Slope ranges from 3 to 8 percent.

Cotaco soils are on the landscape with the moderately well drained Monongahela soils and the poorly drained or very poorly drained Elkins and Purdy soils. Monongahela soils have a fragipan. Elkins and Purdy soils have a gleyed B horizon.

Typical pedon of Cotaco silt loam, 3 to 8 percent slopes, in a pasture about 0.7 mile east of Muddlety Creek and 300 feet north of Phillips Run:

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

BA—7 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; very strongly acid; clear wavy boundary.

Bt1—14 to 24 inches; brownish yellow (10YR 6/6) silty clay loam; weak medium subangular blocky structure; friable; few very fine roots; few clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—24 to 32 inches; strong brown (7.5YR 5/8) silty clay loam; many medium light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; friable; common clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—32 to 40 inches; strong brown (7.5YR 5/8) silty clay loam; many medium light gray (10YR 7/2) mottles; weak medium and coarse subangular blocky structure; friable; very strongly acid; clear wavy boundary.

Cg—40 to 65 inches; gray (10YR 6/1) silty clay loam; common medium yellowish brown (10YR 5/8) mottles; massive; firm; very strongly acid.

The thickness of the solum ranges from 30 to 48 inches. The depth to bedrock is more than 60 inches. In unlimed areas reaction is very strongly acid or strongly acid. The content of rock fragments ranges from 0 to 3 percent in the A horizon and from 0 to 20 percent in the B and C horizons.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The BA horizon has hue of 7.5YR and 10YR, value of 4 or 5, and chroma of 4. It is silt loam or silty clay loam in the fine-earth fraction. It has weak fine or medium subangular blocky structure.

The Bt and BC horizons have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. They are loam, silt loam, or silty clay loam in the fine-earth fraction. They have weak or moderate medium or coarse subangular blocky structure.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 8. It is silt loam, loam, or silty clay loam in the fine-earth fraction. It is friable or firm.

Craigsville Series

The Craigsville series consists of very deep, well drained soils that formed in alluvial material washed from areas on uplands. These soils are on flood plains throughout the county. Slope ranges from 0 to 5 percent.

Craigsville soils are on the landscape with the well drained Chavies and Pope soils and the moderately well drained Monongahela soils. Chavies and Pope soils are coarse-loamy, and Monongahela soils are fine-loamy.

Typical pedon of Craigsville gravelly sandy loam, 0 to 5 percent slopes, in an idle field about 0.5 mile west of Twentymile Creek Church and 250 feet northwest of County Road 21/1:

Ap—0 to 7 inches; dark brown (10YR 4/3) gravelly sandy loam; moderate fine and medium granular structure; friable; many fine and medium roots; about 30 percent gravel; very strongly acid; abrupt wavy boundary.

Bw1—7 to 18 inches; yellowish brown (10YR 5/4) extremely gravelly sandy loam; weak fine and medium subangular blocky structure; friable; many fine roots; about 65 percent pebbles and cobbles; very strongly acid; clear wavy boundary.

Bw2—18 to 25 inches; dark yellowish brown (10YR 4/4) very gravelly sandy loam; weak medium subangular blocky structure; friable; many fine roots; about 35 percent pebbles and cobbles; very strongly acid; gradual wavy boundary.

C—25 to 65 inches; yellowish brown (10YR 5/4) extremely gravelly loamy sand; massive; very friable; few fine roots; about 65 percent pebbles and cobbles; very strongly acid.

The thickness of the solum ranges from 20 to 35 inches. The depth to bedrock is more than 65 inches. Gravel and cobbles make up 10 to 45 percent of the A horizon and 35 to 70 percent of the B and C horizons. In unlimed 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 B and C horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The B horizon is loam or sandy loam in the fine-earth fraction. It has weak or moderate fine or medium subangular blocky structure. The C horizon is sandy loam or loamy sand in the fine-earth fraction.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils that formed in acid material weathered from sandstone. These soils are on very stony hillsides and ridgetops throughout the county. Slope ranges from 3 to 70 percent.

Dekalb soils are on the landscape with the well drained Cedarcreek, Gilpin, Guyandotte, Lily, and Pineville soils and the moderately well drained Buchanan soils. Cedarcreek and Guyandotte soils are deeper over bedrock than the Dekalb soils. Buchanan, Gilpin, Lily, and Pineville soils are fine-loamy.

Typical pedon of Dekalb channery sandy loam, 35 to 70 percent slopes, very stony, in a wooded area about 60 feet northeast of Spruce Run Road, 2.0 miles north of its intersection with U.S. Route 19:

Oi—6 to 2 inches; loose hardwood leaf litter.

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

A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 20 percent rock fragments; extremely acid; abrupt wavy boundary.

Bw1—3 to 7 inches; yellowish brown (10YR 5/4) channery sandy loam; weak fine and medium subangular blocky structure; very friable; many fine and medium roots; about 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bw2—7 to 20 inches; yellowish brown (10YR 5/4) very channery sandy loam; weak fine and medium subangular blocky structure; very friable; many fine roots; about 50 percent rock fragments; strongly acid; gradual wavy boundary.

C—20 to 24 inches; yellowish brown (10YR 5/4) extremely channery sandy loam; massive; very friable; many fine roots; about 70 percent rock fragments; extremely acid; abrupt wavy boundary.

R—24 inches; sandstone bedrock.

The thickness of the solum ranges from 20 to 28 inches. The depth to bedrock ranges from 20 to 40 inches. Sandstone fragments make up 10 to 60 percent of the solum and 50 to 75 percent of the C horizon. In unlimed areas reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The B horizon has hue of 10YR, value of 5, and chroma of 4 to 6. It is loam or sandy loam in the fine-earth fraction. It has weak or moderate fine to coarse subangular blocky structure. The C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 to 8. It is very friable to firm.

Elkins Series

The Elkins series consists of very deep, poorly drained and very poorly drained soils that formed in alluvial material washed from acid soil material weathered from shale, siltstone, and sandstone on uplands. These soils are on nearly level flood plains along Muddlety Creek, Beaver Creek, Glade Creek, Meadow Creek, and their tributaries. Slope ranges from 0 to 3 percent.

Elkins soils are on the landscape with the moderately well drained Cotaco and Monongahela soils and the poorly drained Purdy soils. Cotaco and Monongahela soils are fine-loamy, and Purdy soils are clayey.

Typical pedon of Elkins silt loam, drained, in a hayfield about 400 feet west of County Road 3 and 0.1 mile south of the confluence of Lick Fork and Big Beaver Creek:

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; friable; many fine roots; very strongly acid; abrupt smooth boundary.

Bg1—8 to 18 inches; gray (10YR 5/1) silt loam; few fine strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to weak medium angular blocky; friable; few fine roots; common small concretions and accumulations of iron and manganese oxide; very strongly acid; clear wavy boundary.

Bg2—18 to 36 inches; gray (10YR 5/1) silt loam; many medium strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; slightly sticky and slightly plastic; few fine roots; common small concretions and accumulations of iron and manganese oxide; very strongly acid; clear wavy boundary.

Cg1—36 to 56 inches; light gray (10YR 6/1) silt loam; common fine and medium strong brown (7.5YR 5/8) mottles; massive; slightly sticky and slightly plastic; very strongly acid; gradual wavy boundary.

Cg2—56 to 65 inches; light gray (10YR 6/1) fine sandy loam; massive; nonsticky and nonplastic; very strongly acid.

The thickness of the solum ranges from 25 to 50 inches. The depth to bedrock is more than 60 inches. In unlimed areas reaction is extremely acid or very strongly acid.

The A horizon is neutral in hue or has hue of 10YR. It has value of 2 or 3 and chroma of 0 to 2. The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam or silty clay loam. It has weak or moderate medium or coarse prismatic structure that parts to weak or moderate angular or subangular blocky. The C horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam, loam, or sandy loam.

Fenwick Series

The Fenwick series consists of moderately deep, moderately well drained soils that formed in acid material weathered from interbedded siltstone, sandstone, and shale. These soils are on broad ridgetops and benches throughout the county. Slope ranges from 3 to 15 percent.

Fenwick soils are on the landscape with the well drained Gilpin and Lily soils. Gilpin and Lily soils do not have grayish mottles in the B horizon.

Typical pedon of Fenwick silt loam, 3 to 8 percent slopes, in a wooded area about 1.3 miles east of West Virginia Route 20 and 1.5 miles south of West Virginia Route 39:

Oi—2 inches to 1 inch; loose hardwood leaf litter.

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

A—0 to 2 inches; very dark brown (10YR 2/2) silt loam; weak fine and medium granular structure; very friable; many fine and medium roots; about 10 percent sandstone fragments; very strongly acid; abrupt wavy boundary.

AB—2 to 8 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; about 10 percent sandstone fragments; very strongly acid; clear wavy boundary.

Bt1—8 to 18 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; few distinct clay films on faces of peds; common fine and medium roots; about 10 percent sandstone fragments; very strongly acid; clear wavy boundary.

Bt2—18 to 25 inches; light yellowish brown (10YR 6/4) loam; many medium light brownish gray (2.5Y 6/2) and yellowish red (5YR 5/8) mottles; moderate coarse subangular blocky structure; friable; common distinct clay films on faces of peds; few fine roots; about 10 percent sandstone fragments; very strongly acid; gradual wavy boundary.

BC—25 to 33 inches; light yellowish brown (10YR 6/4) loam; many medium light brownish gray (2.5YR 6/2) and yellowish red (5Y 5/8) mottles; weak coarse subangular blocky structure; firm; about 5 percent sandstone fragments; very strongly acid; clear smooth boundary.

C—33 to 38 inches; light yellowish brown (10YR 6/4) and light brownish gray (2.5Y 6/2) loam; massive; firm; about 5 percent sandstone fragments; very strongly acid; clear smooth boundary.

R—38 inches; hard, yellowish gray sandstone and soft, gray shale.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Rock fragments consisting of channers and flagstones make up 0 to 15 percent of the A and B horizons and 5 to 35 percent of the C horizon. In unlimed areas reaction is strongly acid or very strongly acid.

The A horizon has hue of 7.5YR, 10YR, or 2.5Y and value and chroma of 2 to 4. The B horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 5 or 6, and chroma of 4 or 6. It is silt loam, loam, or clay loam in the fine-earth fraction. It has weak or moderate fine to coarse subangular blocky structure. It is friable or firm. The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 7, and chroma of 2 to 6. It is sandy loam, loam, silt loam, or silty clay loam in the fine-earth fraction. It is firm or very firm.

Fiveblock Series

The Fiveblock series consists of very deep, somewhat excessively drained soils that formed in material weathered from neutral sandstone, siltstone, shale, and coal in surface-mined areas. These gently sloping to very steep soils are on nearly level benches and side slopes. They are associated with the Lower Kittaning coal of the Allegheny Formation. Slope ranges from 3 to 80 percent.

Fiveblock soils are on the landscape with the somewhat excessively drained Itmann soils and the well drained Gilpin and Lily soils. Itmann soils have a higher content of carbolithic rock fragments in the C horizon than the Fiveblock soils. Gilpin and Lily soils are fine-loamy.

Typical pedon of Fiveblock channery sandy loam, very steep, in an idle field about 1,800 feet north of McMillion Creek and 2 miles west of Back Fork:

A—0 to 4 inches; yellowish brown (10YR 5/4) channery sandy loam; weak medium granular structure; loose; many fine roots; about 30 percent rock fragments (90 percent sandstone, 9 percent siltstone, and 1 percent coal fragments); neutral; gradual wavy boundary.

C1—4 to 27 inches; yellowish brown (10YR 5/6) very channery sandy loam; massive; friable; common fine roots; about 60 percent rock fragments (90 percent sandstone, 5 percent siltstone, and 5 percent coal fragments); mildly alkaline; gradual wavy boundary.

C2—27 to 65 inches; yellowish brown (10YR 5/6) extremely channery sandy loam; massive; friable; about 65 percent rock fragments (95 percent sandstone and 5 percent siltstone); mildly alkaline.

The depth to bedrock is more than 60 inches. Reaction generally ranges from moderately acid to mildly alkaline. The surface layer of natural soil that was stockpiled and then spread over the surface, however, generally is strongly acid. The content of rock fragments ranges from 30 to 80 percent, by volume, throughout the profile. These fragments are 65 percent or more sandstone. A few are siltstone, shale, or coal fragments. The fragments are mostly channers, but stones and boulders are in some pedons.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. The C horizon has hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 1 to 6. It is friable or firm.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils that formed in acid material weathered from interbedded siltstone, shale, and sandstone. These soils are on ridgetops, plateaus, benches, and side slopes throughout the county. Slope ranges from 3 to 70 percent.

Gilpin soils are on the landscape with the somewhat excessively drained Itmann and Fiveblock soils; the well drained Cedarcreek, Dekalb, Guyandotte, Kaymine, Lily, Pineville, and Upshur soils; and the moderately well drained Buchanan and Fenwick soils. Gilpin soils contain less sand in the subsoil than the Lily soils. They are not so deep over bedrock as Buchanan, Cedarcreek, Fiveblock, Guyandotte, Itmann, Kaymine, Pineville, and Upshur soils. Buchanan soils have a fragipan. Fenwick and Buchanan soils have grayish mottles in the B horizon. Cedarcreek, Dekalb, Fiveblock, Guyandotte, Itmann, and Kaymine soils are loamy-skeletal.

Typical pedon of Gilpin silt loam, 15 to 35 percent slopes, stony, in a wooded area 30 feet east of County Road 19/20 and 1 mile north of Twentymile Creek Church:

Oi—3 inches to 1 inch; hardwood leaf litter.

Oe—1 inch to 0; decomposed leaves.

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

BA—3 to 11 inches; yellowish brown (10YR 5/4) silt loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; about 10 percent rock fragments; extremely acid; clear wavy boundary.

Bt1—11 to 21 inches; yellowish brown (10YR 5/6) channery silt loam; moderate medium subangular blocky structure; friable; common fine roots; common clay films on faces of peds; about 20 percent rock fragments; extremely acid; clear wavy boundary.

Bt2—21 to 27 inches; yellowish brown (10YR 5/6) channery loam; weak and moderate medium subangular blocky structure; friable; few fine roots; few clay films on faces of peds; about 25 percent rock fragments; extremely acid; clear wavy boundary.

C—27 to 34 inches; yellowish brown (10YR 5/6) very channery loam; massive; friable; occasional roots; about 40 percent rock fragments; extremely acid; clear smooth boundary.

R—34 inches; siltstone.

The thickness of the solum ranges from 20 to 34 inches. The depth to bedrock ranges from 20 to 40 inches. Shale, siltstone, and sandstone fragments make up 5 to 35 percent of individual horizons in the solum and 30 to 80 percent of the C horizon. In unlimed areas reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. The B and C horizons have hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. They are loam, silt loam, or silty clay loam in the fine-earth fraction. The B horizon has weak or moderate fine or medium subangular blocky structure. The C horizon is friable or firm.

Guyandotte Series

The Guyandotte series consists of very deep, well drained soils that formed in colluvial material. These soils are on north-facing mountain side slopes, on foot slopes, and in coves in the western and northern parts of the county. Slope ranges from 35 to 70 percent.

Guyandotte soils are on the landscape with the well drained Dekalb, Gilpin, and Pineville soils and the moderately well drained Buchanan soils. Dekalb and Gilpin soils are shallower over bedrock than the Guyandotte soils. Gilpin, Pineville, and Buchanan soils are fine-loamy.

Typical pedon of Guyandotte channery silt loam, in a wooded area of Gilpin-Pineville-Guyandotte association, very steep, very stony, about 1.9 miles east of

Twentymile Creek and 1.0 mile south of Hardway Branch:

Oi—2 inches to 1 inch; loose hardwood leaf litter.
Oe—1 inch to 0; partially decomposed leaf litter.
A1—0 to 5 inches; very dark brown (10YR 2/2) channery silt loam, very dark grayish brown (10YR 3/2) dry; weak fine and medium granular structure; very friable; many fine, medium, and coarse roots; about 20 percent rock fragments; neutral; clear wavy boundary.
A2—5 to 11 inches; dark brown (10YR 3/3) channery silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many fine, medium, and coarse roots; about 25 percent rock fragments; slightly acid; clear wavy boundary.
BA—11 to 14 inches; dark yellowish brown (10YR 4/4) very channery loam; weak medium subangular blocky structure; friable; many fine, medium, and coarse roots; about 40 percent rock fragments; slightly acid; clear wavy boundary.
Bw1—14 to 30 inches; yellowish brown (10YR 5/6) very channery loam; weak fine and medium subangular blocky structure; friable; common fine and medium roots; about 40 percent rock fragments; slightly acid; clear wavy boundary.
Bw2—30 to 52 inches; yellowish brown (10YR 5/6) very channery loam; weak coarse subangular blocky structure; friable; common fine and medium roots; about 55 percent rock fragments; slightly acid; clear wavy boundary.
BC—52 to 65 inches; yellowish brown (10YR 5/4) extremely channery loam; weak fine and medium subangular blocky structure; firm in place; few fine roots; about 75 percent rock fragments; slightly acid.

The thickness of the solum is 50 to more than 70 inches. The depth to bedrock is more than 60 inches. In unlimed areas reaction ranges from very strongly acid to neutral in the A horizon and from very strongly acid to moderately acid in the B and C horizons.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. The B horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is silt loam, loam, or sandy loam in the fine-earth fraction. It has weak fine to coarse subangular blocky structure. It is friable or firm.

Itmann Series

The Itmann series consists of very deep, somewhat excessively drained soils. These soils formed in an acid regolith of waste material derived from the processing of coal. The regolith is a mixture of partially weathered fine-earth material and fragments of bedrock. The rock fragments consist mainly of acid carboliths, but a few are siltstone, sandstone, or shale fragments. Slope ranges from 0 to 80 percent.

Itmann soils are on the landscape with the somewhat excessively drained Fiveblock soils; the well drained Cedarcreek, Gilpin, and Kaymine soils; and the moderately well drained Buchanan soils. The associated soils have fewer carbolithic rock fragments throughout than the Itmann soils. Gilpin and Buchanan soils are fine-loamy.

Typical pedon of Itmann channery sandy loam, very steep, in an idle field about 275 feet south of Buffalo Creek and 1,000 feet east of the Nicholas-Clay County line:

A—0 to 4 inches; very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) channery sandy loam; weak fine and medium granular structure; loose; about 30 percent rock fragments (60 percent carbolith fragments, 20 percent shale, and 20 percent siltstone); very strongly acid; clear wavy boundary.
C1—4 to 16 inches; black (N 2/0) very channery sandy loam; massive; dominantly loose but firm in a few pockets; about 50 percent rock fragments (70 percent carbolith fragments, 15 percent siltstone, and 15 percent shale); very strongly acid; gradual wavy boundary.
C2—16 to 65 inches; black (N 2/0) extremely channery sandy loam; common fine and medium yellow (10YR 7/8) and red (2.5YR 4/6) lithochromic mottles; massive; dominantly loose but firm in a few pockets; about 70 percent rock fragments (65 percent carbolith fragments, 25 percent shale, and 10 percent siltstone); extremely acid.

The depth to bedrock is more than 60 inches. Rock fragments of carbolith, shale, siltstone, and sandstone make up 15 to 35 percent of the A horizon and 30 to 80 percent of the C horizon. Carboliths make up more than 60 percent of the total content of rock fragments. In unlimed areas reaction ranges from extremely acid to strongly acid.

The A and C horizons have hue of 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. The C horizon is loam or sandy loam in the fine-earth fraction. It is loose or very friable.

Kaymine Series

The Kaymine series consists of very deep, well drained soils that formed in material partially weathered from moderately acid to neutral siltstone, sandstone, shale, and coal fragments in surface-mined areas. These soils are on ridgetops, side slopes, and foot slopes. They are associated with most of the kinds of coal in the Kanawha and New River Formations. Slope ranges from 3 to 80 percent.

Kaymine soils are on the landscape with the somewhat excessively drained Itmann soils, the well drained Cedarcreek and Gilpin soils, and the moderately well drained Buchanan soils. Itmann soils have a higher content of carbolithic rock fragments throughout than the Kaymine soils. Cedarcreek soils do not have a moderately acid to neutral C horizon. Gilpin and Buchanan soils are fine-loamy.

Typical pedon of Kaymine channery loam, very steep, in an idle field about 1,200 feet east of Laurel Creek and 1,200 feet north of Nixon Branch:

A—0 to 2 inches; dark yellowish brown (10YR 4/4) channery loam; weak fine and medium granular structure; very friable; many fine roots; about 25 percent channers and pebbles (50 percent sandstone and 50 percent siltstone); slightly acid; clear smooth boundary.

C1—2 to 13 inches; yellowish brown (10YR 5/6) very channery loam; common fine, medium, and coarse yellowish brown (10YR 5/8) and yellowish red (5YR 5/6) lithochromic mottles; massive; friable and firm; common fine roots; about 40 percent channers (60 percent siltstone and 40 percent sandstone); moderately acid; clear wavy boundary.

C2—13 to 31 inches; yellowish brown (10YR 5/6) very channery loam; common fine, medium, and coarse yellowish brown (10YR 5/8), yellowish red (5YR 5/6), and gray (10YR 6/1) lithochromic mottles; massive; firm; few fine roots to a depth of about 31 inches; about 40 percent channers (50 percent sandstone and 50 percent siltstone); moderately acid; gradual wavy boundary.

C3—31 to 65 inches; yellowish brown (10YR 5/6) very channery loam; common fine, medium, and coarse yellowish brown (10YR 5/8), yellowish red (5YR 5/6), and gray (10YR 6/1) lithochromic mottles; massive; firm; about 35 percent channers and stones (55 percent siltstone and 45 percent sandstone); moderately acid.

The depth to bedrock is more than 60 inches. In unlimed areas reaction ranges from moderately acid to neutral. The content of rock fragments ranges from 15 to 60 percent, by volume, in the A horizon and from 30 to 65 percent in the C horizon. These fragments are siltstone, sandstone, shale, or coal. The percentage of each is less than 65 percent of the total content of rock fragments in the control section. The fragments are mostly channers, but stones and a few boulders are in some pedons. Lithochromic mottles in shades of red, brown, yellow, or gray are in some or all horizons.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The C horizon has hue of 10YR, value of 2 to 6, and chroma of 1 to 8. It is loam or silt loam in the fine-earth fraction. It is friable or firm.

Lily Series

The Lily series consists of moderately deep, well drained soils that formed in acid material weathered from sandstone. These soils are on ridgetops throughout the county. Slope ranges from 3 to 35 percent.

Lily soils are on the landscape with the somewhat excessively drained Fiveblock soils; the well drained Cedarcreek, Dekalb, Gilpin, and Upshur soils; and the moderately well drained Fenwick soils. Fiveblock, Cedarcreek, and Dekalb soils are loamy-skeletal, and Upshur soils are fine textured. Gilpin soils have less sand in the subsoil than the Lily soils. Fenwick soils have grayish mottles in the B horizon.

Typical pedon of Lily loam, 3 to 8 percent slopes, in a white pine plantation about 100 feet west of U.S. Route 19, about 0.4 mile north of its intersection with West Virginia Route 24:

Oi—1¼ inches to ¼ inch; dominantly white pine needles.

Oe—¼ inch to 0; partially decomposed organic material.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam; weak medium and coarse subangular blocky structure parting to weak medium granular; firm; many fine, medium, and coarse roots; about 5 percent sandstone fragments; strongly acid; abrupt smooth boundary.

BA—7 to 10 inches; yellowish brown (10YR 5/4) loam; weak medium and coarse subangular blocky structure; friable; many fine and medium roots; about 5 percent sandstone fragments; very strongly acid; clear wavy boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/6) loam; moderate medium and fine subangular blocky structure; friable; many fine and medium roots; few clay films around pores and bridging sand grains; about 5 percent sandstone fragments; very strongly acid; clear wavy boundary.

Bt2—14 to 18 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; firm; common fine and medium roots; few clay films around pores and on faces of peds; about 10 percent sandstone fragments; very strongly acid; gradual wavy boundary.

Bt3—18 to 25 inches; yellowish brown (10YR 5/6) channery loam; moderate fine and medium subangular blocky structure; firm; few fine roots; few clay films around pores and on faces of peds; about 25 percent sandstone fragments; very strongly acid; gradual wavy boundary.

C—25 to 28 inches; brownish yellow (10YR 6/6) channery loam; massive; firm; occasional roots; about 30 percent sandstone fragments; very strongly acid; clear wavy boundary.

R—28 inches; variegated brown, yellowish brown, and strong brown sandstone.

The thickness of the solum ranges from 20 to 32 inches. The depth to sandstone bedrock ranges from 20 to 40 inches. Sandstone fragments make up 5 to 25 percent of the solum and 10 to 35 percent of the C horizon. In unlimed areas reaction ranges from extremely acid to strongly acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 2 to 4. The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is loam or clay loam in the fine-earth fraction. It has weak or moderate fine or medium subangular blocky structure. It is friable or firm. The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is sandy loam, loamy sand, fine sandy loam, or loam in the fine-earth fraction. It is friable or firm.

Monongahela Series

The Monongahela series consists of very deep, moderately well drained soils that formed in alluvial material washed mainly from acid areas on uplands. These soils are on terraces, mainly along Peters Creek, Muddlety Creek, Glade Creek, Meadow Creek, and their tributaries. Slope ranges from 3 to 8 percent.

Monongahela soils are on the landscape with the well drained Chavies, Craigsville, and Pope soils; the moderately well drained Cotaco soils; and the poorly drained Elkins and Purdy soils. Elkins and Purdy soils have a gleyed B horizon. Chavies and Pope soils are coarse-loamy, and Craigsville soils are loamy-skeletal.

Typical pedon of Monongahela silt loam, 3 to 8 percent slopes, near Lockwood, in a hayfield about 300 feet southeast of Fairview Baptist Church:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; weak medium granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

BA—8 to 11 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.

Bt1—11 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; many fine and medium roots; common clay films on faces of peds; few fine concretions of iron and manganese oxide; strongly acid; clear wavy boundary.

Bt2—23 to 29 inches; yellowish brown (10YR 5/6) silty clay loam; common fine light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; common fine roots; common clay films on faces of peds; common fine concretions of iron and manganese oxide; strongly acid; clear wavy boundary.

Btx1—29 to 39 inches; brownish yellow (10YR 6/6) silt loam; common fine and medium light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; weak very coarse prismatic structure; firm; brittle; few clay films on faces of peds; many fine concretions of iron and manganese oxide; strongly acid; gradual wavy boundary.

Btx2—39 to 65 inches; brownish yellow (10YR 6/6) silt loam; common fine and medium light brownish gray (2.5Y 6/2) and yellowish red (5YR 5/8) mottles; weak very coarse prismatic structure; very firm; brittle; few clay films on faces of peds; many fine concretions of iron and manganese oxide; strongly acid.

The thickness of the solum ranges from 40 to 72 inches. The depth to bedrock is more than 60 inches. Rounded pebbles make up 0 to 15 percent of the solum. In unlimed areas reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The BA and Bt horizons have hue of 10YR, value of 5 or 6, and chroma of 4 to 8. They are silt loam, loam, or silty clay loam in the fine-earth fraction. They have weak or moderate fine or medium subangular blocky structure. The Btx horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 8. It is silt loam or loam in the fine-earth fraction. It is firm or very firm.

Pineville Series

The Pineville series consists of very deep, well drained soils that formed in acid material. These soils are in mountain coves, on the lower side slopes, and on foot slopes. Slope ranges from 35 to 70 percent.

Pineville soils are on the landscape with the well drained Dekalb, Gilpin, and Guyandotte soils and the moderately well drained Buchanan soils. Dekalb and

Guyandotte soils are loamy-skeletal. Gilpin soils are shallower than the Pineville soils. Buchanan soils have a fragipan.

Typical pedon of Pineville channery silt loam, in a wooded area of Gilpin-Pineville-Guyandotte association, very steep, very stony, about 10 feet north of Vaughn Hollow Road, 0.7 mile northeast of West Virginia Route 39, and 0.9 mile west of the head of Line Branch:

Oi—1 inch to 0; loose hardwood leaf litter.

A—0 to 4 inches; dark brown (10YR 3/3) channery silt loam; weak fine and medium granular structure; very friable; many medium and coarse roots; about 20 percent rock fragments; very strongly acid; clear wavy boundary.

BA—4 to 10 inches; yellowish brown (10YR 5/4) channery loam; weak fine subangular blocky structure; friable; many medium and coarse roots; about 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/6) channery loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; few distinct clay films on faces of peds; about 25 percent rock fragments; very strongly acid; gradual wavy boundary.

Bt2—20 to 42 inches; yellowish brown (10YR 5/6) channery loam; weak coarse subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; about 30 percent rock fragments; very strongly acid; clear wavy boundary.

Bt3—42 to 53 inches; yellowish brown (10YR 5/6) very channery loam; weak medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; about 45 percent rock fragments; very strongly acid; clear wavy boundary.

C—53 to 65 inches; yellowish brown (10YR 5/6) and brownish yellow (10YR 6/8) very channery loam; common medium light brownish gray (10YR 6/2) mottles; massive; firm in place; few fine roots; about 55 percent rock fragments; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 60 inches. Rock fragments, mainly sandstone, make up 15 to 45 percent of the solum and 35 to 60 percent of the C horizon. In unlimed areas reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam or clay loam in the fine-earth fraction. It has weak or moderate fine to coarse subangular blocky structure. It is friable or firm. The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 to 8. It is loam or sandy loam in the fine-earth fraction.

Pope Series

The Pope series consists of very deep, well drained soils that formed in alluvial material washed from acid soil material on uplands. These soils are on nearly level flood plains along small streams throughout the county. Slope ranges from 0 to 3 percent.

Pope soils are on the landscape with the well drained Chavies and Craigsville soils and the moderately well drained Monongahela soils. Chavies soils are flooded less frequently than the Pope soils. Craigsville soils are loamy-skeletal, and Monongahela soils are fine-loamy.

Typical pedon of Pope sandy loam, in an area of Pope-Craigsville complex, in an idle field about 50 feet south of Twentymile Creek and 450 feet west of the intersection of Twentymile Creek Road and Jerry Fork Road:

Oi—1 inch to 0; hardwood leaf litter.

Ap1—0 to 4 inches; dark brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many fine and medium roots; extremely acid; abrupt smooth boundary.

Ap2—4 to 7 inches; dark brown (10YR 3/3) sandy loam; weak medium subangular blocky structure parting to weak fine granular; very friable; many fine and medium roots; extremely acid; abrupt smooth boundary.

Bw1—7 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium and coarse subangular blocky structure; very friable; many fine roots; extremely acid; abrupt smooth boundary.

Bw2—12 to 20 inches; dark brown (10YR 4/3) sandy loam; weak medium and coarse subangular blocky structure; very friable; many fine roots; extremely acid; abrupt smooth boundary.

Bw3—20 to 32 inches; yellowish brown (10YR 5/6) sandy loam; weak medium and coarse subangular blocky structure; very friable; common fine roots; extremely acid; abrupt wavy boundary.

C—32 to 65 inches; yellowish brown (10YR 5/6) very gravelly sandy loam; single grained; loose; few fine roots; about 55 percent rounded gravel; extremely acid.

The thickness of the solum ranges from 30 to 40 inches. The depth to bedrock is more than 60 inches. In unlimed areas reaction is very strongly acid or extremely acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. The B horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam or fine sandy loam in the fine-earth fraction. It has weak medium or coarse subangular blocky structure.

Purdy Series

The Purdy series consists of very deep, poorly drained and very poorly drained soils that formed in slack-water deposits washed from areas on uplands. These soils are on terraces, mainly along Muddlety Creek, Beaver Creek, Glade Creek, and Meadow Creek. Slope ranges from 0 to 5 percent.

Purdy soils are on the landscape with the moderately well drained Cotaco and Monongahela soils and the poorly drained Elkins soils. Cotaco and Monongahela soils do not have a gleyed B horizon. Elkins soils do not have an argillic horizon.

Typical pedon of Purdy silt loam, 0 to 5 percent slopes, in a meadow about 200 feet south of West Virginia Route 41, about 1,100 feet west of its intersection with County Road 10:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; few fine yellowish brown (10YR 5/6) and brown (10YR 5/3) mottles; weak coarse subangular blocky structure parting to weak fine granular; friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

BAg—8 to 12 inches; grayish brown (2.5Y 5/2) silt loam; common fine olive yellow (2.5Y 6/8) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; very strongly acid; clear wavy boundary.

Btg—12 to 40 inches; olive gray (5Y 5/2) silty clay; many medium strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; very sticky and very plastic; few fine roots; continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.

Cg—40 to 65 inches; olive gray (5Y 5/2) silty clay; many medium strong brown (7.5YR 5/8) mottles; massive; very sticky and very plastic; extremely acid.

The thickness of the solum ranges from 28 to 40 inches. The depth to bedrock is more than 60 inches. In unlimed areas reaction is very strongly acid or extremely acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The BA horizon has hue of 2.5Y or 5Y or is neutral in hue. It has value of 4 or 5 and chroma of 0 to 2. It is silt loam or silty clay loam. It is friable or firm. The Bt horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 1 or 2. It is silty clay loam or silty clay in the fine-earth fraction. It has weak medium or coarse prismatic or subangular blocky structure. It is sticky and plastic or very sticky and very plastic. The Cg horizon has hue of 5Y, value of 5 or 6, and chroma of 1 or 2.

Udorthents

Udorthents are shallow to very deep soils that consist of a mixture of soil material and rock fragments. They are in areas where the landscape has been drastically disturbed. The Udorthents in Nicholas County are along highways and railroads, on mining and construction sites, and in other areas that have been excavated or filled. Slope ranges from 3 percent to nearly vertical.

These soils cannot be represented by a typical pedon because of their variability. The depth to bedrock is generally more than 40 inches but ranges from 2 inches to more than 6 feet. The rock fragments range widely in kind, size, and amount. In unlimed areas reaction is extremely acid or very strongly acid.

The A and C horizons have hue of 7.5YR to 2.5Y, value of 2 to 6, and chroma of 4 to 8. Low chromas are lithochromic. The fine-earth fraction is sandy loam, loam, silt loam, clay loam, or silty clay loam.

Upshur Series

The Upshur series consists of deep, well drained soils that formed in limy material weathered mainly from red clay shale. These soils are on the tops of ridges in the northern part of the county. Slope ranges from 15 to 35 percent.

Upshur soils are on the landscape with the well drained Gilpin and Lily soils. Gilpin and Lily soils are fine-loamy. They are shallower than the Upshur soils.

Typical pedon of Upshur silt loam, in a wooded area of Gilpin-Upshur silt loams, 15 to 25 percent slopes, about 40 feet west of Runnion Ridge Road (County Road 1/2) and 0.2 mile south of the Braxton-Nicholas County line:

Oi—3 inches to 1 inch; hardwood leaf litter.

Oe—1 inch to 0; decomposed leaves.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; many fine and medium roots; slightly acid; abrupt wavy boundary.

Bt1—5 to 15 inches; reddish brown (5YR 4/4) silty clay; strong medium angular and subangular blocky structure; firm; many fine and medium roots;

continuous clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—15 to 27 inches; dark reddish brown (2.5YR 3/4) clay; strong medium angular and subangular blocky structure; firm; many fine roots; continuous clay films on faces of peds; very strongly acid; clear wavy boundary.

BC—27 to 36 inches; reddish brown (2.5YR 4/4) channery silty clay; weak medium subangular blocky structure; friable; common fine roots; many clay films on faces of peds; about 20 percent siltstone fragments; very strongly acid; gradual wavy boundary.

C—36 to 47 inches; dark reddish brown (2.5YR 3/4) channery silty clay that has pale yellow (5Y 7/4) streaks; massive; friable; few fine roots; about 30 percent siltstone and shale fragments; slightly acid; clear wavy boundary.

Cr—47 inches; soft, weathered clay shale and siltstone.

The thickness of the solum ranges from 26 to 36 inches. The depth to bedrock ranges from 40 to 60 inches. The content of shale and siltstone fragments is 0 to 10 percent in the A horizon and in the upper part of the Bt horizon, 0 to 25 percent in the lower part of the Bt horizon and in the BC horizon, and 10 to 50 percent in the C horizon. In unlimed areas reaction ranges from very strongly acid to slightly acid in the solum and from strongly acid to slightly acid in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. The B and C horizons have hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 to 6. They are silty clay or clay in the fine-earth fraction. They are friable or firm. The B horizon has moderate or strong medium angular or subangular blocky structure.

Formation of the Soils

The origin and development of the soils in Nicholas County are explained in this section. The five major factors of soil formation are identified, and their influence on the soils in the county is described. Also described are the morphology of the soils as related to horizon nomenclature, the processes involved in horizon development, and the geological characteristics of the county.

Factors of Soil Formation

The soils in Nicholas County formed as a result of the interaction of the five major factors of soil formation—parent material, time, climate, living organisms, and topography *(5)*. Each factor modifies the effect of the others. Parent material, topography, and time have resulted in the major differences among the soils in the county. Climate and living organisms generally influence soil formation uniformly over broad areas.

Parent Material, Time, and Climate

The character of the parent material strongly influences the time required for soil formation and the nature of the soil that forms. The soils of the county formed in residual, colluvial, and alluvial parent materials. Most formed in material weathered from interbedded shale, siltstone, and sandstone. For example, Gilpin soils formed in material weathered from interbedded shale, siltstone, and fine grained sandstone; Lily soils formed in material weathered from sandstone; and Upshur soils formed in material weathered from shale.

The residuum is the oldest parent material in the county. Soil formation has been retarded by resistant rock, by the slope, and by constant soil erosion. Consequently, the profile of some of the soils that formed in residual material is less well developed than that in some of the soils that formed in younger material.

Colluvial material is along foot slopes, on side slopes, and at the head of drainageways. This material moved downslope from areas of the residual soils. Buchanan, Guyandotte, and Pineville soils formed in colluvium below areas of Dekalb and Gilpin soils.

The parent material on terraces and flood plains was washed from soils on uplands. The soil-forming processes have had considerable time to act on the material on terraces. Many additions, losses, and alterations have taken place. The resulting soils, such as Cotaco and Monongahela soils, are strongly leached and have a moderately well developed profile.

The alluvium on low flood plains is the youngest parent material in the county. Most of this material is well suited to soil formation, but the soil-forming processes have had little time to act. The soils on flood plains generally have a weakly developed profile. Pope, Craigsville, and Elkins are examples.

Differences in climate occur among the western, central, and eastern parts of the county, but they are not significant enough to have noticeable effects on soil formation. Therefore, climate is not responsible for major differences among the soils in the county. Rainfall and temperature, however, have a general influence on the development of layers in the soil profile. A detailed description of climate is given in the section "General Nature of the County."

Living Organisms

Living organisms, including plants, animals, bacteria, fungi, and humans, affect soil formation. The kind and amount of vegetation are generally responsible for the content of organic matter and color of the surface layer and are partly responsible for the content of nutrients. Earthworms and burrowing animals help to keep the soil open and porous. They mix organic material with mineral material by moving soil to the surface. Bacteria and fungi decompose organic matter, thus releasing plant nutrients.

Human activities also influence soil formation. The characteristics of the surface layer are affected by activities that disturb the surface, such as clearing the forest, plowing, and mining. Human activities have added fertilizer, mixed some of the soil horizons, and moved soil from place to place. On more than 14,000 acres in this county, the soils have been disturbed by surface mining of coal. The original soils and some of the underlying bedrock have been excavated and mixed, and then the mined areas have been reclaimed. The resulting young soils exhibit little evidence of soil formation, except in the surface layer.

Topography

Topography affects soil formation through its effect on the amount of water moving through the soil, the amount and rate of runoff, and the rate of erosion. Large amounts of water have moved through gently sloping and strongly sloping soils. This movement of water favors the formation of deep soils that have a moderately developed or well developed profile. On steep and very steep mountain side slopes, less water moves through the profile and the amount and rate of runoff are greater. Also, the soil material may be washed away almost as rapidly as a soil forms. Thus, it is likely that some of the steeper soils will be more shallow over bedrock than the soils on the more gentle slopes.

The topography in this county favors the formation of soils on flood plains and terraces, and formation is progressing at a rather rapid rate. Soils on low flood plains are weakly developed, however, mainly because too little time has elapsed since the material was deposited.

Morphology of Soils

The results of the soil-forming processes are evident in the different layers, or horizons, in the soil profile. The profile extends from the surface downward to material that is little changed by the soil-forming processes. Most soils have three major horizons, called the A, B, and C horizons.

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

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, and other compounds leached from the surface layer. It generally has blocky structure and is firmer and lighter in color than the A horizon.

The C horizon is below the A and B horizons. It consists of material that has been modified by weathering but has been altered little by the soil-forming processes.

In Nicholas County many processes have been involved in the formation of soil horizons. The more important of these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation and translocation of clay minerals, and the formation of soil structure. These processes are continuous and have been taking place for thousands of years.

Most of the well drained and moderately well drained soils on uplands in the county have a yellowish brown B horizon. This color is caused mainly by iron oxides. The B horizon generally has blocky structure and translocated clay minerals.

A fragipan has formed in the B horizon of the moderately well drained Buchanan soils on foot slopes and side slopes and in the B horizon of Monongahela soils on terraces. This layer is dense and brittle, mottled, and moderately slowly permeable or slowly permeable. Most fragipans are yellowish brown and are mottled with gray. The gray mottles result from the reduction of iron during soil formation.

Geology

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

All of the surface rocks in Nicholas County are sedimentary in origin and occur as cyclic deposits of sandstone, siltstone, shale, and coal of Pennsylvanian age, except for a small outcrop of Mississippian-age material at Richwood *(8)*.

Most of the exposed rock is part of the Allegheny, Kanawha, and New River Formations. The Conemaugh Group is exposed in a small area on ridgetops in the northern part of the county. Although there is little local folding, a somewhat sharp, nearly uninterrupted southeastward rise in the strata has resulted in three distinct areas with somewhat differing geologic features.

The northwestern part of the county, bordering Clay and Kanawha Counties, is an area of rugged mountains drained by Twentymile Creek. Sandstone, siltstone, and shale of the Allegheny and Kanawha Formations form steep, narrow ridgetops and long, steep side slopes. Numerous coal seams have been extensively mined in this part of the county. They include the Lower Freeport, Upper Kittaning, Middle Kittaning, Lower Kittaning (No. 5 Block), Chilton, Alma, Campbells Creek (Peerless Bench and No. 2 Gas), Eagle, and Little Eagle coals. Gilpin, Pineville, Lily, Guyandotte, Buchanan, Cedarcreek, and Kaymine soils are dominant in this area.

The central part of the county is an area of rolling hills and moderately wide valleys drained by Meadow Creek, Glade Creek, and Beaver Creek. Rocks of the lower Kanawha Formation form low, rolling hills that have slow-moving streams. This area is underlain mostly by siltstone, shale, and sandstone. Gilbert coal is extensively mined in this area. Gilpin, Buchanan, and

Kaymine soils are dominant in the area.

The southeastern part of the county, bordering Webster and Greenbrier Counties, is an area of rugged mountains drained by the Gauley River, the Cherry River, Hominy Creek, and Anglins Creek. Sandstone, siltstone, and shale of the New River Formation form moderately wide ridgetops and steep side slopes. Sewell and Fire Creek coals are the only minable seams in this area. Gilpin and Buchanan soils are dominant in the area.

The youngest rocks in the county are exposed in the extreme northern part of the county, in an area along the Braxton County line where the lower part of the Conemaugh Formation caps the ridgetops. Gilpin, Buchanan, and Upshur soils formed in material weathered from siltstone, shale, and sandstone in this area. The side slopes in the area are primarily of the Allegheny and Kanawha Formations.

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Glossary

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

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

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

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

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:

Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Base saturation. The degree to which material having 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 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.

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

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

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

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material, 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.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Congeliturbate. Soil material disturbed by frost action.

Conservation tillage. A tillage and planting system in which crop residue covers at least 30 percent of the soil surface after planting. Where soil erosion by wind is the main concern, the system leaves the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

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.

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

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

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

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

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

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

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of 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.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

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.

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.

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

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

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.

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.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

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.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

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.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

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.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

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 substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. 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.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1967-80 at Summersville Lake, West Virginia)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	38.4	17.7	28.1	67	-14	71	3.51	1.98	4.85	9	20.1
February----	40.7	18.1	29.4	71	-11	53	2.36	1.17	3.39	7	12.7
March-------	52.7	28.6	40.7	80	3	172	3.56	2.38	4.62	8	6.5
April-------	63.9	38.4	51.2	85	20	336	3.81	2.32	5.14	10	.4
May---------	72.0	46.6	59.3	89	28	598	4.52	2.83	6.03	10	.0
June--------	78.1	54.4	66.3	90	39	789	4.26	3.08	5.34	9	.0
July--------	81.4	58.7	70.1	91	44	933	5.89	4.64	7.06	10	.0
August------	81.0	58.3	69.7	90	45	921	5.05	3.64	6.35	8	.0
September---	75.5	52.3	63.9	89	34	717	3.39	2.08	4.57	7	.0
October-----	64.4	40.1	52.3	82	20	397	3.63	2.13	4.96	7	.2
November----	52.8	31.5	42.2	78	10	145	2.95	1.87	3.92	7	2.5
December----	44.6	24.2	34.4	70	2	71	3.65	1.98	5.11	8	7.4
Yearly:											
Average---	62.1	39.1	50.6	---	---	---	---	---	---	---	---
Extreme---	---	---	---	92	-16	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,203	46.58	40.67	52.27	100	49.8

* 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 1967-80 at Summersville Lake, 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--	Apr. 17	May 6	May 16
2 years in 10 later than--	Apr. 13	May 1	May 12
5 years in 10 later than--	Apr. 5	Apr. 22	May 4
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 13	Oct. 7	Sept. 30
2 years in 10 earlier than--	Oct. 20	Oct. 12	Oct. 4
5 years in 10 earlier than--	Nov. 3	Oct. 21	Oct. 10

TABLE 3.--GROWING SEASON

(Recorded in the period 1967-80 at Summersville Lake, West Virginia)

Probability	Daily minimum temperature during growing season		
	Higher than 24 ^{o}F	Higher than 28 ^{o}F	Higher than 32 ^{o}F
	Days	Days	Days
9 years in 10	184	158	143
8 years in 10	193	166	148
5 years in 10	212	181	158
2 years in 10	230	195	168
1 year in 10	239	203	173

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BuB	Buchanan loam, 3 to 8 percent slopes	300	0.1
BuC	Buchanan loam, 8 to 15 percent slopes	4,270	1.0
BuD	Buchanan loam, 15 to 25 percent slopes	2,000	0.5
BvC	Buchanan channery fine sandy loam, 8 to 15 percent slopes, very stony	6,380	1.5
BvE	Buchanan channery fine sandy loam, 15 to 35 percent slopes, very stony	57,500	13.8
CeF	Cedarcreek channery loam, very steep	4,810	1.2
ChB	Chavies fine sandy loam, 2 to 6 percent slopes	1,270	0.3
CoB	Cotaco silt loam, 3 to 8 percent slopes	1,220	0.3
Cr	Craigsville gravelly sandy loam, 0 to 5 percent slopes	2,170	0.5
DeC	Dekalb channery sandy loam, 3 to 15 percent slopes, very stony	2,000	0.5
DeE	Dekalb channery sandy loam, 15 to 35 percent slopes, very stony	10,890	2.6
DeF	Dekalb channery sandy loam, 35 to 70 percent slopes, very stony	12,220	2.9
DRF	Dekalb-Buchanan-Rock outcrop association, very steep	7,360	1.8
Ed	Elkins silt loam, drained	3,050	0.7
Ep	Elkins silt loam, ponded	790	0.2
FeB	Fenwick silt loam, 3 to 8 percent slopes	2,560	0.6
FeC	Fenwick silt loam, 8 to 15 percent slopes	540	0.1
FvB	Fiveblock channery sandy loam, 3 to 8 percent slopes	860	0.2
FvF	Fiveblock channery sandy loam, very steep	1,380	0.3
GlB	Gilpin silt loam, 3 to 8 percent slopes	3,540	0.9
GlC	Gilpin silt loam, 8 to 15 percent slopes	18,770	4.5
GlD	Gilpin silt loam, 15 to 25 percent slopes	10,050	2.4
GlE	Gilpin silt loam, 25 to 35 percent slopes	12,590	3.0
GlF	Gilpin silt loam, 35 to 70 percent slopes	22,960	5.5
GnC	Gilpin silt loam, 3 to 15 percent slopes, stony	9,190	2.2
GnE	Gilpin silt loam, 15 to 35 percent slopes, stony	35,180	8.5
GnF	Gilpin silt loam, 35 to 70 percent slopes, stony	47,550	11.4
GoF	Gilpin-Buchanan complex, 35 to 70 percent slopes, very stony	21,420	5.2
GPF	Gilpin-Pineville-Guyandotte association, very steep, very stony	64,080	15.5
GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	1,120	0.3
GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	380	0.1
ItF	Itmann channery sandy loam, very steep	1,300	0.3
KaB	Kaymine channery loam, 3 to 8 percent slopes	510	0.1
KaF	Kaymine channery loam, very steep	5,580	1.3
LlB	Lily loam, 3 to 8 percent slopes	1,940	0.5
LlC	Lily loam, 8 to 15 percent slopes	8,770	2.1
LlD	Lily loam, 15 to 25 percent slopes	13,710	3.3
LlE	Lily loam, 25 to 35 percent slopes	3,730	0.9
MoB	Monongahela silt loam, 3 to 8 percent slopes	400	0.1
Pc	Pope-Craigsville complex	3,480	0.8
Pu	Purdy silt loam, 0 to 5 percent slopes	700	0.2
Ud	Udorthents, smoothed	3,000	0.7
	Water	4,480	1.1
	Total	416,000	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
BuB	Buchanan loam, 3 to 8 percent slopes
ChB	Chavies fine sandy loam, 2 to 6 percent slopes
Ed	Elkins silt loam, drained
FeB	Fenwick silt loam, 3 to 8 percent slopes
GlB	Gilpin silt loam, 3 to 8 percent slopes
LlB	Lily loam, 3 to 8 percent slopes
Pc	Pope-Craigsville complex

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Wheat	Grass-legume hay	Alfalfa hay	Oats	Kentucky bluegrass
		Bu	Bu	Tons	Tons	Bu	AUM*
BuB------------- Buchanan	IIe	100	40	3.0	3.5	65	4.5
BuC------------- Buchanan	IIIe	90	35	3.0	3.5	60	4.5
BuD------------- Buchanan	IVe	85	35	2.5	3.0	60	4.0
BvC------------- Buchanan	VIs	---	---	---	---	---	3.5
BvE------------- Buchanan	VIIs	---	---	---	---	---	3.0
CeF------------- Cedarcreek	VIIs	---	---	---	---	---	---
ChB------------- Chavies	IIe	115	45	3.5	5.0	70	5.0
CoB------------- Cotaco	IIe	110	35	3.0	3.5	65	4.5
Cr-------------- Craigsville	IIs	70	25	1.5	2.0	45	4.5
DeC------------- Dekalb	VIs	---	---	---	---	---	---
DeE, DeF-------- Dekalb	VIIs	---	---	---	---	---	---
DRF**:							
Dekalb---------	VIIs	---	---	---	---	---	---
Buchanan-------	VIIs	---	---	---	---	---	---
Rock outcrop.							
Ed-------------- Elkins	IIIw	100	---	3.0	---	60	4.5
Ep-------------- Elkins	Vw	---	---	---	---	---	---
FeB------------- Fenwick	IIe	100	40	3.0	3.5	65	4.5
FeC------------- Fenwick	IIIe	90	35	3.0	3.5	60	4.5
FvB------------- Fiveblock	VIIs	---	---	---	---	---	---
FvF------------- Fiveblock	VIIs	---	---	---	---	---	---

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Grass-legume hay	Alfalfa hay	Oats	Kentucky bluegrass
		Bu	Bu	Tons	Tons	Bu	AUM*
GlB------------- Gilpin	IIe	90	40	3.0	3.5	65	4.5
GlC------------- Gilpin	IIIe	85	35	3.0	3.5	60	4.5
GlD------------- Gilpin	IVe	80	30	2.5	3.0	55	4.0
GlE------------- Gilpin	VIe	---	---	---	---	---	3.0
GlF------------- Gilpin	VIIe	---	---	---	---	---	---
GnC------------- Gilpin	VIs	---	---	---	---	---	---
GnE, GnF-------- Gilpin	VIIs	---	---	---	---	---	---
GoF------------- Gilpin-Buchanan	VIIs	---	---	---	---	---	---
GPF------------- Gilpin-Pineville-Guyandotte	VIIs	---	---	---	---	---	---
GuD------------- Gilpin-Upshur	IVe	80	30	2.5	3.0	55	4.0
GuE------------- Gilpin-Upshur	VIe	---	---	---	---	---	3.5
ItF------------- Itmann	VIIs	---	---	---	---	---	---
KaB, KaF-------- Kaymine	VIIs	---	---	---	---	---	---
LlB------------- Lily	IIe	95	40	3.5	3.5	65	4.5
LlC------------- Lily	IIIe	85	35	3.0	3.0	60	4.5
LlD------------- Lily	IVe	70	30	2.5	3.0	55	4.0
LlE------------- Lily	VIe	---	---	---	---	---	3.0
MoB------------- Monongahela	IIe	100	40	3.0	3.5	65	4.5
Pc-------------- Pope-Craigsville	IIIw	80	30	3.0	2.5	50	3.5

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Grass-legume hay	Alfalfa hay	Oats	Kentucky bluegrass
		Bu	Bu	Tons	Tons	Bu	AUM*
Pu--------------- Purdy	IVw	80	---	2.5	---	55	4.0
Ud. Udorthents							

* 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	---	---	---	---
II	13,400	11,230	---	2,170
III	38,880	32,350	6,530	---
IV	27,580	26,880	700	---
V	790	---	790	---
VI	34,270	16,700	---	17,570
VII	293,600	22,960	---	270,640
VIII	---	---	---	---

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	Ordi-nation symbol	Management concerns: Erosion hazard	Management concerns: Equip-ment limita-tion	Management concerns: Seedling mortal-ity	Management concerns: Plant competi-tion	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
BuB, BuC-------- Buchanan	4A	Slight	Slight	Slight	Severe	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	90	90	440	1.04
BuD------------- Buchanan	4R	Moderate	Moderate	Slight	Severe	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	90	90	440	1.04
BvC------------- Buchanan	4X	Slight	Moderate	Slight	Severe	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	90	90	440	1.04
BvE------------- Buchanan	4R	Moderate	Moderate	Slight	Severe	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	90	90	440	1.04
CeF------------- Cedarcreek	4R	Severe	Severe	Severe	Moderate	Northern red oak----	80	62	250	0.81
						Eastern white pine--	94	---	---	---
						Yellow poplar-------	105	115	650	1.32
						American sycamore---	90	---	---	---
						Black locust--------	---	---	---	---
ChB------------- Chavies	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	93	95	482	1.10
						Black walnut--------	---	---	---	---
						Black cherry--------	---	---	---	---
						Sugar maple---------	---	---	---	---
						Red maple-----------	---	---	---	---
						Hickory-------------	---	---	---	---
						White oak-----------	---	---	---	---
						American sycamore---	---	---	---	---
CoB------------- Cotaco	5A	Slight	Slight	Slight	Moderate	Black oak-----------	87	69	299	0.91
						Yellow poplar-------	95	98	510	1.14
						Sweet birch---------	---	---	---	---
Cr-------------- Craigsville	4F	Slight	Slight	Moderate	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						Eastern white pine--	90	---	---	---
						Virginia pine-------	80	---	---	---
						Sweetgum------------	---	---	---	---
DeC------------- Dekalb	3X	Slight	Moderate	Moderate	Moderate	Northern red oak----	66	48	152	0.61
						Chestnut oak--------	61	44	117	0.54
						Scarlet oak---------	70	52	180	0.67
						Red maple-----------	---	---	---	---
DeE------------- Dekalb (north aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	75	57	215	0.74
						Chestnut oak--------	76	58	222	0.75
						Scarlet oak---------	76	58	222	0.75
						Red maple-----------	---	---	---	---
DeE------------- Dekalb (south aspect)	3R	Moderate	Moderate	Severe	Moderate	Northern red oak----	66	48	152	0.61
						Chestnut oak--------	61	44	117	0.54
						Scarlet oak---------	70	52	180	0.67
						Red maple-----------	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Management concerns: Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Plant competi- tion	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/ ac	Board feet/ ac	Cords/ac
DeF------------- Dekalb (north aspect)	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	75	57	215	0.74
						Chestnut oak--------	76	58	222	0.75
						Scarlet oak---------	76	58	222	0.75
						Red maple-----------	---	---	---	---
DeF------------- Dekalb (south aspect)	3R	Severe	Severe	Severe	Moderate	Northern red oak----	66	48	152	0.61
						Chestnut oak--------	61	44	117	0.54
						Scarlet oak---------	70	52	180	0.67
						Red maple-----------	---	---	---	---
DRF**:										
Dekalb--------- (north aspect)	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	75	57	215	0.74
						Chestnut oak--------	76	58	222	0.75
						Scarlet oak---------	76	58	222	0.75
						White oak-----------	69	51	173	0.65
Buchanan------- (north aspect)	4R	Severe	Severe	Severe	Moderate	Northern red oak----	73	55	201	0.71
						Yellow poplar-------	90	72	320	0.95
Rock outcrop.										
DRF**:										
Dekalb--------- (south aspect)	3R	Severe	Severe	Severe	Moderate	Northern red oak----	66	48	152	0.61
						Chestnut oak--------	61	44	117	0.54
						Scarlet oak---------	70	52	180	0.67
						White oak-----------	71	53	187	0.68
Buchanan------- (south aspect)	4R	Severe	Severe	Severe	Moderate	Northern red oak----	73	55	201	0.71
						Yellow poplar-------	90	90	440	1.04
Rock outcrop.										
Ed-------------- Elkins	5W	Slight	Moderate	Severe	Severe	Pin oak-------------	94	76	355	1.02
						Yellow poplar-------	90	90	440	1.04
Ep-------------- Elkins	4W	Slight	Severe	Severe	Severe	Pin oak-------------	80	62	250	0.81
						Swamp white oak-----	---	---	---	---
FeB, FeC-------- Fenwick	4A	Slight	Slight	Slight	Moderate	Northern red oak----	75	57	215	0.74
						Black cherry--------	85	52	---	---
						Yellow poplar-------	90	90	440	1.04
						White ash-----------	85	111	---	---
						Sugar maple---------	80	50	---	---
FvB------------- Fiveblock	4X	Slight	Slight	Severe	Moderate	Northern red oak----	80	62	250	0.81
						Eastern white pine--	94	174	---	---
						Black locust--------	---	---	---	---
FvF------------- Fiveblock	4R	Severe	Severe	Severe	Moderate	Northern red oak----	80	62	250	0.81
						Eastern white pine--	94	174	---	---
						Black locust--------	---	---	---	---
GlB, GlC-------- Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
GlD------------- Gilpin (north aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						Hickory-------------	---	---	---	---
						White oak-----------	74	56	208	0.73

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/ac	Board feet/ac	Cords/ac
GlD------------- Gilpin (south aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	90	90	440	1.04
						White oak-----------	68	50	166	0.64
						Hickory-------------	---	---	---	---
GlE------------- Gilpin (north aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
GlE------------- Gilpin (south aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	90	90	440	1.04
						White oak-----------	68	50	166	0.64
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
GlF------------- Gilpin (north aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
GlF------------- Gilpin (south aspect)	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	90	90	440	1.04
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
GnC------------- Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
GnE------------- Gilpin (north aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
GnE------------- Gilpin (south aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	90	90	440	1.04
						White oak-----------	68	50	166	0.64
						Hickory-------------	---	---	---	---
GnF------------- Gilpin (north aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
GnF------------- Gilpin (south aspect)	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	90	90	440	1.04
						White oak-----------	68	50	166	0.64
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Management concerns: Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Plant competi- tion	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/ ac	Board feet/ ac	Cords/ac
GoF**:										
Gilpin--------- (north aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
Buchanan------- (north aspect)	4R	Severe	Moderate	Slight	Severe	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	90	90	440	1.04
GoF**:										
Gilpin--------- (south aspect)	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	90	90	440	1.04
						White oak-----------	68	50	166	0.64
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
Buchanan------- (south aspect)	4R	Severe	Moderate	Slight	Severe	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	90	90	440	1.04
GPF**:										
Gilpin--------- (north aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
						Black oak-----------	80	62	250	0.81
						Sugar maple---------	72	44	---	---
Pineville------ (north aspect)	5R	Severe	Severe	Slight	Severe	Northern red oak----	86	68	292	0.89
						Yellow poplar-------	108	121	692	1.38
						Black oak-----------	85	67	285	0.88
						Basswood------------	---	---	---	---
						Hickory-------------	---	---	---	---
Guyandotte----- (north aspect)	5R	Severe	Severe	Moderate	Severe	Northern red oak----	85	67	285	0.88
						American basswood---	99	---	---	---
						Yellow poplar-------	104	114	636	1.31
						Black cherry--------	86	53	---	---
						Black locust--------	85	---	---	---
GPF**:										
Gilpin--------- (south aspect)	4R	Severe	Severe	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	90	90	440	1.04
						White oak-----------	68	50	166	0.64
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
						Black oak-----------	74	56	208	0.73
						Sugar maple---------	68	42	---	---
Pineville------ (south aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	81	63	257	0.82
						Yellow poplar-------	88	86	416	0.99
						White oak-----------	75	57	215	0.74
						Black oak-----------	82	64	264	0.84
						Hickory-------------	---	---	---	---
Guyandotte----- (south aspect)	5R	Severe	Severe	Moderate	Severe	Northern red oak----	85	67	285	0.88
						American basswood---	99	---	---	---
						Yellow poplar-------	104	114	636	1.31
						Black cherry--------	86	53	---	---
						Black locust--------	85	---	---	---

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/ac	Board feet/ac	Cords/ac
GuD**:										
Gilpin--------- (north aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						Black locust--------	---	---	---	---
Upshur--------- (north aspect)	4R	Severe	Severe	Slight	Severe	Northern red oak----	76	58	222	0.75
						White oak-----------	67	49	159	0.63
						Hickory-------------	---	---	---	---
						Black locust--------	---	---	---	---
GuD**:										
Gilpin--------- (south aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	90	90	440	1.04
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						Black locust--------	---	---	---	---
Upshur--------- (south aspect)	3R	Severe	Severe	Slight	Moderate	Northern red oak----	60	43	110	0.52
						White oak-----------	59	42	105	0.51
						Hickory-------------	---	---	---	---
						Black locust--------	---	---	---	---
GuE**:										
Gilpin--------- (north aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						American beech------	---	---	---	---
						Black oak-----------	72	54	194	0.70
Upshur--------- (north aspect)	4R	Severe	Severe	Slight	Severe	Northern red oak----	76	58	222	0.75
						White oak-----------	67	49	159	0.63
						Hickory-------------	---	---	---	---
						Black locust--------	---	---	---	---
GuE**:										
Gilpin--------- (south aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	52	180	0.67
						White oak-----------	74	56	208	0.73
						Hickory-------------	---	---	---	---
						Black locust--------	72	54	194	0.70
Upshur--------- (south aspect)	3R	Severe	Severe	Slight	Moderate	Northern red oak----	60	43	110	0.52
						White oak-----------	60	43	110	0.52
						Hickory-------------	---	---	---	---
						Black locust--------	---	---	---	---
ItF------------- Itmann	---	Severe	Severe	Severe	Slight	--------------------	---	---	---	---
KaB------------- Kaymine	4X	Slight	Slight	Severe	Moderate	Northern red oak----	80	62	250	0.81
						Eastern white pine--	94	---	---	---
						Yellow poplar-------	105	115	650	1.32
						Black locust--------	---	---	---	---
						Black birch---------	---	---	---	---

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth*: Cubic feet/ac	Board feet/ac	Cords/ac
KaF------------- Kaymine	4R	Severe	Severe	Severe	Moderate	Northern red oak----	80	62	250	0.81
						Eastern white pine--	94	---	---	---
						Yellow poplar-------	105	115	650	1.32
						American sycamore---	90	---	---	---
						Black locust--------	---	---	---	---
						Black birch---------	---	---	---	---
LlB, LlC-------- Lily	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	62	250	0.81
						Black oak-----------	---	---	---	---
						White oak-----------	---	---	---	---
						Hickory-------------	---	---	---	---
						Red maple-----------	---	---	---	---
						Scarlet oak---------	64	47	138	0.58
						Chestnut oak--------	76	58	222	0.75
LlD, LlE-------- Lily	4R	Moderate	Moderate	Slight	Slight	Northern red oak----	80	62	250	0.81
						Black oak-----------	---	---	---	---
						White oak-----------	---	---	---	---
						Hickory-------------	---	---	---	---
						Red maple-----------	---	---	---	---
						Scarlet oak---------	64	47	138	0.58
						Chestnut oak--------	76	58	222	0.75
MoB------------- Monongahela	4A	Slight	Slight	Slight	Severe	Northern red oak----	70	52	180	0.67
						Yellow poplar-------	85	81	380	0.93
						Eastern white pine--	72	---	---	---
						White ash-----------	---	---	---	---
						Black walnut--------	---	---	---	---
Pc**:										
Pope-----------	4A	Slight	Slight	Slight	Severe	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	96	100	524	1.15
						American beech------	---	---	---	---
						White oak-----------	80	62	250	0.81
						Blackgum------------	---	---	---	---
						American sycamore---	---	---	---	---
						American basswood---	---	---	---	---
						Eastern hemlock-----	---	---	---	---
						Bitternut hickory---	---	---	---	---
Craigsville----	4F	Slight	Slight	Moderate	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	95	98	510	1.14
						Eastern white pine--	90	---	---	---
Pu-------------- Purdy	4W	Slight	Severe	Severe	Severe	Pin oak-------------	85	67	285	0.88
						Yellow poplar-------	90	90	440	1.04
						Sweetgum------------	85	---	---	---

* Average annual growth is equal to the total volume growth at rotation divided by the rotation age. Actual annual growth varies with stand vigor and other factors. Yield data are based on site indices of natural stands at age 50 years. The International 1/4 Log Rule is used for board feet. Cords are standard rough cords. This information should be used for planning only.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BuB------------------- Buchanan	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones.	Slight----------	Moderate: large stones.
BuC------------------- Buchanan	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight----------	Moderate: large stones, slope.
BuD------------------- Buchanan	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
BvC------------------- Buchanan	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Slight----------	Severe: small stones.
BvE------------------- Buchanan	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope, small stones.
CeF------------------- Cedarcreek	Variable--------	Variable--------	Variable--------	Variable--------	Severe: small stones, slope.
ChB------------------- Chavies	Severe: flooding.	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
CoB------------------- Cotaco	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: wetness.
Cr-------------------- Craigsville	Severe: flooding.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, large stones.
DeC------------------- Dekalb	Severe: large stones, small stones.	Severe: small stones, large stones.	Severe: slope, small stones, large stones.	Moderate: large stones.	Severe: small stones.
DeE, DeF-------------- 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.
DRF*:					
Dekalb---------------	Severe: slope, large stones, small stones.	Moderate: slope, large stones, small stones.	Severe: slope, small stones, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Buchanan-------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DRF*: Rock outcrop.					
Ed: Elkins	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ep: Elkins	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
FeB: Fenwick	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, depth to rock.	Moderate: wetness.	Moderate: wetness, depth to rock.
FeC: Fenwick	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: slope, wetness, depth to rock.
FvB, FvF: Fiveblock	Variable	Variable	Variable	Variable	Variable.
GlB: Gilpin	Slight	Slight	Moderate: small stones, slope.	Slight	Moderate: thin layer.
GlC: Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
GlD: Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GlE, GlF: Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GnC: Gilpin	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: slope, small stones, large stones.	Moderate: large stones.	Moderate: slope, thin layer, small stones.
GnE, GnF: Gilpin	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
GoF*: Gilpin	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
Buchanan	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope, small stones.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GPF*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
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.
GuD*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GuE*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
ItF Itmann	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
KaB, KaF Kaymine	Variable	Variable	Variable	Variable	Variable.
LlB Lily	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
LlC Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
LlD Lily	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
LlE Lily	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MoB Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
Pc*:					
Pope	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pc*:					
Craigsville----------	Severe: flooding.	Moderate: flooding, small stones.	Severe: flooding, small stones.	Moderate: flooding.	Severe: flooding.
Pu-------------------- Purdy	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, erodes easily.	Severe: wetness.
Ud. Udorthents					

* 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
BuB----------------- Buchanan	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BuC----------------- Buchanan	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BuD----------------- Buchanan	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BvC----------------- Buchanan	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
BvE----------------- Buchanan	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
CeF----------------- Cedarcreek	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
ChB----------------- Chavies	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
CoB----------------- Cotaco	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Cr------------------ Craigsville	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
DeC, DeE, DeF------- Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DRF*:										
Dekalb-------------	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Buchanan-----------	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.										
Ed------------------ Elkins	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ep------------------ Elkins	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
FeB----------------- Fenwick	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FeC----------------- Fenwick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FvB, FvF------------ Fiveblock	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GlB----------------- Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very 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 herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
GlC: Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GlD: Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GlE: Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GlF, GnC, GnE, GnF: Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GoF*:										
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Buchanan	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
GPF*:										
Gilpin	Very poor.	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.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GuD*:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuE*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
ItF: Itmann	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
KaB, KaF: Kaymine	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
LlB: Lily	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LlC: Lily	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LlD: Lily	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LlE: Lily	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							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
MoB----------------- Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pc*:										
Pope---------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Craigsville--------	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Pu----------------- Purdy	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Ud. Udorthents										

* 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
BuB: Buchanan	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: wetness, frost action.	Moderate: large stones.
BuC: Buchanan	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: slope, wetness, frost action.	Moderate: large stones, slope.
BuD: Buchanan	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope.
BvC: Buchanan	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Severe: small stones.
BvE: Buchanan	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
CeF: Cedarcreek	Variable	Variable	Variable	Variable	Variable	Severe: small stones, slope.
ChB: Chavies	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
CoB: Cotaco	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness.
Cr: Craigsville	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: large stones.	Moderate: small stones, large stones.
DeC: Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
DeE, DeF: Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
DRF*:						
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Buchanan	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Rock outcrop.						

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
Ed: Elkins	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, frost action.	Severe: wetness.
Ep: Elkins	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, flooding.
FeB: Fenwick	Severe: depth to rock, wetness.	Moderate: wetness, depth to rock.	Severe: wetness, depth to rock.	Moderate: wetness, depth to rock.	Severe: frost action.	Moderate: wetness, depth to rock.
FeC: Fenwick	Severe: depth to rock, wetness.	Moderate: wetness, depth to rock, slope.	Severe: wetness, depth to rock.	Moderate: slope, wetness, depth to rock.	Severe: frost action.	Moderate: slope, wetness, depth to rock.
FvB, FvF: Fiveblock	Variable	Variable	Variable	Variable	Variable	Variable.
GlB: Gilpin	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: thin layer.
GlC: Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
GlD, GlE, GlF: Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GnC: Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer, small stones.
GnE, GnF: Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GoF*:						
Gilpin	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.
GPF*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
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.

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
GuD*, GuE*:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope.
ItF--------------- Itmann	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
KaB--------------- Kaymine	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
KaF--------------- Kaymine	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
LlB--------------- Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
LlC--------------- Lily	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, depth to rock.
LlD, LlE---------- Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
MoB--------------- Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.
Pc*:						
Pope-------------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Craigsville------	Severe: cutbanks cave, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding, large stones.	Severe: flooding.
Pu---------------- Purdy	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength, frost action.	Severe: wetness.
Ud. Udorthents						

* 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 "moderate," "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
BuB: Buchanan	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Poor: small stones.
BuC: Buchanan	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Poor: small stones.
BuD: Buchanan	Severe: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
BvC: Buchanan	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: slope, wetness.	Poor: small stones.
BvE: Buchanan	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: slope.	Poor: small stones, slope.
CeF: Cedarcreek	Variable	Variable	Variable	Variable	Variable.
ChB: Chavies	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
CoB: Cotaco	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage, wetness.	Poor: small stones.
Cr: Craigsville	Severe: poor filter, large stones.	Severe: seepage, large stones.	Severe: seepage, large stones.	Severe: seepage.	Poor: seepage, large stones.
DeC: Dekalb	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
DeE, DeF: 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.
DRF*:					
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.

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
DRF*:					
Buchanan	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop.					
Ed: Elkins	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Ep: Elkins	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
FeB: Fenwick	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, wetness.	Severe: wetness.	Severe: depth to rock.	Poor: depth to rock, thin layer.
FeC: Fenwick	Severe: depth to rock, wetness, percs slowly.	Severe: slope, depth to rock, wetness.	Severe: wetness.	Severe: depth to rock.	Poor: depth to rock, thin layer.
FvB, FvF: Fiveblock	Variable	Variable	Variable	Variable	Variable.
GlB: Gilpin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GlC: Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GlD, GlE, GlF: 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.
GnC: Gilpin	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, large stones, area reclaim.
GnE, GnF: Gilpin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, large stones.
GoF*:					
Gilpin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, large stones.

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
GoF*:					
Buchanan	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: slope.	Poor: small stones, slope.
GPF*:					
Gilpin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, large stones.
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.
GuD*, GuE*:					
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.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
ItF Itmann	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
KaB, KaF Kaymine	Variable	Variable	Variable	Variable	Variable.
LlB Lily	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
LlC Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
LlD, LlE 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: depth to rock, slope.
MoB Monongahela	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
Pc*:					
Pope	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.

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
Pc*:					
Craigsville	Severe: flooding, poor filter, large stones.	Severe: seepage, flooding, large stones.	Severe: flooding, seepage, large stones.	Severe: flooding, seepage.	Poor: seepage, large stones.
Pu: Purdy	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey, hard to pack.
Ud. Udorthents					

* 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
BuB, BuC-------------- Buchanan	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
BuD------------------- Buchanan	Fair: slope, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
BvC------------------- Buchanan	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
BvE------------------- Buchanan	Severe: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
CeF------------------- Cedarcreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
ChB------------------- Chavies	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
CoB------------------- Cotaco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Cr-------------------- Craigsville	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
DeC------------------- Dekalb	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
DeE, DeF-------------- Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
DRF*:				
Dekalb---------------	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Buchanan-------------	Severe: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ed, Ep: Elkins	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
FeB: Fenwick	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, thin layer.
FeC: Fenwick	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, thin layer, slope.
FvB: Fiveblock	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
FvF: Fiveblock	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
GlB, GlC: Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GlD: Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GlE, GlF: Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GnC: Gilpin	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, small stones.
GnE, GnF: Gilpin	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, large stones, small stones.
GoF*:				
Gilpin	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, large stones, small stones.
Buchanan	Severe: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
GPF*:				
Gilpin	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, large stones, small stones.
Pineville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Severe: small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GPF*:				
Guyandotte	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
GuD*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
GuE*:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
ItF Itmann	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
KaB Kaymine	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
KaF Kaymine	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
LlB, LlC Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
LlD Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
LlE Lily	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
MoB Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Pc*:				
Pope	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Craigsville	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pu-------------------- Purdy	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
Ud. Udorthents				

* 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	Terraces and diversions	Grassed waterways
BuB: Buchanan	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Percs slowly, rooting depth.	Percs slowly, rooting depth.
BuC, BuD, BvC, BvE: Buchanan	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.
CeF: Cedarcreek	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
ChB: Chavies	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
CoB: Cotaco	Moderate: seepage, slope.	Severe: piping, wetness.	Slope	Erodes easily, wetness.	Erodes easily, droughty.
Cr: Craigsville	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, too sandy.	Large stones, droughty.
DeC, DeE, DeF: Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, depth to rock, large stones.	Slope, large stones, droughty.
DRF*:					
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, depth to rock, large stones.	Slope, large stones, droughty.
Buchanan	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.
Rock outcrop.					
Ed: Elkins	Moderate: seepage.	Severe: wetness, piping.	Percs slowly, flooding, poor outlets.	Wetness, percs slowly, poor outlets.	Wetness, erodes easily, percs slowly.
Ep: Elkins	Moderate: seepage.	Severe: ponding, piping.	Ponding, percs slowly, flooding.	Ponding, percs slowly, poor outlets.	Wetness, erodes easily, percs slowly.
FeB: Fenwick	Moderate: depth to rock.	Severe: piping.	Slope, depth to rock, frost action.	Depth to rock, wetness.	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	Terraces and diversions	Grassed waterways
FeC: Fenwick	Severe: slope.	Severe: piping.	Slope, depth to rock, frost action.	Slope, depth to rock, wetness.	Slope, depth to rock.
FvB: Fiveblock	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones	Large stones, droughty.
FvF: Fiveblock	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
GlB: Gilpin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, large stones.	Depth to rock, large stones.
GlC, GlD, GlE, GlF: Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
GnC, GnE, GnF: Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
GoF*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Buchanan	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.
GPF*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Pineville	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Guyandotte	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, large stones.	Slope, large stones.
GuD*, GuE*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Upshur	Severe: slope, slippage.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
ItF: Itmann	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope	Slope, droughty.

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	Terraces and diversions	Grassed waterways
KaB: Kaymine	Severe: seepage.	Moderate: large stones.	Deep to water	Large stones	Large stones, droughty.
KaF: Kaymine	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
LlB: Lily	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock	Depth to rock.
LlC, LlD: Lily	Severe: seepage.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
LlE: Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
MoB: Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
Pc*:					
Pope	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Craigsville	Severe: seepage.	Severe: seepage, large stones.	Deep to water	Large stones, too sandy.	Large stones, droughty.
Pu: Purdy	Slight	Severe: piping, hard to pack, wetness.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ud. Udorthents					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
BuB, BuC, BuD----Buchanan	0-7	Loam-------------	ML, CL, CL-ML	A-4	0-5	90-100	85-100	75-90	65-85	20-35	2-11
	7-20	Channery loam, silt loam, channery clay loam.	GM, ML, CL, SM	A-4, A-2	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	20-65	Channery loam, loam, channery clay loam, very channery sandy 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
BvC, BvE---------Buchanan	0-7	Very stony fine sandy loam.	GM, ML, CL, CL-ML	A-2, A-4	3-20	50-90	45-75	40-75	30-65	20-35	2-11
	7-20	Channery loam, silt loam, channery clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	20-65	Channery loam, loam, channery clay loam, very channery sandy 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
CeF--------------Cedarcreek	0-5	Channery loam----	GC	A-2, A-4	15-30	45-60	40-55	30-50	20-40	25-35	7-11
	5-65	Extremely channery loam, very stony silt loam, very channery loam.	GC	A-2, A-4	5-30	30-55	25-50	20-40	15-35	25-35	7-11
ChB--------------Chavies	0-11	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	85-100	75-100	40-90	40-75	<25	NP-5
	11-50	Fine sandy loam, sandy loam, loam.	SM, ML	A-4	0	85-100	75-100	65-100	45-85	<35	NP-8
	50-65	Sandy loam, gravelly fine sandy loam, loam, loamy sand.	SM, ML, CL-ML, SM-SC	A-4, A-2, A-1-b	0-5	70-100	60-95	40-85	20-75	<25	NP-5
CoB--------------Cotaco	0-7	Silt loam--------	ML, CL-ML, CL	A-4	0	95-100	95-100	90-100	80-90	20-30	3-10
	7-65	Silt loam, gravelly loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	75-100	70-100	65-95	55-85	25-35	6-15

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	
Cr---------------- Craigsville	0-7	Gravelly sandy loam.	ML, SM, CL-ML, SC	A-2, A-4	0-25	65-90	60-85	40-75	25-60	<25	NP-10
	7-25	Extremely gravelly sandy loam, cobbly loam, very gravelly sandy loam.	SM, GM, GC, SC	A-1, A-2, A-4	25-60	50-80	30-65	25-60	15-40	<25	NP-10
	25-65	Very gravelly loamy sand, very gravelly sandy loam, very cobbly loamy sand, extremely gravelly loamy sand.	GC, GM, GP-GM, GM-GC	A-1, A-2	35-75	35-55	30-50	20-45	10-25	<25	NP-8
DeC, DeE, DeF---- Dekalb	0-3	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
	3-20	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
	20-24	Channery sandy loam, flaggy sandy loam, extremely channery sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
DRF*:											
Dekalb-----------	0-3	Extremely stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-30	50-90	45-80	40-75	20-55	10-32	NP-10
	3-20	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
	20-24	Channery sandy loam, flaggy sandy loam, extremely channery sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Buchanan---------	0-7	Rubbly fine sandy loam.	GM, ML, CL, CL-ML	A-2, A-4, A-6	40-70	50-85	45-70	40-70	30-60	20-35	2-11
	7-20	Channery loam, silt loam, channery clay loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	50-100	45-95	40-90	20-80	20-35	2-15
	20-65	Channery 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
Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Ed, Ep----------- Elkins	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	75-90	20-40	4-14
	8-36	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	85-95	75-90	20-40	4-17
	36-65	Silt loam, loam, fine sandy loam.	ML, CL, SM, SC	A-4, A-6	0	95-100	90-100	65-95	40-85	15-35	1-13
FeB, FeC--------- Fenwick	0-8	Silt loam--------	ML, CL-ML	A-4	0-10	85-100	80-100	70-95	60-90	20-35	2-10
	8-25	Loam, silt loam, clay loam.	ML, CL, CL-ML	A-4, A-6	0-10	85-100	75-100	65-95	55-90	25-40	4-14
	25-38	Loam, silt loam, channery loam.	CL, CL-ML	A-4, A-6	0-15	65-100	60-95	55-90	50-85	25-35	4-12
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FvB, FvF--------- Fiveblock	0-4	Channery sandy loam.	SM, SM-SC, GM-GC, GM	A-1, A-2	15-30	55-70	50-65	35-50	10-25	15-25	NP-7
	4-65	Extremely channery sandy loam, very stony sandy loam, very channery sandy loam.	SM, SM-SC, GM-GC, GM	A-1, A-2	5-30	45-65	25-50	15-35	10-20	15-25	NP-7
GlB, GlC, GlD, GlE, GlF-------- Gilpin	0-3	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	3-27	Channery loam, channery 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
	27-34	Channery loam, very channery silt loam, very channery silty clay loam, very channery 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
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GnC, GnE, GnF---- Gilpin	0-3	Stony silt loam	GC, CL, SC, CL-ML	A-2, A-4, A-6	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	3-27	Channery silt loam, channery loam, sandy clay loam.	GM-GC, CL, CL-ML, SC	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-34	Channery loam, very channery silt loam, very channery silty clay loam, very channery 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
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

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	
GoF*:											
Gilpin----------	0-3	Very stony silt loam.	GC, CL, SC, CL-ML	A-2, A-4, A-6	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	3-27	Channery silt loam, channery loam, silty clay loam.	GM-GC, CL, CL-ML, SC	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-34	Channery loam, very channery silt loam, very channery silty clay loam, very channery 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
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Buchanan--------	0-7	Very stony fine sandy loam.	GM, ML, CL, CL-ML	A-2, A-4	3-20	50-90	45-75	40-75	30-65	20-35	2-11
	7-20	Channery loam, silt loam, channery clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	20-65	Channery loam, loam, channery clay loam, very channery sandy 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
GPF*:											
Gilpin----------	0-3	Very stony silt loam.	GC, CL, SC, CL-ML	A-2, A-4, A-6	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	3-27	Channery silt loam, channery loam, silty clay loam.	GM-GC, CL, CL-ML, SC	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-34	Channery loam, very channery silt loam, very channery silty clay loam, very channery 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
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pineville-------	0-4	Very stony silt 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
	4-53	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
	53-65	Very channery loam, very channery clay loam, very channery sandy loam.	GM, GM-GC, SC, SM-SC	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	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
GPF*:											
Guyandotte	0-11	Very stony silt 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
	11-65	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	10-55	20-30	NP-8
GuD*, GuE*:											
Gilpin	0-3	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	3-27	Channery loam, channery 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
	27-34	Channery loam, very channery silt loam, very channery silty clay loam, very channery 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
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur	0-5	Silt loam	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	5-36	Silty clay, clay, channery silty clay.	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-47	Silty clay loam, channery silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	47	Weathered bedrock	---	---	---	---	---	---	---	---	---
ItF Itmann	0-4	Channery sandy loam.	ML, CL, SM, SC	A-2, A-4	0-10	65-85	60-80	50-75	30-60	20-30	NP-8
	4-65	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
KaB, KaF Kaymine	0-2	Channery loam	GC	A-2, A-4	15-30	45-60	40-55	30-50	20-40	25-35	7-11
	2-65	Extremely channery loam, very stony silt loam, very channery loam.	GC	A-2, A-4	5-30	30-55	25-50	20-45	15-40	25-35	7-11
LlB, LlC, LlD, LlE Lily	0-7	Loam	ML, CL-ML	A-4	0-5	90-100	85-100	70-95	55-80	<35	NP-10
	7-18	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
	18-28	Sandy clay loam, clay loam, channery 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
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

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	
MoB-------------- Monongahela	0-8	Silt loam--------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	8-29	Silt loam, clay loam, loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	29-65	Silt loam, sandy clay loam, loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	75-100	55-95	45-95	20-40	3-15
Pc*:											
Pope------------	0-7	Sandy loam-------	SM, ML, CL-ML, SM-SC	A-2, A-4	0	85-100	75-100	51-85	25-55	<20	NP-5
	7-32	Fine sandy loam, sandy loam, loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	<30	NP-7
	32-65	Very gravelly sandy loam, loamy sand.	SM, SM-SC, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	<30	NP-7
Craigsville-----	0-7	Gravelly sandy loam.	ML, SM, CL-ML, SC	A-2, A-4	0-25	65-90	60-85	40-75	25-60	<25	NP-10
	7-25	Gravelly sandy loam, cobbly loam, very gravelly sandy loam, extremely gravelly sandy loam.	SM, GM, GC, SC	A-1, A-2, A-4	25-60	50-80	30-65	25-60	15-40	<25	NP-10
	25-65	Very gravelly loamy sand, very gravelly sandy loam, very cobbly loamy sand, extremely gravelly loamy sand.	GC, GM, GP-GM, GM-GC	A-1, A-2	35-75	35-55	30-50	20-45	10-25	<25	NP-8
Pu--------------- Purdy	0-12	Silt loam--------	ML, CL	A-4, A-6, A-7	0	95-100	90-100	90-100	90-100	25-50	4-20
	12-40	Silty clay, clay, clay loam.	CL, CH, MH	A-6, A-7	0	95-100	90-100	85-100	75-85	30-65	11-30
	40-65	Silty clay, clay loam, clay.	CL, CH, MH	A-6, A-7	0	95-100	90-100	85-100	70-95	30-65	11-30
Ud. Udorthents											

* 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
BuB, BuC, BuD----- Buchanan	0-7	10-27	1.20-1.40	0.6-2.0	0.14-0.20	3.6-5.5	Low----------	0.32	3-2	1-3
	7-20	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24		
	20-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	Low----------	0.17		
BvC, BvE---------- Buchanan	0-7	10-20	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.24	3-2	---
	7-20	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24		
	20-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	Low----------	0.17		
CeF--------------- Cedarcreek	0-5	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low----------	0.32	5	<.5
	5-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	3.6-5.5	Low----------	0.32		
ChB--------------- Chavies	0-11	7-18	1.20-1.40	2.0-6.0	0.11-0.18	4.5-7.3	Low----------	0.24	4	.5-4
	11-50	7-18	1.20-1.40	2.0-6.0	0.11-0.20	4.5-7.3	Low----------	0.24		
	50-65	7-18	1.30-1.50	2.0-6.0	0.08-0.18	4.5-6.0	Low----------	0.24		
CoB--------------- Cotaco	0-7	7-27	1.20-1.40	0.6-6.0	0.12-0.20	3.6-5.5	Low----------	0.37	3	.5-4
	7-65	18-35	1.20-1.50	0.6-2.0	0.15-0.18	3.6-5.5	Low----------	0.28		
Cr---------------- Craigsville	0-7	5-15	1.20-1.40	2.0-20	0.07-0.15	4.5-5.5	Low----------	0.17	3	1-5
	7-25	5-15	1.30-1.60	2.0-20	0.06-0.15	4.5-5.5	Low----------	0.17		
	25-65	5-10	1.35-1.55	>6.0	0.04-0.09	4.5-5.5	Low----------	0.17		
DeC, DeE, DeF----- Dekalb	0-3	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	2	2-4
	3-20	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	20-24	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	24	---	---	---	---	---	-------------	----		
DRF*:										
Dekalb-----------	0-3	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	2	2-4
	3-20	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	20-24	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	24	---	---	---	---	---	-------------	----		
Buchanan---------	0-7	10-20	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.20	3-2	---
	7-20	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24		
	20-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	Low----------	0.17		
Rock outcrop.										
Ed---------------- Elkins	0-8	18-27	1.20-1.50	0.6-2.0	0.18-0.24	3.6-5.0	Low----------	0.37	5	1-5
	8-36	18-35	1.30-1.60	0.06-0.2	0.12-0.16	3.6-5.0	Moderate-----	0.37		
	36-65	7-27	1.30-1.60	0.2-2.0	0.10-0.14	3.6-5.0	Low----------	0.32		
Ep---------------- Elkins	0-8	18-27	1.20-1.50	0.6-2.0	0.18-0.24	3.6-5.0	Low----------	0.37	5	5-10
	8-36	18-35	1.30-1.60	0.06-0.2	0.12-0.16	3.6-5.0	Moderate-----	0.37		
	36-65	7-27	1.30-1.60	0.2-2.0	0.10-0.14	3.6-5.0	Low----------	0.32		
FeB, FeC---------- Fenwick	0-8	10-27	1.20-1.40	0.6-2.0	0.12-0.16	4.5-7.3	Low----------	0.32	3	1-4
	8-25	18-35	1.20-1.50	0.6-2.0	0.10-0.16	4.0-5.0	Low----------	0.24		
	25-38	18-30	1.40-1.70	0.2-0.6	0.08-0.14	4.0-5.0	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		
FvB, FvF---------- Fiveblock	0-4	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low----------	0.32	5	<.5
	4-65	5-18	1.35-1.65	2.0-20	0.05-0.12	5.6-7.8	Low----------	0.32		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
GlB, GlC, GlD, GlE, GlF--------- Gilpin	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.32	3	.5-4
	3-27	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	27-34	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	34	---	---	---	---	---	-------------	----		
GnC, GnE, GnF---- Gilpin	0-3	15-27	1.20-1.40	0.6-2.0	0.08-0.14	3.6-5.5	Low-----------	0.24	3	---
	3-27	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	27-34	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	34	---	---	---	---	---	-------------	----		
GoF*: Gilpin-----------	0-3	15-27	1.20-1.40	0.6-2.0	0.08-0.14	3.6-5.5	Low-----------	0.24	3	---
	3-27	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	27-34	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	34	---	---	---	---	---	-------------	----		
Buchanan---------	0-7	10-20	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.24	3-2	---
	7-20	18-30	1.30-1.60	0.6-2.0	0.10-0.16	3.6-5.5	Low-----------	0.24		
	20-65	18-35	1.40-1.70	0.06-0.2	0.06-0.10	3.6-5.5	Low-----------	0.17		
GPF*: Gilpin-----------	0-3	15-27	1.20-1.40	0.6-2.0	0.08-0.14	3.6-5.5	Low-----------	0.24	3	---
	3-27	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	27-34	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	34	---	---	---	---	---	-------------	----		
Pineville--------	0-4	15-25	1.00-1.30	2.0-6.0	0.10-0.16	4.5-7.3	Low-----------	0.20	4	.5-5
	4-53	18-30	1.30-1.60	2.0-6.0	0.08-0.14	4.5-5.5	Low-----------	0.15		
	53-65	15-30	1.30-1.60	0.6-6.0	0.06-0.14	4.5-5.5	Low-----------	0.15		
Guyandotte-------	0-11	5-18	1.00-1.30	0.6-6.0	0.10-0.16	4.5-7.3	Low-----------	0.10	4	2-10
	11-65	5-18	1.30-1.60	0.6-6.0	0.05-0.15	4.5-6.0	Low-----------	0.17		
GuD*, GuE*: Gilpin-----------	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.32	3	.5-4
	3-27	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	27-34	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	34	---	---	---	---	---	-------------	----		
Upshur-----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Moderate------	0.43	3	1-4
	5-36	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32		
	36-47	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate------	0.32		
	47	---	---	---	---	---	-------------	----		
ItF--------------- Itmann	0-4	10-20	1.00-1.30	0.6-6.0	0.08-0.15	3.6-5.5	Low-----------	0.32	5	<.5
	4-65	4-15	1.00-1.30	2.0-20	0.05-0.12	3.6-5.5	Low-----------	0.32		
KaB, KaF---------- Kaymine	0-2	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low-----------	0.32	5	<.5
	2-65	18-27	1.35-1.65	0.6-6.0	0.07-0.16	5.6-7.8	Low-----------	0.32		
LlB, LlC, LlD, LlE-------------- Lily	0-7	7-27	1.20-1.40	0.6-6.0	0.13-0.18	3.6-5.5	Low-----------	0.28	2	.5-4
	7-18	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low-----------	0.28		
	18-28	20-35	1.25-1.35	2.0-6.0	0.08-0.17	3.6-5.5	Low-----------	0.17		
	28	---	---	---	---	---	-------------	----		
MoB--------------- Monongahela	0-8	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-5.5	Low-----------	0.43	3	2-4
	8-29	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low-----------	0.43		
	29-65	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low-----------	0.43		

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
Pc*:										
Pope------------	0-7	5-15	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.28	5	1-4
	7-32	5-18	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low----------	0.28		
	32-65	5-20	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low----------	0.28		
Craigsville-----	0-7	5-15	1.20-1.40	2.0-20	0.07-0.15	4.5-5.5	Low----------	0.17	3	1-5
	7-25	5-15	1.30-1.60	2.0-20	0.06-0.15	4.5-5.5	Low----------	0.17		
	25-65	5-10	1.35-1.55	>6.0	0.04-0.09	4.5-5.5	Low----------	0.17		
Pu--------------- Purdy	0-12	18-27	1.30-1.50	0.2-0.6	0.18-0.24	3.6-5.5	Moderate-----	0.43	3	2-4
	12-40	35-50	1.30-1.60	0.06-0.2	0.12-0.18	3.6-5.5	Moderate-----	0.32		
	40-65	35-50	1.30-1.60	0.06-0.2	0.10-0.16	3.6-5.5	Moderate-----	0.32		
Ud. Udorthents										

* 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," "frequent," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
BuB, BuC, BuD, BvC, BvE: Buchanan	C	None	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	High	High.
CeF: Cedarcreek	C	None	>6.0	---	---	>60	---	Moderate	Moderate	High.
ChB: Chavies	B	Rare	>6.0	---	---	>60	---	Low	Low	Moderate.
CoB: Cotaco	C	None	1.5-2.5	Apparent	Nov-May	>60	---	High	Moderate	High.
Cr: Craigsville	B	Rare	>6.0	---	---	>60	---	Moderate	Low	Moderate.
DeC, DeE, DeF: Dekalb	C	None	>6.0	---	---	20-40	Hard	Low	Low	High.
DRF*:										
Dekalb	C	None	>6.0	---	---	20-40	Hard	Low	Low	High.
Buchanan	C	None	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	High	High.
Rock outcrop.										
Ed: Elkins	D	Occasional	0-1.5	Apparent	Nov-Jun	>60	---	High	High	High.
Ep: Elkins	D	Frequent	+2-0.5	Apparent	Jan-Dec	>60	---	High	High	High.
FeB, FeC: Fenwick	C	None	1.5-2.5	Perched	Nov-Apr	20-40	Hard	High	Moderate	High.
FvB, FvF: Fiveblock	C	None	>6.0	---	---	>60	---	Moderate	Low	Low.
GlB, GlC, GlD, GlE, GlF, GnC, GnE, GnF: 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				
GoF*:										
Gilpin-----------	C	None------------	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
Buchanan---------	C	None------------	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	High-----	High.
GPF*:										
Gilpin-----------	C	None------------	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
Pineville--------	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	High.
Guyandotte-------	B	None------------	>6.0	---	---	>60	---	Low------	Low------	High.
GuD*, GuE*:										
Gilpin-----------	C	None------------	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
Upshur-----------	D	None------------	>6.0	---	---	>40	Soft	Moderate	High-----	Moderate.
ItF--------------- Itmann	C	None------------	>6.0	---	---	>60	---	Moderate	High-----	High.
KaB, KaF---------- Kaymine	C	None------------	>6.0	---	---	>60	---	Moderate	Low------	Low.
LlB, LlC, LlD, LlE-------------- Lily	B	None------------	>6.0	---	---	20-40	Hard	Low------	Moderate	High.
MoB--------------- Monongahela	C	None------------	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High-----	High.
Pc*:										
Pope-------------	B	Frequent--------	>6.0	---	---	>60	---	Moderate	Low------	High.
Craigsville------	B	Frequent--------	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
Pu---------------- Purdy	D	None------------	+1-1.0	Apparent	Nov-Jun	>60	---	High-----	High-----	High.
Ud. Udorthents										

* 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
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Cedarcreek	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Chavies	Coarse-loamy, mixed, mesic Ultic Hapludalfs
Cotaco	Fine-loamy, mixed, mesic Aquic Hapludults
Craigsville	Loamy-skeletal, mixed, mesic Fluventic Dystrochrepts
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Elkins	Fine-silty, mixed, acid, mesic Humaqueptic Fluvaquents
Fenwick	Fine-loamy, mixed, mesic Aquic Hapludults
Fiveblock	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Guyandotte	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Itmann	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Kaymine	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Pineville	Fine-loamy, mixed, mesic Typic Hapludults
Pope	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Purdy	Clayey, mixed, mesic Typic Ochraquults
Udorthents	Udorthents
Upshur	Fine, mixed, mesic Typic Hapludalfs

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