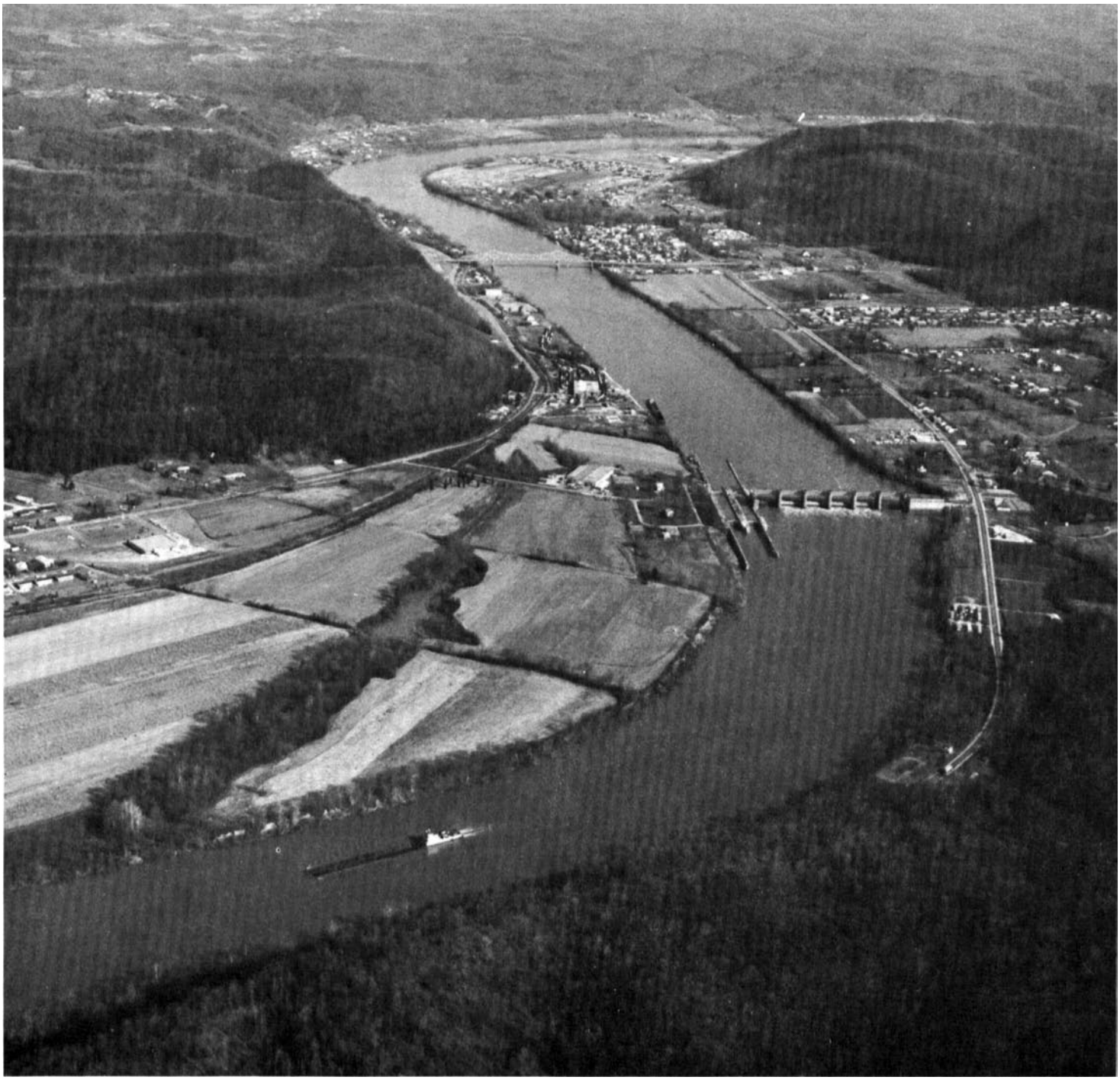
United States Department of Agriculture

Soil Conservation Service

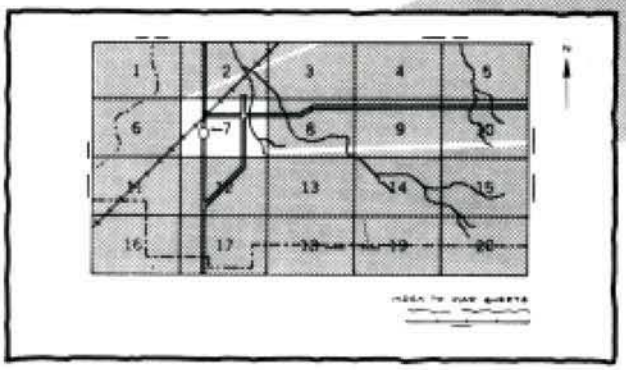
In cooperation with the West Virginia University Agricultural and Forestry Experiment Station

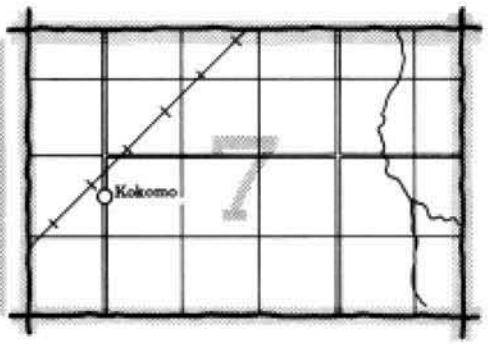
Soil Survey of Putnam County West Virginia



HOW TO USE

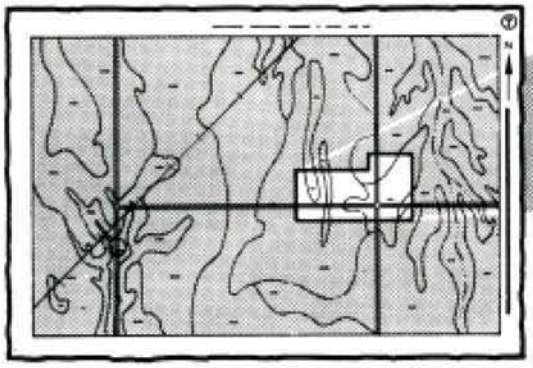
1. Locate your area of interest on the "Index to Map Sheets"

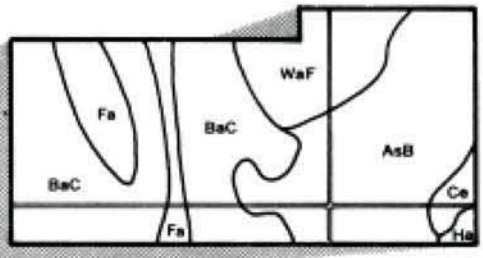




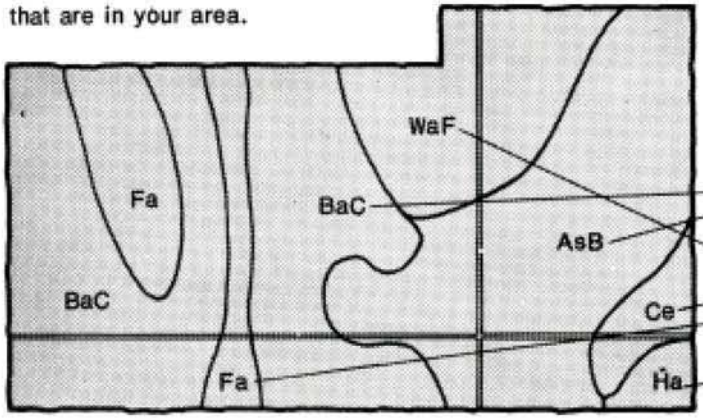
2. Note the number of the map sheet and turn to that sheet.

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





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

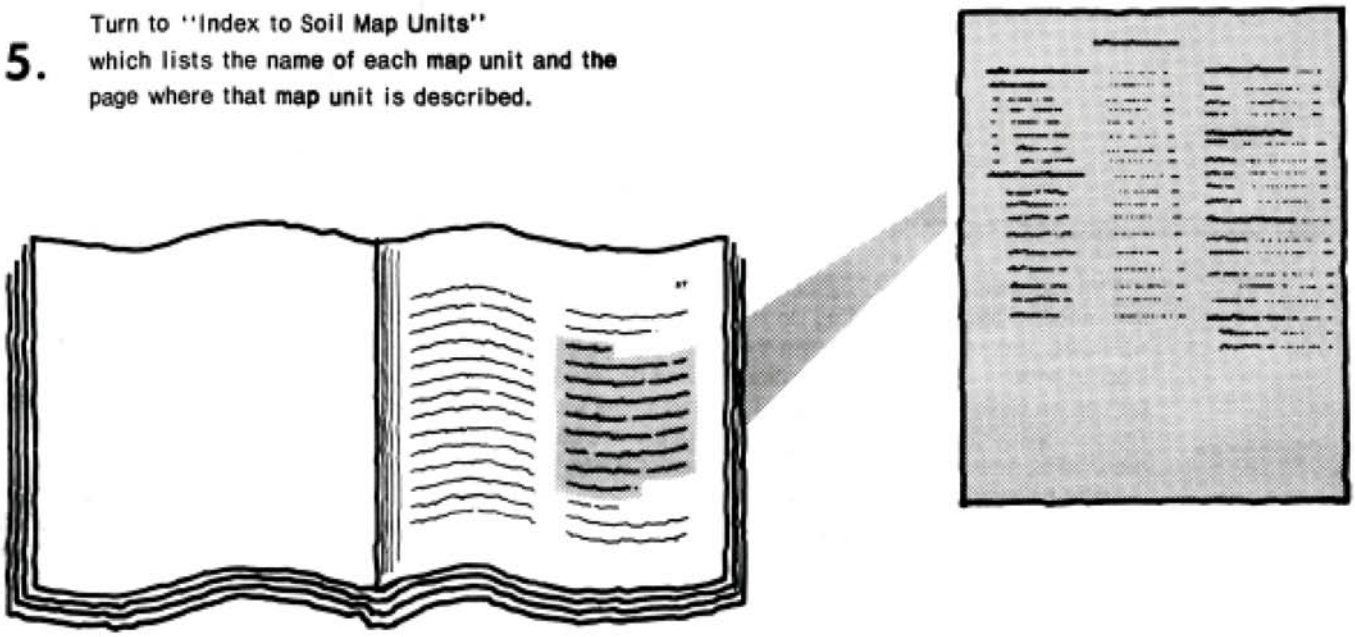


Symbols

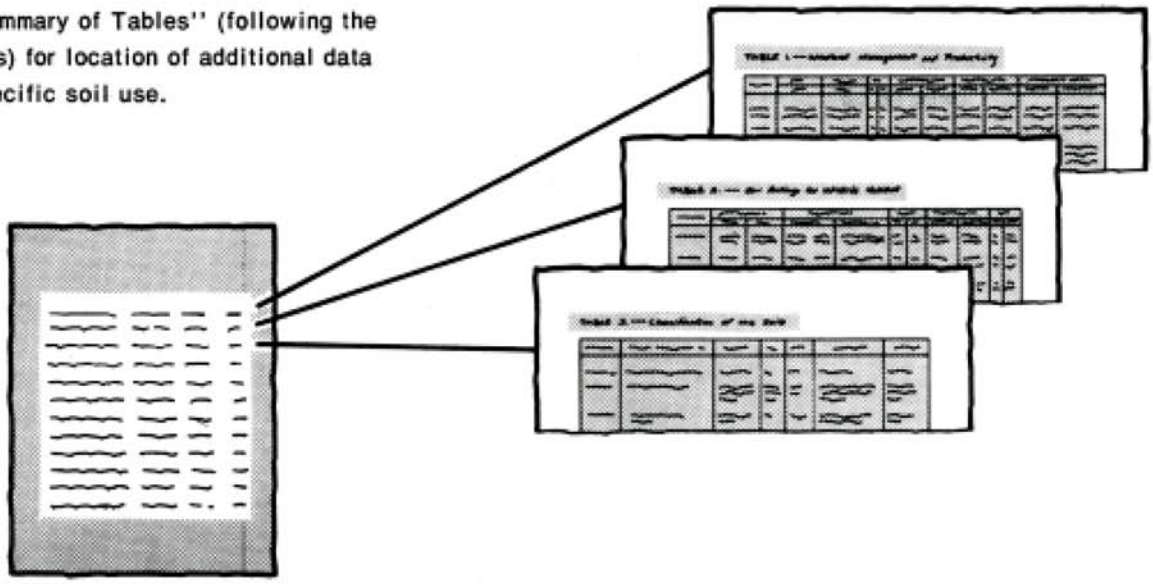
- AsB
- BaC
- Ce
- Fa
- Ha
- WaF

THIS SOIL SURVEY

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



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



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

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

This survey was made cooperatively by the Soil Conservation Service and the West Virginia University Agricultural and Forestry Experiment Station. It is part of the technical assistance furnished to the Western Soil Conservation District. Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1980.

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

Cover: Aerial view of Winfield. This community is in the Kanawha-Lindside-Urban land map unit.

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Soil Series

Issued August 1985

Index to Soil Map Units

Summary of Tables

Foreword

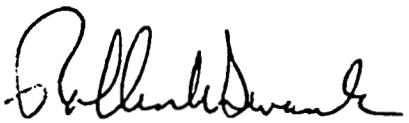
The Soil Survey of Putnam County contains information that can be used in land-planning programs. It contains predictions of soil behavior for selected land uses. This survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

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

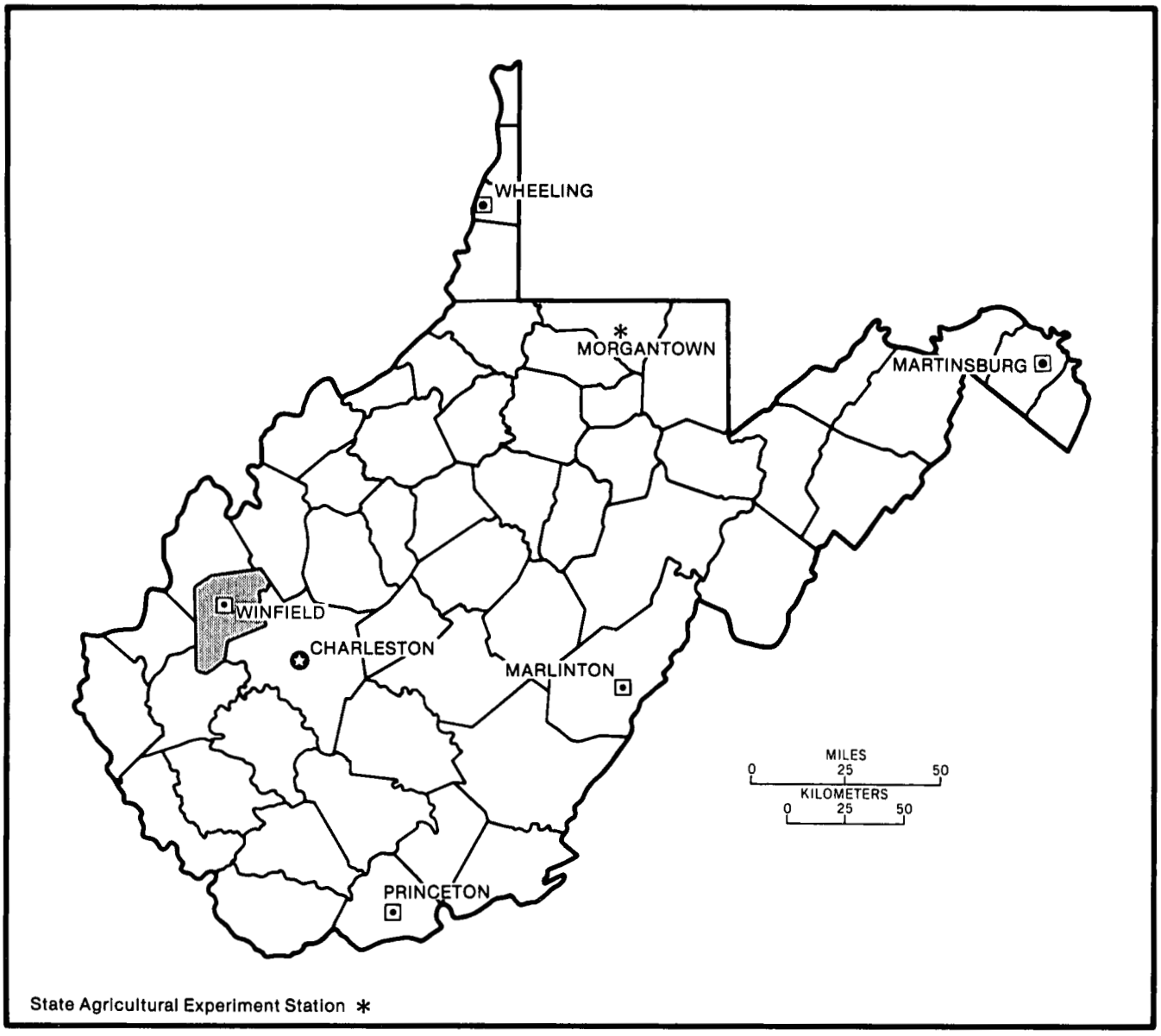
Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Wet soils and soils high in clay content are poorly suited to use as septic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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described, and much information is given about each soil for specific uses. Additional information and assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

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



Rollin N. Swank
State Conservationist
Soil Conservation Service



Location of Putnam County in West Virginia.

Soil Survey of
Putnam County, West Virginia

By Carlos P. Cole, Stephen G. Carpenter, and
Charles H. Delp, Soil Conservation Service

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

Putnam County is in the southwestern part of West Virginia. It covers 352 square miles, or 225,280 acres, 3,030 acres of which is water. The major river in the county is the Kanawha River.

Hurricane is the largest city in the county. The major enterprises in the county are chemical, power, and industrial plants and warehouses along the Kanawha River and in the Teays Valley. Other small businesses support rapidly growing residential and urban areas.

The transportation needs of the county are met by a network of state and federal highways. In addition, two freight railroads serve the area, and air freight and passenger service are available at the Kanawha and Tri-county Airports. The Kanawha River provides a barge route for industrial products, coal, and other raw materials.

General Nature of the County

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

Settlement

The first known settlements in the area that is now Putnam County were made in 1774 along the Kanawha River and in the Teays Valley (*12*).

Putnam County was created in 1848 from parts of Kanawha, Mason, and Cabell Counties by an act of the Virginia General Assembly. It was named in honor of General Israel Putnam, a New England soldier and patriot. The establishment of Putnam County preceded by 15 years the formation of West Virginia as a state.

Winfield, the county seat, was laid out in 1848 but not incorporated until 1868. It was named in honor of General Winfield Scott of Mexican War fame.

The town of Buffalo is the oldest settlement in the county. The other incorporated towns in Putnam County are Bancroft, Eleanor, Hurricane, Nitro (partly in Kanawha County), and Poca (*5*).

Farming

According to the 1978 Census of Agriculture (*11*), there were 502 farms in Putnam County and a total farm acreage of 64,077 acres.

The number of farms is decreasing with the rapid industrial and residential growth of the county (fig. 1). The total acreage of farmland decreased from 81,570 acres in 1969 to 64,077 acres in 1978. The average farm size increased from 108 acres in 1969 to 128 acres in 1978.

Although the value of farm products increased during 1969 to 1978, the importance of farming in the county is rapidly declining. Tobacco is the main marketed product, followed in importance by beef cattle, grain crops, and poultry products. Most of the farms are operated on a part-time basis.

Relief and Drainage

Putnam County is within one major land resource area, the Central Allegheny Plateau.

The county is characterized by hills and narrow valleys. The northern section has gently sloping, more rounded ridgetops descending to steep and very steep

side slopes. These gently sloping ridgetops are steeper south of West Virginia Route 34, north of the Kanawha River. The central and southern part of the county is dominated by narrower ridgetops with steep to very steep side slopes broken in many areas by more gently sloping benches.

The topography of the Kanawha River Valley (fig. 2) and the Teays Valley is dominated by nearly level to gently sloping soils.

Elevation ranges from 1,228 feet above sea level on a knob near the Lincoln County line in the southernmost part of the county to 538 feet above sea level at normal pool elevation on the Kanawha River near the Mason County line.

The county is drained primarily by Eighteenmile Creek, Hurricane Creek, the Pocatalico River, and other Kanawha River tributaries in the north and central parts of the county. Trace Fork of the Mud River is the primary drainageway in the southern part of the county.

Climate

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

Winters are cold with a moderate amount of snow throughout Putnam County. Intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm on the mountain slopes and very warm with occasional very hot days in the valleys. Rainfall is evenly distributed during the year, but it is heavier on the windward, west-facing slopes than in the valleys. The average annual precipitation is adequate for most crops.

Table 1 gives data on temperature and precipitation for the county as recorded at Winfield Locks in the period 1951 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 34 degrees F, and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which

Figure 1.—Aerial view of Eleanor shows agricultural land that has been converted to nonfarm uses in the Kanawha-Lindside-Urban land map unit. A hangar for small aircraft is in the field corner at upper left.

Figure 2.—Aerial view of the Kanawha River, the major drainageway in Putnam County.

occurred on January 18, 1977, is minus 11 degrees. In summer the average temperature is 73 degrees, and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred on September 3, 1953, is 102 degrees.

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

The total annual precipitation is about 41 inches. Of this, 22 inches, or more than 50 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 19 inches. The heaviest 1-day rainfall during the period of record was 2.65 inches at Winfield Locks on May 7, 1967. Thunderstorms occur on about 40 days each year, and most occur in summer. Severe thunderstorms in summer and heavy rains, which can occur at any time of the year, sometimes cause flash flooding, particularly in narrow valleys.

The average seasonal snowfall is 14 inches. The greatest snow depth at any one time during the period of record was 18 inches. On an average of 12 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 40 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 8 miles per hour, in winter.

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 is devoid of roots and other living organisms and has not been changed by other biologic activity.

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

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

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

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

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

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

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 soils 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, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

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

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

Soil Descriptions

1. Kanawha-Lindside-Urban land

Deep, nearly level and gently sloping, well drained and moderately well drained soils and Urban land; on high flood plains and terraces

This map unit consists of soils and Urban land along the Kanawha River. It covers about 6 percent of the county. This unit is about 11 percent Kanawha soils, 11 percent Lindside soils, 8 percent Urban land, and 70 percent soils of minor extent.

The Kanawha soils are nearly level and gently sloping. They are well drained and are on high flood plains and terraces. They formed in alluvial material washed from lime-influenced and acid soils on uplands. Kanawha soils have a dark brown, medium textured surface layer and a strong brown, medium textured and moderately coarse textured subsoil.

The Lindside soils are nearly level and moderately well drained. They are on low and high flood plains. They formed in alluvial material washed from lime-influenced and acid soils on uplands. Lindside soils have a dark brown, medium textured surface layer and a brown, moderately fine textured subsoil.

Urban land is land covered by streets, parking lots, buildings, and other urban structures.

The minor soils in this unit are the well drained Ashton, Huntington, and Sensabaugh soils and the poorly drained Melvin soils on flood plains; the well drained Allegheny soils, the moderately well drained Monongahela soils, and the somewhat poorly drained Tyler soils on terraces; the well drained Vandalia soils on foot slopes; the well drained Gilpin and Upshur soils on uplands; and areas of Udorthents and water.

Most of this unit is cleared and used for cultivated crops and hay or for urban development. The hazard of erosion is slight or moderate.

The Kanawha soils have few, if any, limitations for community development. The seasonal high water table and hazard of flooding in the low areas are the main limitations of the Lindside soils for community development. The seasonal high water table, moderately slow or slow permeability, hazard of flooding, slippage, and depth to bedrock are the main limitations of the minor soils for community development.

2. Moshannon-Vandalia-Senecaville

Deep, nearly level to moderately steep, well drained and moderately well drained soils; on flood plains and foot slopes

This map unit consists of soils along Eighteenmile Creek, Five and Twentymile Creek, Hurricane Creek, Little Hurricane Creek, Trace Creek, and the Pocatalico River. It covers about 6 percent of the county. This unit is about 27 percent Moshannon soils, 24 percent Vandalia soils, 9 percent Senecaville soils, and 40 percent soils of minor extent.

The Moshannon soils are nearly level and well drained. They are on flood plains. They formed in alluvial material washed from lime-influenced and acid soils on uplands. Moshannon soils have a dark brown, medium textured surface layer and a reddish brown and yellowish red, medium textured subsoil.

The Vandalia soils are strongly sloping and moderately steep and are well drained. They are on foot slopes and at the heads of drainageways. They formed in lime-influenced and acid colluvial material that moved downslope mainly from Upshur and Gilpin soils on uplands. Vandalia soils have a reddish brown, medium textured surface layer and a reddish brown, moderately fine and fine textured subsoil.

The Senecaville soils are nearly level and moderately well drained. They are on flood plains. They formed in alluvial material washed from lime-influenced and acid

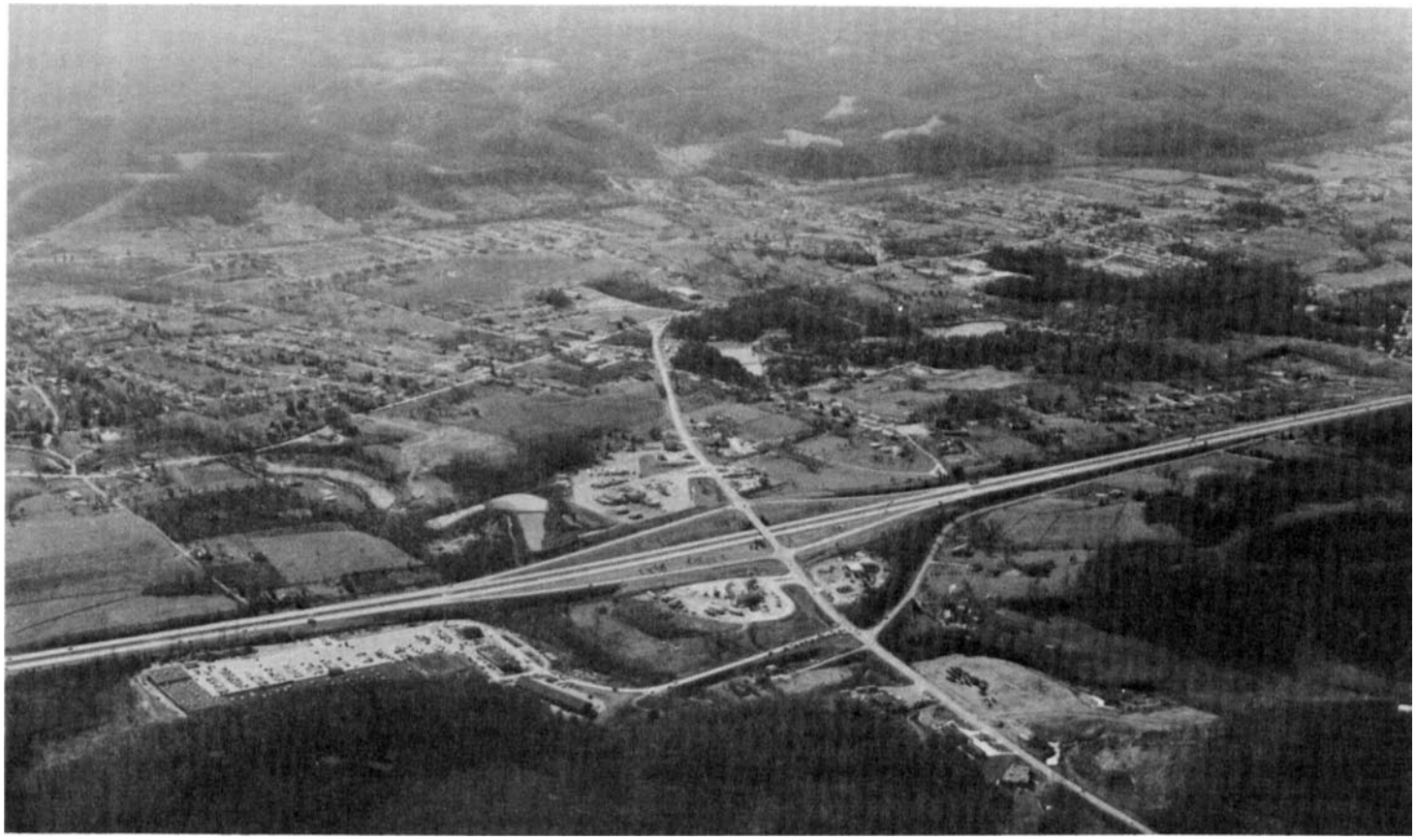


Figure 3.—An urban area of the Teays Valley in the Monongahela-Vincent map unit.

soils on uplands. Senecaville soils have a dark brown, medium textured surface layer and a reddish brown, medium textured subsoil.

The minor soils in this unit are the well drained Hackers and Sensabaugh soils on flood plains, the well drained Allegheny soils and moderately well drained Monongahela and Zoar soils on terraces, and the well drained Gilpin and Upshur soils on uplands.

Most of this unit is cleared and used for cultivated crops, hay, pasture, or urban development.

The hazard of flooding is the main limitation of the Moshannon soils for community development. The slope, moderately slow or slow permeability, high shrink-swell potential, low strength, clayey texture, and the hazard of slipping are the main limitations of the Vandalia soils for community development. The hazard of flooding and seasonal high water table are the main limitations of the Senecaville soils for community development. The hazard of flooding, seasonal high water table, depth to bedrock, high shrink-swell potential, slope, and hazard of slipping are the main limitations of the minor soils for community development.

3. Monongahela-Vincent

Deep, gently sloping and strongly sloping, moderately well drained soils; on terraces

This map unit consists of soils on terraces in the Teays Valley. It covers about 4 percent of the county. This unit is about 28 percent Monongahela soils, 18 percent Vincent soils, and 54 percent soils of minor extent.

The Monongahela soils formed in alluvial material washed from acid soils on uplands. Monongahela soils have a yellowish brown, medium textured surface layer and a brownish yellow and yellowish brown, medium textured subsoil that is very firm and brittle in the lower part.

The Vincent soils formed in alluvium and lacustrine sediments washed from lime-influenced soils on uplands. Vincent soils have a dark brown, medium textured surface layer and a strong brown, yellowish red, and reddish brown, fine textured subsoil.

The minor soils in this unit are the well drained Allegheny soils and the somewhat poorly drained Tyler

soils on terraces; the well drained to poorly drained Udifluvents and Fluvaquents on flood plains; the well drained Gilpin and Upshur soils on uplands; and the Udorthents, smoothed, along Interstate 64 and in urbanized areas.

Most of this unit is cleared and used for cultivated crops, hay, or urban development (fig. 3).

The slope, seasonal high water table, and moderately slow or slow permeability are the main limitations of the Monongahela and Vincent soils for community development.

The slope, seasonal high water table, moderately slow to very slow permeability, hazard of flooding, depth to bedrock, and hazard of slipping are the main limitations of the minor soils for community development.

4. Upshur-Gilpin-Vandalia

Deep and moderately deep, gently sloping to very steep, well drained soils; on uplands and foot slopes

This map unit consists of soils on uplands and foot slopes in the northeastern part of the county (fig. 4). It covers about 26 percent of the county. This unit is about 39 percent Upshur soils, 30 percent Gilpin soils, 7 percent Vandalia soils, and 24 percent soils of minor extent.

The Upshur soils are gently sloping to very steep and are on uplands. They formed in lime-influenced material weathered mainly from clay shale. Upshur soils have a reddish brown, moderately fine textured surface layer and a dark red, fine textured subsoil.

The Gilpin soils are strongly sloping to very steep and are on uplands. They formed in acid material weathered from interbedded siltstone, shale, and sandstone. Gilpin soils have a very dark grayish brown and yellowish brown, medium textured surface layer and a strong brown, medium and moderately fine textured subsoil.

The Vandalia soils are strongly sloping to steep, and are on foot slopes and at the heads of drainageways. They formed in lime-influenced and acid colluvial

Figure 4.—Typical landscape in the Upshur-Gilpin-Vandalia map unit.

material that moved downslope mainly from Upshur and Gilpin soils on uplands. Vandalia soils have a reddish brown, medium textured surface layer and a reddish brown, moderately fine and fine textured subsoil.

The minor soils in this unit are the well drained Moshannon and Sensabaugh soils and the moderately well drained Senecaville soils on flood plains, and the well drained Lily soils and the moderately well drained Coolville and Tilsit soils on uplands.

The soils on the ridgetops, foot slopes, and flood plains are mostly cleared. The soils on the side slopes are usually wooded. Soil slippage is common on the Upshur and Vandalia soils. The erosion is moderate or severe.

The slope, moderately slow or slow permeability, high shrink-swell potential, clayey texture, and hazard of slipping are the main limitations of the Upshur and Vandalia soils for community development. The slope and depth to bedrock are the main limitations of the Gilpin soils for community development.

The slope, moderately slow or slow permeability, hazard of flooding, seasonal high water table, and depth to bedrock are the main limitations of the minor soils for community development.

5. Gilpin-Upshur-Vandalia

Moderately deep and deep, gently sloping to very steep, well drained soils; on uplands and foot slopes

This map unit consists of soils on uplands and foot slopes in the central and southern parts of the county. It covers about 58 percent of the county. This unit is about 48 percent Gilpin soils, 19 percent Upshur soils, 5 percent Vandalia soils, and 28 percent soils of minor extent.

The Gilpin soils are strongly sloping to very steep and are on uplands. They formed in acid material weathered from interbedded siltstone, shale, and sandstone. Gilpin soils have a very dark grayish brown and yellowish brown, medium textured surface layer and a strong brown, medium and moderately fine textured subsoil.

The Upshur soils are gently sloping to very steep and are on uplands. They formed in lime-influenced material weathered mainly from clay shale. Upshur soils have a reddish brown, moderately fine textured surface layer and a dark red, fine textured subsoil.

The Vandalia soils are strongly sloping to steep. They are on foot slopes and at the heads of drainageways. They formed in lime-influenced and acid colluvial material that moved downslope mainly from Gilpin and Upshur soils on uplands. Vandalia soils have a reddish brown, medium textured surface layer and a reddish brown, moderately fine and fine textured subsoil.

The minor soils in this unit are the well drained Moshannon and Sensabaugh soils, the moderately well drained Senecaville soils on flood plains, and the well drained Lily soils and moderately well drained Coolville and Tilsit soils on uplands.

The soils on the ridgetops, foot slopes, and flood plains are mostly cleared. The soils on the side slopes are usually wooded. Soil slippage is common on the Upshur and Vandalia soils. The erosion is moderate or severe.

The slope and depth to bedrock are the main limitations of the Gilpin soils for community development. The slope, moderately slow or slow permeability, high shrink-swell potential, clayey texture, and hazard of slipping are the main limitations of the Upshur and Vandalia soils for community development.

The slope, moderately slow or slow permeability, hazard of flooding, seasonal high water table, and depth to bedrock are the main limitations of the minor soils for community development.

Detailed Soil Map Units

Dr. John Sencindiver, assistant professor of soil science, West Virginia University, 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 underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Upshur silty clay loam, 8 to 15 percent slopes, is one of several phases in the Upshur series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Gilpin-Upshur complex, 15 to 25 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Udifluvents and Fluvaquents, frequently flooded, is an undifferentiated group in this survey area.

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

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

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

Soil Descriptions

AgA—Allegheny loam, 0 to 3 percent slopes. This soil is nearly level and well drained. The areas are on terraces mainly in the Teays Valley and along the Kanawha River.

Typically, the surface layer is dark brown loam about 10 inches thick. The subsoil is about 42 inches thick. The upper 7 inches of the subsoil is yellowish brown loam. The next 26 inches is strong brown loam and clay loam, and the lower 9 inches is strong brown loam. The substratum is strong brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of moderately well drained Monongahela soils and somewhat poorly drained Tyler soils. Also included are a few small areas of soils that have a silt loam surface layer, a few small areas of a soil that has a reddish brown subsoil, a few small areas of soils that have a loamy sand subsoil, and a few small areas of gently

sloping soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Allegheny soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid. The depth to bedrock is greater than 60 inches.

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

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

This soil has few, if any, limitations for community development.

This soil is in capability class I.

AgB—Allegheny loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. The areas are on terraces, mainly in the Teays Valley and along the Kanawha River.

Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil is about 41 inches thick. The upper 7 inches of the subsoil is yellowish brown loam. The next 25 inches is strong brown loam and clay loam, and the lower 9 inches is strong brown loam. The substratum is strong brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of moderately well drained Monongahela and Vincent soils and somewhat poorly drained Tyler soils. Also included are a few small areas of soils that have a silt loam surface layer, a few small areas of soils that have a reddish brown subsoil, a few small areas of soils that have a loamy sand subsoil, and a few small areas of strongly sloping soils. In the Teays Valley, a few small areas have a hard ironstone layer .25 to 2 inches thick. These inclusions make up about 25 percent of the unit.

The available water capacity of this Allegheny soil is high. Permeability is moderate in the subsoil. Runoff is medium, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid. The depth to bedrock is greater than 60 inches.

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

This soil has high potential for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

This soil has few, if any, limitations for community development.

This soil is in capability subclass IIe.

AgC—Allegheny loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. The areas are on terraces, mainly in the Teays Valley and along the Kanawha River.

Typically, the surface layer is dark brown loam about 8 inches thick. The subsoil is about 41 inches thick. The upper 7 inches of the subsoil is yellowish brown loam. The next 25 inches is strong brown loam and clay loam, and the lower 9 inches is strong brown loam. The substratum is strong brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the moderately well drained Monongahela and Vincent soils and the somewhat poorly drained Tyler soils. Also included are a few small areas of soils that have a silt loam surface layer, a few small areas of soils that have a reddish brown subsoil, a few small areas of soils that have a loamy sand subsoil, and a few small areas of moderately steep soils. In the Teays Valley, a few small areas have a hard ironstone layer .25 to 2 inches thick. These inclusions make up about 25 percent of the unit.

The available water capacity of this Allegheny soil is high. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid. The depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is farmed, or it is urbanized. The hazard of erosion, which is severe in unprotected areas, is a management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes and rotational grazing.

This soil has high potential for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

Slope is the main limitation of this soil for community development.

This soil is in capability subclass IIIe.

AsA—Ashton silt loam, 0 to 3 percent slopes. This soil is nearly level and well drained. It is on high flood plains along the Kanawha River.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 39 inches thick. The upper 6 inches of the subsoil is dark brown silt loam. The next 21 inches is dark brown silty clay loam, and the lower 12 inches is strong brown silt loam. The substratum is dark yellowish brown loam with pockets of fine sandy loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of the well drained Huntington and Kanawha soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. Also included are a few small areas of soils that have a loam surface layer and a loam subsoil and a few small areas of gently sloping soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Ashton soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is medium acid to neutral. The depth to bedrock is greater than 60 inches.

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

This soil has very high potential for trees, but only a small acreage is wooded.

The hazard of flooding is the main limitation of this soil for community development.

This soil is in capability class I.

AsB—Ashton silt loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. The areas are on high flood plains along the Kanawha River.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 38 inches thick. The upper 5 inches of the subsoil is dark brown silt loam. The next 21 inches is dark brown silty clay loam, and the lower 12 inches is strong brown silt loam. The substratum is dark yellowish brown with pockets of fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Huntington and Kanawha soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. Also included are a few small areas of soils that have a loam surface layer and a loam subsoil, and a few small areas of nearly level soils and strongly sloping soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Ashton soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is medium acid to neutral. The depth to bedrock is greater than 60 inches.

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

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

The hazard of flooding is the main limitation of this soil for community development.

This soil is in capability subclass IIe.

CoB—Coolville silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. It is mostly on broad ridgetops in the northeastern part of the county.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is about 26 inches thick. The upper 11 inches of the subsoil is brownish yellow and yellowish brown silty clay loam mottled in the lower part with light brown. The next 9 inches is yellowish red silty clay mottled with pinkish gray and pink, and the lower 6 inches is strong brown channery silty clay loam mottled with reddish yellow and light brownish gray. The substratum is brownish yellow channery silty clay loam mottled with light gray that extends to bedrock at a depth of about 40 inches.

Included with this soil in mapping are a few small areas of the well drained Gilpin and Upshur soils and the moderately well drained Tilsit soils. Also included are a few small areas of a soil that has a loam surface layer and a silt loam or loam subsoil, nearly level soils, and strongly sloping soils. These inclusions make up about 25 percent of the unit.

The available water capacity of this Coolville soil is moderate or high. Permeability is slow in the subsoil. Runoff is medium, and natural fertility is moderate. Where unlimed, the soil is strongly acid to extremely acid. The depth to bedrock is 40 to 50 inches.

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

legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

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

The seasonal high water table, slow permeability, and clayey texture are the main limitations of this soil for community development.

This soil is in capability subclass IIe.

CoC—Coolville silt loam, 8 to 15 percent slopes. This soil is strongly sloping and moderately well drained. It is mostly on broad ridgetops in the northeastern part of the county.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 25 inches thick. The upper 10 inches of the subsoil is brownish yellow and yellowish brown silty clay loam mottled in the lower part with light brown. The next 9 inches is yellowish red silty clay mottled with pinkish gray and pink, and the lower 6 inches is strong brown channery silty clay loam mottled with reddish yellow and light brownish gray. The substratum is brownish yellow channery silty clay loam mottled with light gray that extends to bedrock at a depth of about 40 inches.

Included with this soil in mapping are a few small areas of the well drained Gilpin and Upshur soils and the moderately well drained Tilsit soils. Also included are a few small areas of a soil that has a loam surface layer and a silt loam or loam subsoil and a few small areas of gently sloping soils. These inclusions make up about 25 percent of the unit.

The available water capacity of this Coolville soil is moderate or high. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate. Where unlimed, the soil is strongly acid to extremely acid. The depth to bedrock is 40 to 50 inches.

This soil is suited to cultivated crops and to hay and pasture. It is used mainly for hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

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

The slope, seasonal high water table, slow permeability, and clayey texture are the main limitations of this soil for community development.

This soil is in capability subclass IIIe.

GlC—Gilpin silt loam, 8 to 15 percent slopes. This soil is strongly sloping and is well drained. It is mostly on ridgetops in the central and southern part of the county.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is strong brown and is about 24 inches thick. The upper 9 inches of the subsoil is silt loam, and the lower 15 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 36 inches.

Included with this soil in mapping are a few small areas of the well drained Lily and Upshur soils, and a few small areas of the moderately well drained Coolville and Tilsit soils. Also included are a few small areas of severely eroded soils, soils where the depth to bedrock is less than 20 inches, and moderately steep soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Gilpin soil is low or moderate. Permeability is moderate. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, the soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to hay and pasture. It is used mainly for hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include rotational grazing and proper stocking rates to maintain desirable grasses and legumes.

The soil has moderately high potential for trees, and a moderate acreage is wooded. Erosion on logging roads and trails is a management concern, but it can be reduced by locating the roads and trails on the contour.

The slope and depth to bedrock are the main limitations of this soil for community development.

This soil is in capability subclass IIIe.

GuC—Gilpin-Upshur complex, 8 to 15 percent slopes. This complex consists of strongly sloping, well drained soils on ridgetops in the central and southern parts of the county. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 55 percent Gilpin silt loam, 25 percent Upshur silty clay loam, and 20 percent other soils.

Typically, the surface layer of the Gilpin soil is dark grayish brown silt loam about 7 inches thick. The subsoil is strong brown and is about 24 inches thick. The upper 9 inches of the subsoil is silt loam, and the lower 15 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 36 inches.

Typically, the surface layer of the Upshur soil is reddish brown silty clay loam about 7 inches thick. The subsoil is dark red and is about 29 inches thick. The upper 12 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 44 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils and the moderately well drained Tilsit and Coolville soils. Also included are a few small areas of a soil that is similar to the Gilpin soil, but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; and a few small areas of severely eroded soils, gently sloping soils, and moderately steep soils.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These soils are suited to cultivated crops and to hay and pasture. Most areas are used for hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If these soils are used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm.

These soils have moderately high to high potential for trees, and a moderate acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil are the main limitations of these soils for community development.

These soils are in capability subclass IIIe.

GuC3—Gilpin-Upshur complex, 8 to 15 percent slopes, severely eroded. This complex consists of strongly sloping, well drained, severely eroded soils on ridgetops in the central and southern parts of the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 55 percent Gilpin silt loam, 25 percent Upshur silty clay, and 20 percent other soils.

Typically, the surface layer of the Gilpin soil is yellowish brown silt loam about 5 inches thick. The subsoil is strong brown and is about 22 inches thick. The upper 7 inches of the subsoil is silt loam, and the lower 15 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 32 inches.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay about 5 inches thick. The subsoil is dark red and is about 27 inches thick. The upper 10 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 42 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils and the moderately well drained Tilsit and Coolville soils. Also included are a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; and a few small areas of moderately eroded soils, gently sloping soils, and moderately steep soils.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These soils have limited suitability for cultivated crops and are better suited to hay and pasture. The hazard of erosion, which is very severe in unprotected areas, is a

major management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If these soils are used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm.

These soils have moderately high to high potential for trees, and a moderate acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil are the main limitations of these soils for community development.

These soils are in capability subclass IVe.

GuD—Gilpin-Upshur complex, 15 to 25 percent slopes. This complex consists of moderately steep, well drained soils on ridgetops and benches in the central and southern parts of the county. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 55 percent Gilpin silt loam, 25 percent Upshur silty clay loam, and 20 percent other soils.

Typically, the surface layer of the Gilpin soil is dark brown silt loam about 5 inches thick. The subsoil is strong brown and is about 22 inches thick. The upper 8 inches of the subsoil is silt loam, and the lower 14 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 35 inches.

Typically, the surface layer of the Upshur soil is reddish brown silty clay loam about 5 inches thick. The subsoil is dark red and is about 28 inches thick. The upper 11 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 43 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils and the moderately well drained Tilsit and Coolville soils. Also included are a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; and a few small areas of severely eroded soils, stony soils, strongly sloping soils, steep soils, and escarpments.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These soils have limited suitability for cultivated crops and are better suited to hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a major management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil are practices that help to control erosion and to maintain fertility and tilth. If these soils are used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm.

These soils have moderate to high potential for trees, and about one-third to one-half of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil are the main limitations of these soils for community development.

These soils are in capability subclass IVe.

GuD3—Gilpin-Upshur complex, 15 to 25 percent slopes, severely eroded. This complex consists of moderately steep, well drained soils on ridgetops and benches in the central and southern parts of the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 55 percent Gilpin silt loam, 25 percent Upshur silty clay, and 20 percent other soils.

Typically, the surface layer of the Gilpin soil is brown silt loam about 5 inches thick. The subsoil is strong brown and is about 20 inches thick. The upper 6 inches of the subsoil is silt loam, and the lower 14 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 33 inches.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay about 5 inches thick. The subsoil

is dark red and is about 26 inches thick. The upper 9 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 41 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils and the moderately well drained Tilsit and Coolville soils. Also included are a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; and a few small areas of moderately eroded soils, stony soils, strongly sloping soils, steep soils, and escarpments.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These soils are not suited to cultivated crops or hay, but are suited to pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. If these soils are used for pasture, overgrazing can result in more severe erosion. Proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm are major pasture management needs.

These soils have moderate to high potential for trees, and about one-third to one-half of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil are the main limitations of these soils for community development.

These soils are in capability subclass VIe.

GuE—Gilpin-Upshur complex, 25 to 35 percent slopes. This complex consists of steep, well drained soils on hillsides and benches in the central and southern parts of the county. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Gilpin silt loam, 20 percent Upshur silty clay loam, and 30 percent other soils.

Typically, the surface layer of the Gilpin soil is very dark grayish brown and yellowish brown silt loam about 4 inches thick. The subsoil is strong brown and is about 20 inches thick. The upper 8 inches of the subsoil is silt loam, and the lower 12 inches is channery silty clay loam. The substratum is strong brown channery silt loam that extends to bedrock at a depth of about 34 inches.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay loam about 4 inches thick. The subsoil is dark red and is about 26 inches thick. The upper 10 inches is very sticky and very plastic clay, and the lower 16 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 42 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils. Also included are a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; and a few small areas of severely eroded soils, stony soils, moderately steep soils, very steep soils, and escarpments.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These soils are not suited to cultivated crops or hay, but are suited to pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. If these soils are used for pasture, overgrazing is a major management concern. Proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm are major pasture management needs.

These soils have moderate to high potential for trees, and about two-thirds of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock in the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of

the Upshur soil are the main limitations of these soils for community development.

These soils are in capability subclass VIe.

GuE3—Gilpin-Upshur complex, 25 to 35 percent slopes, severely eroded. This complex consists of steep, well drained soils on hillsides and benches in the central and southern parts of the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Gilpin silt loam, 20 percent Upshur silty clay, and 30 percent other soils.

Typically, the surface layer of the Gilpin soil is brown silt loam about 3 inches thick. The subsoil is strong brown and is about 18 inches thick. The upper 6 inches of the subsoil is silt loam, and the lower 12 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 31 inches.

Typically, the surface layer of the Upshur soil is reddish brown silty clay about 3 inches thick. The subsoil is dark red and is about 25 inches thick. The upper 9 inches of the subsoil is very sticky and very plastic clay, and the lower 16 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 40 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils. Also included are a few small areas of a soil that is similar to the Gilpin soils but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; and a few small areas of moderately eroded soils, stony soils, moderately steep soils, very steep soils, and escarpments.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low to moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. The hazard of erosion is very severe in unprotected areas. Bare areas are difficult to revegetate, but they should be seeded to permanent cover. Mulching will help protect seeded areas until the plants become established. These soils have moderate to high potential for trees, and about two-thirds of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock in the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil are the main limitations of these soils for community development.

These soils are in capability subclass VIIe.

GuF—Gilpin-Upshur complex, 35 to 65 percent slopes. This complex consists of very steep, well drained soils on hillsides throughout the county. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Gilpin silt loam, 25 percent Upshur silty clay loam, and 25 percent other soils.

Typically, the surface layer of the Gilpin soil is very dark grayish brown and yellowish brown silt loam about 4 inches thick. The subsoil is strong brown and is about 20 inches thick. The upper 8 inches of the subsoil is silt loam, and the lower 12 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 34 inches.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay loam about 4 inches thick. The subsoil is dark red and is about 26 inches thick. The upper 10 inches of the subsoil is very sticky and very plastic clay, and the lower 16 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to a depth of about 42 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils. Also included are a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; a few small areas of severely eroded soils, stony soils, steep soils, and escarpments. Most areas of this unit in the northeastern part of the county consist of 50 percent Upshur soil, 25 percent Gilpin soil, and 25 percent inclusions.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of the Upshur soil is moderate or high. Permeability is slow in the subsoil. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly

acid to slightly acid in the surface layer and subsoil and strongly acid to slightly acid in the substratum. Depth to bedrock is 40 to 60 inches. The subsoil has a high shrink-swell potential.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. The hazard of erosion is very severe in unprotected areas. These soils have moderate to high potential for trees, and about four-fifths of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock in the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil are the main limitations of these soils for community development.

These soils are in capability subclass VIIe.

GuF3—Gilpin-Upshur complex, 35 to 65 percent slopes, severely eroded. This complex consists of very steep, well drained soils on hillsides throughout the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Gilpin silt loam, 25 percent Upshur silty clay, and 25 percent other soils.

Typically, the surface layer of the Gilpin soil is brown silt loam about 3 inches thick. The subsoil is strong brown and is about 18 inches thick. The upper 6 inches of the subsoil is silt loam, and the lower 12 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 31 inches.

Typically, the surface layer of the Upshur soil is silty clay about 3 inches thick. The subsoil is dark red and is about 25 inches thick. The upper 9 inches of the subsoil is very sticky and very plastic clay, and the lower 16 inches is very sticky and very plastic clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 40 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils. Also included are a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; and a few small areas of moderately eroded soils, a few small areas of stony soils, a few escarpments, and a few small areas of steep soils. Most areas of this unit in the northeastern part of the county consist of 50 percent Upshur soil, 25 percent Gilpin soil, and 25 percent inclusions.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These soils are not suited to cultivated crops or hay and are very difficult to manage for pasture. Livestock should be excluded from these soils. The hazard of erosion is very severe in unprotected areas. Bare areas are difficult to revegetate, but they should be seeded to a permanent cover. Mulching will help protect seeded areas until the plants become established. These soils have moderate to high potential for trees, and about four-fifths of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock in the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil are the main limitations of these soils for community development.

These soils are in capability subclass VIIe.

GvE—Gilpin-Upshur complex, stony, 15 to 35 percent slopes. This complex consists of moderately steep and steep, well drained soils on ridgetops and hillsides throughout the county. These soils have 1 to 3 percent of their surface covered with stones that are 1 to 2 feet across. Areas of these soils are so intermingled that it was not practical to map them separately. This complex is about 50 percent Gilpin silt loam, 20 percent Upshur silty clay loam, and 30 percent other soils.

Typically, the surface layer of the Gilpin soil is very dark grayish brown and yellowish brown silt loam about 5 inches thick. The subsoil is strong brown and is about 21 inches thick. The upper 8 inches of the subsoil is silt loam, and the lower 13 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 35 inches.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay loam about 5 inches thick. The subsoil is dark red and is about 27 inches thick. The upper 10 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and

very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 43 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils. Also included are a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; and a few small areas of severely eroded soils, nonstony soils, strongly sloping soils, very steep soils, and bedrock escarpments.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These stony soils are not suited to cultivated crops or hay and are difficult to manage for pasture. The erosion hazard is very severe in unprotected areas. These soils have moderate to high potential for trees, and about nine-tenths of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock in the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil, and stones are the main limitations of these soils for community development.

These soils are in capability subclass VIIs.

GvF—Gilpin-Upshur complex, stony, 35 to 65 percent slopes. This complex consists of very steep, well drained soils on hillsides throughout the county. These soils have 1 to 3 percent of their surface covered with stones that are 1 to 2 feet across. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Gilpin silt loam, 20 percent Upshur silty clay loam, and 30 percent other soils.

Typically, the surface layer of the Gilpin soil is very dark grayish brown and yellowish brown silt loam about 4 inches thick. The subsoil is strong brown and is about 20 inches thick. The upper 8 inches of the subsoil is silt loam, and the lower 12 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 34 inches.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay loam about 4 inches thick. The subsoil is dark red and is about 26 inches thick. The upper 10 inches of the subsoil is very sticky and very plastic clay, and the lower 16 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 42 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils. Also included are areas of rock outcrop, a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches to bedrock; a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches to bedrock; and a few small areas of severely eroded soils, nonstony soils, steep soils, and bedrock escarpments.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

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

These soils are not suited to cultivated crops, hay, or pasture because of slope and a very severe erosion hazard. These soils have moderate to high potential for trees. Most of the acreage is wooded (fig. 5). The use of equipment is restricted by the slope and rock outcrops in many areas, and the Upshur soil is soft and slippery when wet. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, clayey texture, low strength, and hazard of slippage of the Upshur soil, and stones are the main limitations of these soils for community development.

These soils are in capability subclass VIIs.

HaA—Hackers silt loam, 0 to 3 percent slopes. This soil is nearly level and well drained. It is on high flood plains, mainly along Eighteenmile and Hurricane Creeks and the Pocatalico River.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 36 inches thick. The upper 21 inches of the subsoil is yellowish red silty clay loam. The next 9 inches is reddish brown silty clay loam, and the lower 6 inches is dark reddish brown

Figure 5.—A wooded area of Gilpin-Upshur complex, stony, 35 to 65 percent slopes.

loam. The substratum is dark reddish brown fine sandy loam with pockets of loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Moshannon and Sensabaugh soils and the moderately well drained Senecaville soils. Also included are a few small areas of soils that have a loam surface layer and subsoil, and a few small areas of gently sloping soils. These inclusions make up about 15 percent of the unit.

The available water capacity of this Hackers soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is strongly acid to medium acid. The depth to bedrock is greater than 60 inches. Flooding is unlikely on this soil, but is possible under unusual weather conditions.

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

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

The hazard of flooding is the main limitation of this soil for community development.

This soil is in capability class I.

HaB—Hackers silt loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. It is on high flood plains, mainly along Eighteenmile Creek, Hurricane Creek, and the Pocatalico River.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 34 inches thick. The upper 19 inches of the subsoil is yellowish red silty clay loam. The next 9 inches is reddish brown silty clay loam, and the lower 6 inches is dark reddish brown loam. The substratum is dark reddish brown fine sandy loam with pockets of loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Moshannon and Sensabaugh soils and the moderately well drained Senecaville soils. Also included are a few small areas of soils that have a loam surface layer and subsoil and a few small areas of strongly sloping soils. These inclusions make up about 15 percent of the unit.

The available water capacity of this Hackers soil is high. Permeability is moderate in the subsoil. Runoff is medium, and natural fertility is high. Where unlimed, the soil is strongly acid or medium acid. The depth to bedrock is greater than 60 inches. Flooding is unlikely on this soil, but is possible under unusual weather conditions.

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

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

The hazard of flooding is the main limitation of this soil for community development.

This soil is in capability subclass IIe.

Hu—Huntington loam. This soil is nearly level and well drained. It is on flood plains along the Kanawha River.

Typically, the surface layer is dark brown loam about 10 inches thick. The subsoil is dark yellowish brown and is about 35 inches thick. The upper 21 inches of the subsoil is loam, and the lower 14 inches is fine sandy loam. The substratum is dark yellowish brown sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Ashton and Kanawha soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. Also included are a few small areas of soils that have a thinner subsoil, soils that are more sandy throughout, soils that are more silty throughout, soils that are gently sloping, and soils that have a lighter colored surface layer. These inclusions make up about 15 percent of the unit.

The available water capacity of this Huntington soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is medium acid to neutral. The depth to bedrock is greater than 60 inches. Flooding is unlikely on this soil, but is possible under unusual weather conditions.

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

This soil has very high potential for trees, but only a small acreage is wooded.

The hazard of flooding is the main limitation of this soil for community development.

This soil is in capability class I.

KaA—Kanawha loam, 0 to 3 percent slopes. This soil is nearly level and well drained. It is on high flood plains and low terraces along the Kanawha River where it is protected from flooding.

Typically, the surface layer is dark brown loam about 10 inches thick. The subsoil is strong brown and is about 32 inches thick. The upper 12 inches of the subsoil is loam. The next 9 inches is heavy fine sandy loam, and the lower 11 inches is sandy loam. The substratum is strong brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Ashton and Huntington soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. Also included are a few small areas of soils that have a thinner subsoil, a few small areas of soils that have a silty clay loam subsoil, and a few small areas of gently sloping soils. These inclusions make up about 15 percent of the unit.

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

This soil is well suited to cultivated crops, hay, and pasture. Most of the acreage is farmed. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and

tilth. If this soil is used for pasture, the major management needs include rotational grazing and proper stocking rates to maintain desirable grasses and legumes.

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

This soil has few, if any, limitations for community development. It is protected from flooding by flood-control structures on the Kanawha River System.

This soil is in capability class I.

KaB—Kanawha loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. It is on high flood plains and low stream terraces along the Kanawha River where it is protected from flooding.

Typically, the surface layer is dark brown loam about 10 inches thick. The subsoil is strong brown and is about 32 inches thick. The upper 12 inches of the subsoil is loam. The next 9 inches is strong brown heavy fine sandy loam, and the lower 11 inches is strong brown sandy loam. The substratum is strong brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Ashton and Huntington soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. Also included are a few small areas of soils that have a thinner subsoil, a few small areas of soils that have a silty clay loam subsoil, and a few small areas of strongly sloping soils. These inclusions make up about 15 percent of the unit.

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

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

This soil has high potential for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a management concern, but it can be reduced by locating roads and trails on the contour.

This soil has few, if any, limitations for community development. It is protected from flooding by flood-control structures on the Kanawha River System.

This soil is in capability subclass IIe.

LIC—Lily loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. It is on ridgetops throughout the county.

Typically, the surface layer is yellowish brown loam about 7 inches thick. The subsoil is yellowish brown loam and is about 13 inches thick. The substratum is strong brown channery fine sandy loam that extends to bedrock at a depth of about 24 inches.

Included with this soil in mapping are a few small areas of the well drained Gilpin soils. Also included are a few small areas of severely eroded soils, stony soils, and moderately steep soils. These inclusions make up about 15 percent of the unit.

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

This soil is suited to cultivated crops, hay, and pasture. It is used mainly for hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, major management needs include rotational grazing and proper stocking rates to maintain desirable grasses and legumes.

The soil has moderate potential for trees, and a moderate acreage is wooded. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock are the main limitations of this soil for community development.

This soil is in capability subclass IIIe.

LID—Lily loam, 15 to 25 percent slopes. This soil is moderately steep and well drained. It is on ridgetops and rounded knobs throughout the county.

Typically, the surface layer is yellowish brown loam about 7 inches thick. The subsoil is yellowish brown loam and is about 13 inches thick. The substratum is strong brown channery fine sandy loam that extends to bedrock at a depth of about 24 inches.

Included with this soil in mapping are a few small areas of the well drained Gilpin soils. Also included are a few small areas of severely eroded soils, stony soils, strongly sloping soils, and steep soils. These inclusions make up about 15 percent of the unit.

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

This soil has limited suitability for cultivated crops and is better suited to hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a major management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include rotational grazing and proper stocking rates to maintain desirable grasses and legumes.

This soil has moderate potential for trees, and about one-third of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock are the main limitations of this soil for community development.

This soil is in capability subclass IVe.

LlE—Lily loam, 25 to 35 percent slopes. This soil is steep and well drained. It is on ridgetops and rounded knobs throughout the county.

Typically, the surface layer is dark brown loam about 6 inches thick. The subsoil is yellowish brown loam and is 14 inches thick. The substratum is strong brown channery fine sandy loam that extends to bedrock at a depth of about 22 inches.

Included with this soil in mapping are a few small areas of the well drained Gilpin soils. Also included are a few small areas of soils that are less than 20 inches deep over bedrock, a few small areas of severely eroded soils, stony soils, moderately steep soils, and very steep soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Lily soil is moderate. Permeability is moderately rapid in the subsoil. Runoff is very rapid, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or hay, but it is suited to pasture. The hazard of erosion, which is very severe in unprotected areas, is a major management concern. If this soil is used for pasture, the major management needs include rotational grazing and proper stocking rates to maintain desirable grasses and legumes.

This soil has moderate potential for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope and depth to bedrock are the main limitations of this soil for community development.

This soil is in capability subclass VIe.

Ln—Lindside silt loam. This soil is nearly level and moderately well drained. It is on flood plains along the Kanawha River.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 32 inches thick. The upper 11 inches of the subsoil is brown silty clay loam, and the lower 21 inches is brown silty clay loam mottled with light brownish gray and pale brown. The substratum is brown silty clay loam mottled with light gray to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Ashton, Huntington, and Kanawha soils and a few small areas of the poorly drained Melvin soils. Also included are a few small areas of soils with a loam surface layer, a few small areas of soils with a loam or silty clay subsoil, and a few small areas of gently sloping soils. These inclusions make up about 10 percent of the unit.

The available water capacity of this Lindside soil is high. Permeability is moderate or moderately slow in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly acid in the lower part of the subsoil and substratum. The depth to bedrock is greater than 60 inches. Flooding is unlikely on this soil, but is possible under unusual weather conditions.

This soil is suited to cultivated crops, hay, and pasture. Most of the acreage is farmed. Some small areas are wet and need artificial drainage. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop. Delaying tillage until the soil is reasonably dry and working the residue from the cover crop into the soil help to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

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

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

This soil is in capability subclass IIw.

Me—Melvin silt loam. This soil is nearly level and poorly drained. It is on flood plains along the Kanawha River.

Typically, the surface layer is pale brown silt loam about 9 inches thick. The subsoil is gray silty clay loam mottled with pale brown and strong brown and is about 21 inches thick. The substratum is gray silty clay loam mottled with strong brown to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Ashton, Huntington, and

Kanawha soils and a few small areas of the moderately well drained Lindside soils. Also included are a few small areas of soils with a silty clay loam surface layer and a silty clay subsoil and a few small areas of gently sloping soils. These inclusions make up about 10 percent of the unit.

The available water capacity of this Melvin soil is high. Permeability is moderate in the subsoil. Runoff is slow, and natural fertility is high. Where unlimed, the soil is medium acid to neutral. Depth to bedrock is greater than 60 inches. Flooding is unlikely on this soil, but is possible under unusual weather conditions.

This soil is suited to cultivated crops, but is better suited to water-tolerant hay or pasture plants. Most of the acreage is farmed. Artificial drainage is needed for cultivated crops or for hay or pasture, and providing drainage is a major management concern. Using conservation tillage systems and a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and returning crop residue to the soil help to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

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

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

This soil is in capability subclass IIIw.

Mf—Melvin-Lindside silt loams. This complex consists of nearly level soils on high flood plains and low terraces along the Kanawha River where they are protected from flooding. Areas of these soils are so intermingled that it was not practical to map them separately. This map unit is about 40 percent poorly drained Melvin silt loam, 30 percent moderately well drained Lindside silt loam, and 30 percent other soils.

Typically, the surface layer of the Melvin soil is pale brown silt loam about 9 inches thick. The subsoil is gray silty clay loam mottled with pale brown and strong brown and is about 21 inches thick. The substratum is gray silty clay loam mottled with strong brown to a depth of 60 inches or more.

Typically, the surface layer of the Lindside soil is dark brown silt loam about 8 inches thick. The subsoil is about 32 inches thick. The upper 11 inches of the subsoil is brown silty clay loam, and the lower 21 inches is brown silty clay loam mottled with light brownish gray and pale brown. The substratum is brown silty clay loam mottled with light gray to a depth of 60 inches or more.

Included with these soils in mapping are a few small areas of the well drained Ashton and Kanawha soils. Also included are a few small areas of soils that have a silty clay or clay subsoil. Also included are a few small areas of soils that have a firm and brittle layer in the subsoil, soils that are sloping, and a few small areas of soils that are subject to occasional ponding.

The available water capacity of this Melvin soil is high. Permeability is moderate in the subsoil. Runoff is slow, and natural fertility is high. Where unlimed, the soil is medium acid to neutral. Depth to bedrock is greater than 60 inches.

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

These soils are suited to cultivated crops, but are better suited to water-tolerant hay or pasture plants. Most of the acreage is farmed. The Melvin soil needs artificial drainage for cultivated crops, hay, or pasture. Providing drainage is a major management concern. Using conservation tillage systems and a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and returning crop residue to the soil help to maintain fertility and tilth. If these soils are used for pasture, major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soils are reasonably firm.

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

The seasonal high water table is the main limitation of these soils for community development. These soils are protected from flooding by flood-control structures on the Kanawha River System.

These soils are in capability subclass IIIw.

MgB—Monongahela silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. It is on terraces, mainly in the Teays Valley.

Typically, the surface layer is yellowish brown silt loam about 9 inches thick. The subsoil is about 51 inches thick. The upper 16 inches of the subsoil is brownish yellow silt loam, and the lower 35 inches is a very firm and brittle layer of yellowish brown and brownish yellow silt loam mottled with light gray. The substratum is mixed yellow, very pale brown, and light gray silt loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of the well drained Allegheny soils; the moderately well drained Vincent soils; the somewhat poorly drained Tyler soils; and, on short steep slopes, the well drained Gilpin and Upshur soils. Also included are a few small areas of soils that do not have a very firm and brittle layer in the subsoil, a few small areas of soils that have

a loam surface layer and a loam or sandy loam subsoil, and a few small areas of nearly level soils and strongly sloping soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Monongahela soil is moderate. Permeability is moderate above the very firm part of the subsoil and moderately slow or slow in the very firm part. Runoff is medium, and natural fertility is low. Where unlimed, the soil is strongly acid or very strongly acid. The depth to bedrock is generally greater than 60 inches.

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

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

The seasonal high water table and moderately slow or slow permeability are the main limitations of this soil for community development.

This soil is in capability subclass IIe.

MgC—Monongahela silt loam, 8 to 15 percent slopes. This soil is strongly sloping and moderately well drained. It is on terraces, mainly in the Teays Valley.

Typically, the surface layer is yellowish brown silt loam about 8 inches thick. The subsoil is about 50 inches thick. The upper 15 inches of the subsoil is brownish yellow silt loam, and the lower 35 inches is a very firm layer of yellowish brown and brownish yellow silt loam mottled with light gray. The substratum is mixed yellow, very pale brown, and light gray silt loam to a depth of 72 inches or more.

Included with this soil in mapping are a few small areas of the well drained Allegheny soils; the moderately well drained Vincent soils, the somewhat poorly drained Tyler soils; and, on short steep slopes, the well drained Gilpin and Upshur soils. Also included are a few small areas of soils that do not have a very firm and brittle layer in the subsoil, a few small areas of soils that have a loam surface layer and a loam or sandy loam subsoil, and a few small areas of gently sloping soils and moderately steep soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Monongahela soil is moderate. Permeability is moderate above the very firm part of the subsoil and moderately slow or slow in the very firm part. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or very strongly acid. The depth to bedrock is generally greater than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is farmed or urbanized. The hazard of erosion, which is severe in unprotected areas, is a management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

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

The slope, seasonal high water table, and moderately slow or slow permeability are the main limitations of this soil for community development.

This soil is in capability subclass IIIe.

Mo—Moshannon silt loam. This soil is nearly level and well drained. It is on flood plains along larger streams.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 28 inches thick. The upper 5 inches of the subsoil is reddish brown silt loam. The next 12 inches is yellowish red silt loam, and the lower 11 inches is yellowish red loam. The substratum is dark brown stratified loam, sandy loam, and loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Hackers and Sensabaugh soils and the moderately well drained Senecaville soils. Also included are a few small areas of soils that have a loam surface layer, soils that have a fine sandy loam subsoil, and soils that are gently sloping. These inclusions make up about 15 percent of the unit.

The available water capacity of this Moshannon soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is slightly acid or medium acid. The depth to bedrock is greater than 60 inches. Flooding is infrequent under usual weather conditions.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is farmed. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. In places, crops are subject to damage from

flooding. If this soil is used for pasture, the major management needs include rotational grazing and proper stocking rates to maintain desirable grasses and legumes.

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

The hazard of flooding is the main limitation of this soil for community development.

This soil is in capability subclass IIw.

Se—Senecaville silt loam. This soil is nearly level and moderately well drained. It is mainly on flood plains along the Pocatalico River, Eighteenmile Creek, Trace Fork, Hurricane Creek, and their tributaries.

Typically, the surface layer is dark brown silt loam about 6 inches thick. The subsoil is reddish brown silt loam and is about 24 inches thick. The lower part is mottled with brown and dark brown. The substratum is dark reddish gray silt loam and gray fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Hackers, Moshannon, and Sensabaugh soils. Also included are a few small areas of soils that have a loam surface layer and fine sandy loam subsoil, a few small areas of poorly drained soils, and a few small areas of gently sloping soils. These inclusions make up about 25 percent of the unit.

The available water capacity of this Senecaville soil is high. Permeability is moderate or moderately slow in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is slightly acid to strongly acid. The depth to bedrock is greater than 60 inches. Flooding is infrequent under usual weather conditions.

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

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

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

This soil is in capability subclass IIw.

Sf—Senecaville silt loam, rarely flooded. This soil is nearly level and moderately well drained. It is mainly on high flood plains along the Pocatalico River, Eighteenmile Creek, Trace Fork, Hurricane Creek, Five and Twentymile Creek, and their tributaries.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is reddish brown silty clay loam and silt loam and is about 25 inches thick. The lower part is mottled with brown and dark brown. The substratum is dark reddish gray and gray silt loam and fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Hackers and Sensabaugh soils. Also included are a few small areas of soils that have a silty clay loam surface layer and silty clay subsoil; a few small areas of poorly drained soils and gently sloping soils; and a few small areas of soils that are flooded occasionally. These inclusions make up about 20 percent of the unit.

The available water capacity of this Senecaville soil is high. Permeability is moderately slow or moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is slightly acid to strongly acid. The depth to bedrock is greater than 60 inches. Flooding is unlikely on this soil, but it is possible under unusual weather conditions.

This soil is suited to cultivated crops and to hay and pasture. In places, small wet areas need artificial drainage. Most of the acreage is farmed. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

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

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

This soil is in capability subclass IIw.

Sn—Sensabaugh silt loam. This soil is nearly level and well drained. It is on flood plains along small streams.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is reddish brown gravelly loam with pockets of gravelly clay loam in the lower part and is 22 inches thick. The substratum is reddish brown very gravelly loam with pockets of very gravelly clay loam and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Hackers, Moshannon, and Vandalia soils and the moderately well drained Senecaville soils. Also included are a few small areas of moderately deep soils, a few small areas of a soil that is

rarely flooded, and a few small areas of gently sloping soils. These inclusions make up about 25 percent of the unit.

The available water capacity of this Sensabaugh soil is moderate or high. Permeability is moderate or moderately rapid in the subsoil. Runoff is medium, and natural fertility is high. Where unlimed, the soil is medium acid to mildly alkaline. The depth to bedrock is greater than 60 inches. Flooding is infrequent under usual weather conditions.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is farmed. Cultivated crops can be grown continuously but the soil needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. In places, crops are subject to damage from flooding. If this soil is used for pasture, the major management needs include rotational grazing and proper stocking rates to maintain desirable grasses and legumes.

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

The hazard of flooding is the main limitation of this soil for community development.

This soil is in capability subclass IIw.

SrB—Sensabaugh silt loam, rarely flooded, 3 to 8 percent slopes. This soil is gently sloping and well drained. It is on high flood plains and on alluvial fans at the mouth of hollows.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is reddish brown gravelly silty clay loam and gravelly clay loam and is 26 inches thick. The substratum is reddish brown very gravelly loam with pockets of very gravelly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Hackers and Vandalia soils and the moderately well drained Senecaville soils. Also included are a few small areas of moderately deep soils, soils that are occasionally flooded, nearly level soils, and strongly sloping soils. These inclusions make up about 25 percent of the unit.

The available water capacity of this Sensabaugh soil is moderate or high. Permeability is moderate or moderately rapid in the subsoil. Runoff is medium, and natural fertility is high. Where unlimed, the soil is medium acid to mildly alkaline. The depth to bedrock is greater than 60 inches. Flooding is unlikely on this soil, but it is possible under unusual weather conditions.

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

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

The hazard of flooding is the main limitation of this soil for community development.

This soil is in capability class IIe.

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

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is brownish yellow and is about 43 inches thick. The upper 18 inches of the subsoil is silt loam mottled with light gray in the lower part, and the lower 25 inches is a very firm and brittle layer of silt loam mottled with light gray. The substratum is mixed yellowish red and reddish yellow channery silty clay loam mottled with light gray that extends to bedrock at a depth of about 62 inches.

Included with this soil in mapping are a few small areas of the well drained Lily, Gilpin, and Upshur soils and the moderately well drained Coolville soils. Also included are a few small areas of soils that have a loam surface layer and subsoil, a few small areas of soils that are nearly level, and a few small areas of soils that are strongly sloping soils. These inclusions make up about 10 percent of the unit.

The available water capacity of this Tilsit soil is moderate. Permeability is moderate above the very firm part of the subsoil and slow in the very firm part. Runoff is medium, and natural fertility is low. Where unlimed, the soil is strongly acid or extremely acid. Depth to bedrock ranges from 40 to 60 inches or more.

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

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

The seasonal high water table, depth to bedrock, and moderately slow or slow permeability are the main limitations of this soil for community development.

This soil is in capability subclass IIe.

Ty—Tyler silt loam. This soil is nearly level and somewhat poorly drained. It is on terraces, mainly in the Teays Valley and along the Kanawha River.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil is about 43 inches thick. The upper 6 inches of the subsoil is pale brown silt loam mottled with light gray, and the next 9 inches is light brownish gray silty clay loam mottled with brownish yellow. The lower 28 inches is a very firm and brittle layer of pale brown silty clay loam mottled with strong brown and gray. The substratum is light gray silty clay loam mottled with strong brown to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Allegheny soils and the moderately well drained Monongahela and Vincent soils. Also included are a few small areas of soils that do not have a very firm and brittle layer in the subsoil, a few small areas of soils that have a loam surface layer and sandy loam subsoil, a few small areas of soils that are poorly drained, a few small areas of soils that have a silty clay subsoil, and a few small areas of soils that are gently sloping.

The available water capacity of this Tyler soil is moderate. Permeability is moderately slow in the upper part of the subsoil and slow or very slow in the lower part. Runoff is slow, and natural fertility is low. Where unlimed, the soil is strongly acid or very strongly acid. The depth to bedrock is generally greater than 60 inches.

This soil is suited to cultivated crops but is better suited to water-tolerant hay or pasture plants. Most of the acreage is farmed. Artificial drainage is needed for cultivated crops, and providing drainage is a major farming concern. Using a conservation tillage system and a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and returning crop residue to the soil help to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

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

The seasonal high water table and moderately slow to very slow permeability are the main limitations for community development.

This soil is in capability subclass IIIw.

UA—Udifluvents and Fluvaquents, frequently flooded. These soils are nearly level. The areas are mostly on narrow flood plains and drainageways in the Teays Valley. Some areas consist mostly of excessively drained to moderately well drained Udifluvents, some mostly of poorly drained Fluvaquents, and some of both. Udifluvents and Fluvaquents were mapped together because they have no major differences in use and management. The total acreage of the unit is about 40 percent Udifluvents, 30 percent Fluvaquents, and 30 percent other soils.

Udifluvents and Fluvaquents are too variable to have a typical profile. The soil material is generally stratified loamy alluvium. Some layers are up to 50 percent gravel. Udifluvents mostly have a uniform color throughout. Fluvaquents generally have an overall grayish color with bright mottles.

Included with these soils in mapping are a few small areas of the well drained Allegheny soils, the moderately well drained Monongahela and Vincent soils, and the somewhat poorly drained Tyler soils. Also included are a few small areas of Udorthents, smoothed.

The available water capacity of both Udifluvents and Fluvaquents is high. Permeability in these soils is moderate. Runoff is slow, and natural fertility is high. Where unlimed these soils are slightly acid to medium acid. Depth to bedrock is greater than 60 inches. Flooding is likely to occur often under usual weather conditions.

Frequent flooding makes these soils unsuitable for cultivated crops or hay. The soils are suited to pasture, but the Fluvaquents need artificial drainage. If these soils are used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soils are reasonably firm.

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

The hazard of flooding of these Udifluvents and Fluvaquents and the seasonal high water table of the Fluvaquents are the main limitations of these soils for community development.

These soils are not assigned to a capability subclass.

UB—Udorthents, burned, low base. This unit is on hillsides, on foot slopes, on terraces, on flood plains, and at the mouth of hollows. It consists of coal and high-carbon shale refuse from deep mines and loading tipples. This material has burned as a result of spontaneous combustion. The unit consists of steep or very steep mounds and nearly level or gently sloping, broad and irregularly shaped areas.

Udorthents are too variable to have a typical pedon, but the surface layer of one of the more common pedons is very dark gray to black very shaly sandy loam about 5 inches thick. The surface layer is underlain by layers of dark gray very shaly loam, reddish brown very shaly sandy loam, and white shaly clay loam to a depth of 40 inches or more.

Included with this unit in mapping are small areas of Udorthents, mudstone and sandstone, high and low base; a few small areas of very low base soil materials;

and a few small areas of finely ground carbolithic material. Also included are small areas of Gilpin, Upshur, Vandalia, Sensabaugh, and Moshannon soils. These inclusions make up about 20 percent of the unit.

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

These Udorthents are not suited to cultivated crops, hay, or pasture. The surface layer readily absorbs heat and has a low water-holding capacity. Mulching with straw or hay helps prevent heat damage until plant growth is adequate to shade the soil surface. Seeding grasses and legumes and planting trees during the fall will help establish plant cover.

Establishing a plant cover requires the incorporation of adequate lime and fertilizer in the surface layer or the application of a suitable soil material to a depth of 6 inches.

The invading plants on this unit are dominantly red maple, Virginia pine, broomsedge, deertongue grass, and blackberry briers. Planted trees are dominantly black locust, autumn olive, European black alder, and white pine. The most commonly seeded grass-legume mixture is tall fescue and sericea lespedeza.

Onsite investigations and testing are necessary for determining the limitations of these Udorthents for community development.

This unit is not assigned to a capability subclass.

UC—Udorthents, mudstone and sandstone, high and low base. This unit is mostly on hillsides (fig. 6) in the central and eastern parts of the county north of the Kanawha River. The soils formed in material resulting from surface mining and some deep mining of coal. The surface-mined areas generally consist of a nearly vertical highwall, 10 to 40 feet high; nearly level to moderately steep benches; and moderately steep to very steep outslopes that are variable in width. Some areas of this unit are made up of Udorthents, mudstone and sandstone, high base; some of Udorthents, mudstone and sandstone, low base; and some of both. The total acreage of this unit is about 50 percent Udorthents, mudstone and sandstone, high base; 25 percent Udorthents, mudstone and sandstone, low base; and 25 percent other soils.

Udorthents are too variable to have a typical pedon but the surface layer of one of the more common pedons is brown very channery loam about 3 inches thick. The subsurface layers are mottled yellowish brown very channery loam that extends to a depth of 40 inches or more.

Included with this unit in mapping are a few small areas of Gilpin, Lily, Upshur, Vandalia, and Sensabaugh soils. Also included are a few small areas of Udorthents with coarse fragments of dominantly sandstone and a few small areas of soils with coarse fragments of mostly coal, bone coal, or high-carbon shale.

The available water capacity of these Udorthents is very low to moderate depending on the kind and amount of coarse fragments present. Permeability ranges from moderately slow to moderately rapid depending on the texture and compaction of the soil. Runoff is slow to rapid on the benches and very rapid on the highwalls and outslopes. Natural fertility is low to moderate. Where unlimed, the low base soils are extremely acid to strongly acid and the high base soils are medium acid to neutral. The depth to bedrock is generally greater than 40 inches, but ranges from outcrops on the highwalls to more than 30 feet on some benches and outslopes.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. They are better suited to woodland or wildlife uses.

The invading plants are dominantly Virginia pine, short leaf pine, red maple, black locust, blackberry briers, broomsedge, sweet clover, Kentucky bluegrass, and deertongue grass. The planted tree species are dominantly black locust, white pine, red pine, and autumn-olive. The most commonly seeded grass-legume mixture is tall fescue and lespedeza.

Onsite investigation and testing are necessary for determining the limitations of these Udorthents for community development.

This unit is not assigned to a capability subclass.

UD—Udorthents, smoothed. This unit is nearly level to very steep, mixed soil material and rock fragments from areas which have been disturbed by excavation, fills, and gradings. It is scattered throughout the survey area but is dominantly along Interstate 64, U.S. Routes 35 and 60, and the Kanawha River.

Along the Kanawha River these Udorthents are dark brown, dark yellowish brown, gray, and black sandy loam, loam, or silt loam. Coarse fragments of gravel are in some areas. In other parts of the county these Udorthents range from strong brown silt loam, loam, or sandy loam to dark red shaly clay. Rock fragments vary in kind, size, and amount. In some areas bedrock has been exposed by excavation. The fill areas range from 1 foot to more than 30 feet deep over bedrock.

Included with this unit in mapping are a few small areas of the well drained Gilpin, Lily, Upshur, Huntington, Kanawha, Allegheny, and Ashton soils and the moderately well drained Lindside, Monongahela, and Vincent soils. These inclusions make up about 10 percent of the unit.

In general, these Udorthents have a very low to high available water capacity. Permeability and runoff is slow to very rapid. Natural fertility is low to high.

These Udorthents are not suited to cultivated crops or hay, but have a limited suitability for pasture on some

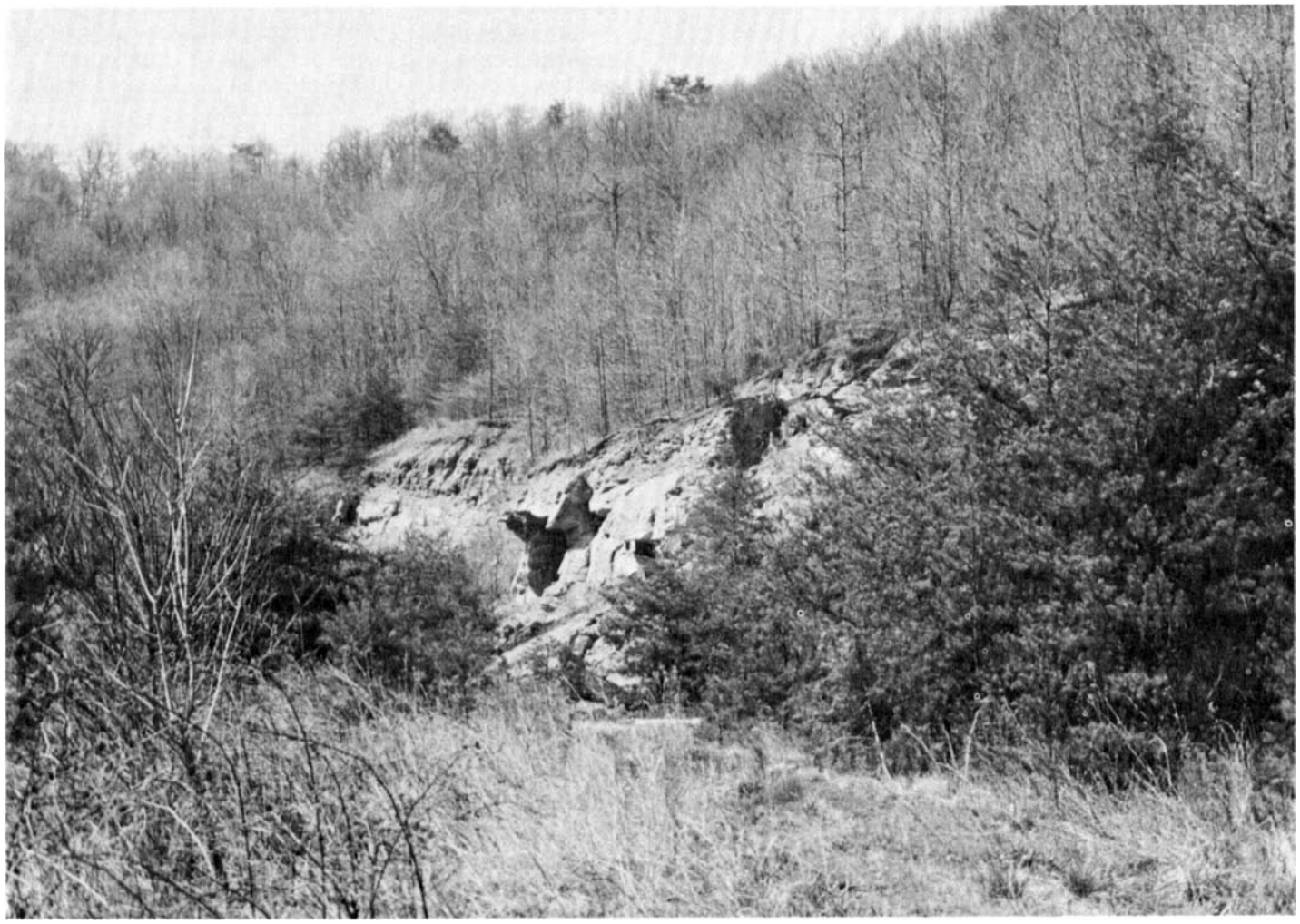


Figure 6.—Typical areas of Udorthents, mudstone and sandstone, high and low base.

areas along the Kanawha River. They are better suited to woodland or wildlife uses.

Onsite investigations and testing are necessary for determining the limitations of these Udorthents for community development.

This unit is not assigned to a capability subclass.

UeB—Upshur silty clay loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. It is on ridgetops in the northeastern part of the county.

Typically, the surface layer is reddish brown silty clay loam about 7 inches thick. The subsoil is dark red and is about 29 inches thick. The upper 12 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 44 inches.

Included with this soil in mapping are a few small areas of the well drained Gilpin soils and the moderately well drained Coolville and Tilsit soils. Also included are a few small areas of soils that have a silty clay or clay surface layer and a few small areas of nearly level soils and strongly sloping soils. These inclusions make up about 10 percent of the unit.

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

These soils are suited to cultivated crops and to hay and pasture. Most areas are used for hay and pasture.

The hazard of erosion, which is moderate in unprotected areas, is a management concern. In addition, the soil is difficult to work and becomes puddled if worked too wet. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

This soil has moderately high potential for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

Slow permeability, high shrink-swell potential, low strength, and clayey texture are the main limitations of this soil for community development.

This soil is in capability subclass IIIe.

UeC—Upshur silty clay loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. It is on ridgetops in the northeastern part of the county.

Typically, the surface layer is reddish brown silty clay loam about 7 inches thick. The subsoil is dark red and is about 29 inches thick. The upper 12 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 44 inches.

Included with this soil in mapping are a few small areas of the well drained Gilpin soils and the moderately well drained Coolville and Tilsit soils. Also included are a few small areas of soils that have a silty clay or clay surface layer and are severely eroded, a few small areas of soils that are gently sloping and soils that are moderately steep. These inclusions make up about 15 percent of the unit.

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

This soil has limited suitability for cultivated crops and is better suited to hay and pasture. Most areas are used for hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a management concern. In addition, the soil is difficult to work and will become puddled if worked too wet. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

This soil has moderately high potential for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, low strength, clayey texture, and hazard of slipping are the main limitations of this soil for community development.

This soil is in capability subclass IVe.

UfC3—Upshur silty clay, 8 to 15 percent slopes, severely eroded. This soil is strongly sloping and well drained. It is on ridgetops in the northeastern part of the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places.

Typically, the surface layer is yellowish red silty clay about 5 inches thick. The subsoil is dark red and is about 27 inches thick. The upper 10 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 42 inches.

Included with this soil in mapping are a few small areas of the well drained Gilpin soils and the moderately well drained Coolville and Tilsit soils. Also included are a few small areas of soils that have a silty clay loam surface layer and are moderately eroded, soils that are gently sloping, and soils that are moderately steep. These inclusions make up about 15 percent of the unit.

The available water capacity of this Upshur soil is moderate to high. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate to high. Where unlimed, the soil is very strongly acid to slightly acid in the surface layer and subsoil and strongly acid to slightly acid in the substratum. The depth to bedrock is 40 to 60 inches.

This soil is not suited to cultivated crops and hay, but it is suited to pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

This soil has moderately high potential for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, low strength, clayey texture, and hazard of slipping are the main limitations of this soil for community development.

This soil is in capability subclass VIe.

UgC—Upshur-Gilpin complex, 8 to 15 percent slopes. This complex consists of strongly sloping, well drained soils on ridgetops in the northern part of the county. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 65 percent Upshur silty clay loam, 20 percent Gilpin silt loam, and 15 percent other soils.

Typically, the surface layer of the Upshur soil is reddish brown silty clay loam about 7 inches thick. The subsoil is dark red and is about 29 inches thick. The upper 12 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 44 inches.

Typically, the surface layer of the Gilpin soil is dark brown silt loam about 7 inches thick. The subsoil is strong brown and is about 24 inches thick. The upper 9 inches of the subsoil is silt loam, and the lower 15 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 36 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils and the moderately well drained Tilsit and Coolville soils. Also included are a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock, a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock, a few small areas of severely eroded soils, a few small areas of gently sloping soils, and a few small areas of moderately steep soils.

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

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

These soils are suited to cultivated crops and to hay and pasture. Most areas are used for hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a management concern. In addition, the Upshur soil is difficult to work and will become puddled if worked too wet. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If the soils are used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm.

These soils have moderately high to high potential for trees, and a moderate amount of acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, clayey texture, and hazard of slippage of the Upshur soil and the slope and depth to bedrock of the Gilpin soil are the main limitations of these soils for community development.

This soil is in capability subclass IIIe.

UgC3—Upshur-Gilpin complex, 8 to 15 percent slopes, severely eroded. This complex consists of strongly sloping, well drained soils on ridgetops in the northern part of the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 65 percent Upshur silty clay, 20 percent Gilpin silt loam, and 15 percent other soils.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay about 5 inches thick. The subsoil is dark red and is about 27 inches thick. The upper 10 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 42 inches.

Typically, the surface layer of the Gilpin soil is brown silt loam about 5 inches thick. The subsoil is strong brown and is about 22 inches thick. The upper 7 inches of the subsoil is silt loam, and the lower 15 inches is channery silty clay loam. The substratum is strong brown very channery silt loam to a depth of about 32 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils and the moderately well drained Tilsit and Coolville soils. Also included are a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock, a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock, a few small areas of moderately eroded soils, a few small areas of gently sloping soils, and a few small areas of moderately steep soils.

The available water capacity of the Upshur soil is moderate or high. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high.

Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and subsoil and strongly acid to slightly acid in the substratum. Depth to bedrock is 40 to 60 inches. The subsoil has a high shrink-swell potential.

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

These soils have limited suitability for cultivated crops and are better suited to hay or pasture. Most areas are used for hay and pasture. The hazard of erosion, which is very severe in unprotected areas, is a major management concern. In addition, the Upshur soil is difficult to work and will become puddled if worked when too wet. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If the soils are used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm.

These soils have moderately high to high potential for trees, and a moderate acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, clayey texture, and hazard of slippage of the Upshur soil and the slope and depth to bedrock of the Gilpin soil are the main limitations of these soils for community development.

These soils are in capability subclass IVe.

UgD—Upshur-Gilpin complex, 15 to 25 percent slopes. This complex consists of moderately steep, well drained soils on ridgetops and benches in the northern part of the county. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 55 percent Upshur silty clay loam, 25 percent Gilpin silt loam, and 20 percent other soils.

Typically, the surface layer of the Upshur soil is reddish brown silty clay loam about 5 inches thick. The subsoil is dark red and is about 28 inches thick. The upper 11 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 43 inches.

Typically, the surface layer of the Gilpin soil is dark brown silt loam about 5 inches thick. The subsoil is strong brown and is about 22 inches thick. The upper 8 inches of the subsoil is silt loam, and the lower 14 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 35 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils and the moderately well drained Tilsit and Coolville soils. Also included are a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; and a few small areas of severely eroded soils, strongly sloping soils, and steep soils.

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

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

These soils have limited suitability for cultivated crops and are better suited to hay or pasture. Most cleared areas are used for hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a major management concern. In addition, the Upshur soil is difficult to work and will become puddled if worked when too wet. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If the soils are used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm.

These soils have moderate to high potential for trees, and about half the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because it is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, clayey texture, and hazard of slippage of the Upshur soil and the slope and depth to bedrock of the Gilpin soil are the main limitations of these soils for community development.

These soils are in capability subclass IVe.

UgD3—Upshur-Gilpin complex, 15 to 25 percent slopes, severely eroded. This complex consists of strongly sloping, well drained soils on ridgetops and benches in the northern part of the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 55 percent Upshur silty clay, 25 percent Gilpin silt loam, and 20 percent other soils.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay about 5 inches thick. The subsoil is dark red and is about 26 inches thick. The upper 9 inches of the subsoil is very sticky and very plastic clay, and the lower 17 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 41 inches.

Typically, the surface layer of the Gilpin soil is brown silt loam about 5 inches thick. The subsoil is strong brown and is about 20 inches thick. The upper 6 inches of the subsoil is silt loam, and the lower 14 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 33 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils and the moderately well drained Tilsit and Coolville soils. Also included are a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; and a few small areas of moderately eroded soils, gently sloping soils, and moderately steep soils.

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

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

These soils are not suited to cultivated crops or hay, but are suited to pasture. The hazard of erosion, which is very severe in unprotected areas, is a major management concern. If the soils are used for pasture, overgrazing is a major management concern. Major pasture needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm.

These soils have moderate to high potential for trees, and a moderate acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because it is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, clayey texture, and hazard of slippage of the Upshur soil and the slope and depth to bedrock of the Gilpin soil are the main limitations of these soils for community development.

These soils are in capability subclass VIe.

UgE—Upshur-Gilpin complex, 25 to 35 percent slopes. This complex consists of steep, well drained soils on benches and hillsides in the northern part of the county. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Upshur silty clay loam, 25 percent Gilpin silt loam, and 25 percent other soils.

Typically, the surface layer of the Upshur soil is dark reddish brown silty clay loam about 4 inches thick. The subsoil is dark red and is about 26 inches thick. The upper 10 inches of the subsoil is very sticky and very plastic clay, and the lower 16 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 42 inches.

Typically, the surface layer of the Gilpin soil is very dark grayish brown and yellowish brown silt loam about 4 inches thick. The subsoil is strong brown and is about 20 inches thick. The upper 8 inches of the subsoil is silt loam, and the lower 12 inches is channery silty clay loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 34 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils. Also included are a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock; a few small areas of a soil that is similar to the Gilpin soil but is less than 20 inches deep over bedrock; a few small areas of severely eroded soils, stony soils, moderately steep soils, and very steep soils; and a few bedrock escarpments.

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

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate.

Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

The soils are not suited to cultivated crops or hay, but are suited to pasture. The hazard of erosion, which is very severe in unprotected areas, is a major management concern. If the soils are used for pasture, overgrazing is a major management concern. Other major pasture needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and the deferment of grazing until the Upshur soil is reasonably firm.

These soils have moderate to high potential for trees, and about two-thirds of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because it is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, clayey texture, and hazard of slippage of the Upshur soil and the slope and depth to bedrock of the Gilpin soil are the main limitations of these soils for community development.

These soils are in capability subclass VIe.

UgE3—Upshur-Gilpin complex, 25 to 35 percent slopes, severely eroded. This complex consists of steep, well drained soils on benches and hillsides in the northern part of the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. Areas of these soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Upshur silty clay, 25 percent Gilpin silt loam, and 25 percent other soils.

Typically, the surface layer of the Upshur soil is reddish brown silty clay about 3 inches thick. The subsoil is dark red and is about 25 inches thick. The upper 9 inches of the subsoil is very sticky and very plastic clay, and the lower 16 inches is very sticky and very plastic shaly clay. The substratum is dusky red very shaly clay that extends to bedrock at a depth of about 40 inches.

Typically, the surface layer of the Gilpin soil is brown silt loam about 3 inches thick. The subsoil is strong brown and is about 18 inches thick. The upper 6 inches of the subsoil is silt loam, and the lower 12 inches is channery silty clay loam. The substratum is strong brown very channery silt loam to a depth of about 31 inches.

Included with these soils in mapping are a few small areas of the well drained Lily soils. Also included are a few small areas of a soil that is similar to the Upshur soil but is less than 40 inches deep over bedrock, a few small areas of a soil that is similar to Gilpin soil but is less than 20 inches deep over bedrock, a few small areas of moderately eroded soils, a few small areas of stony soils, a few small areas of moderately steep soils, a few escarpments, and a few small areas of very steep soils.

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

The available water capacity of the Gilpin soil is low or moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The roots of some plants are restricted by bedrock at a depth of 20 to 40 inches.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. The hazard of erosion is very severe in unprotected areas. Bare areas are difficult to revegetate, but they should be seeded to a permanent cover. Mulching will help protect seeded areas until the plants become established. These soils have moderate to high potential for trees, and about two-thirds of the acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because it is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, clayey textures, and hazard of slippage of the Upshur soil and the slope and depth to bedrock of the Gilpin soil are the main limitations of these soils for community development.

These soils are in capability subclass VIIe.

Uh—Urban land. This unit consists of nearly level areas where more than 85 percent of the surface is covered by asphalt, concrete, buildings, or other impervious materials. Examples of urban uses are industrial complexes, business centers, parking lots, streets, and buildings. Areas of Urban land are mainly along the Kanawha River in the Nitro area (fig. 7) and along Interstate 64 at the Winfield and Hurricane interchanges.

Included with this unit in mapping are a few small areas of the well drained Allegheny, Kanawha, and Ashton soils; the moderately well drained Lindside, Monongahela, and Vincent soils; and the poorly drained Melvin soils. Also included are a few small areas of Udorthents, smoothed. These inclusions make up about 15 percent of the unit.

This unit is not suited to cultivated crops, hay, pasture, or trees. Onsite investigation of the included soils is necessary to determine the limitations for community development.

This unit is not assigned to a capability subclass.

Figure 7.—An area of Urban land along the Kanawha River, near the community of Nitro.

UkB—Urban Land-Kanawha complex, 0 to 8 percent slopes. This complex consists of areas covered by urban structures such as asphalt, concrete, buildings, or other impervious materials and areas of nearly level to gently sloping well drained Kanawha loam. It is on high bottom lands and low stream terraces in the urbanized part of the Kanawha River Valley. Some areas are dissected by natural drainageways. Areas of Urban land and Kanawha loam are in such an intricate pattern that it was not practical to separate them in mapping. This complex is about 45 percent Urban land, about 25 percent Kanawha loam, and 30 percent other soils.

Typically, the surface layer of the Kanawha soil is dark brown loam about 10 inches thick. The subsoil is strong brown and is about 32 inches thick. The upper 12 inches of the subsoil is loam. The next 11 inches is fine sandy loam, and the lower 9 inches is sandy loam. The substratum is strong brown loamy sand to a depth of 60 inches or more.

Included with this complex in mapping are a few small areas of the well drained Ashton and Huntington soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. Also included are a few small areas of strongly sloping soils and Udorthents, smoothed.

The available water capacity of the Kanawha soil is high. Permeability is moderate in the subsoil. Runoff is medium or slow, and natural fertility is high. Where unlimed, the soil is medium acid or slightly acid. The depth to bedrock is greater than 60 inches.

The Kanawha soil has few, if any, limitations for community development. It has been protected from flooding by flood-control structures on the Kanawha River System.

This unit is not assigned to a capability subclass.

Un—Urban land-Lindside complex. This complex consists of areas covered by urban structures such as asphalt, concrete, buildings, or other impervious materials and areas of moderately well drained Lindside silt loam. It is on flood plains in the urbanized part of the Kanawha River Valley. Some areas are dissected by natural drainageways. Areas of the Urban land and Lindside silt loam are in such an intricate pattern that it was not practical to separate them in mapping. This complex is about 45 percent Urban land, about 25 percent Lindside silt loam, and 30 percent other soils.

Typically, the surface layer of the Lindside soil is dark brown silt loam about 8 inches thick. The subsoil is brown and is about 32 inches thick. The upper 11 inches of the subsoil is silty clay loam, and the lower 21 inches is silty clay loam mottled with light brownish gray and pale brown. The substratum is brown silty clay loam mottled with light gray to a depth of 60 inches or more.

Included with this complex in mapping are a few small areas of the well drained Ashton, Huntington, and Kanawha soils and the poorly drained Melvin soils. Also included are a few small areas of gently sloping soils and Udorthents, smoothed.

The available water capacity of the Lindside soil is high. Permeability is moderate or moderately slow in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is strongly acid to slightly acid. The depth to bedrock is greater than 60 inches. Flooding is unlikely on this unit, but it is possible under unusual weather conditions.

The seasonal high water table and the hazard of flooding are the main limitations of the Lindside soil for community development. The hazard of flooding has been reduced by flood-control structures on the Kanawha River System.

This unit is not assigned to a capability subclass.

UoB—Urban Land-Monongahela complex, 3 to 15 percent slopes. This complex consists of areas covered by urban structures such as asphalt, concrete, buildings, or other impervious materials, and gently sloping to strongly sloping, moderately well drained Monongahela silt loam. It is on stream terraces in the urbanized parts of the survey. The areas of Urban land and Monongahela silt loam are in such an intricate pattern that it was not practical to map them separately. The complex is about 40 percent Urban land, 30 percent Monongahela silt loam, and 30 percent other soils.

Typically, the surface layer of this Monongahela soil is brown silt loam about 8 inches thick. The subsoil is about 51 inches thick. The upper 16 inches of the subsoil is brownish yellow silt loam, and the lower 35 inches is very firm and brittle yellowish brown and brownish yellow silt loam mottled with light gray. The substratum is mixed yellow, very pale brown, and light gray silt loam to a depth of 72 inches or more.

Included with this complex in mapping are a few small areas of the well drained Allegheny soils, the moderately well drained Vincent soils, and the somewhat poorly drained Tyler soils. Also included are a few small areas of nearly level soils, moderately steep soils, soils with a loam surface, and Udorthents, smoothed.

The available water capacity of this Monongahela soil is moderate. Permeability is moderate above the very firm part of the subsoil and moderately slow or slow in the very firm part. Runoff is medium to rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or very strongly acid. The depth to bedrock is generally greater than 60 inches.

The slope, the seasonal high water table, and the moderately slow or slow permeability are the main limitations of the Monongahela soil for community development.

This unit is not assigned to a capability subclass.

UvC—Urban land-Vincent complex, 3 to 15 percent slopes. This complex consists of areas covered by urban structures such as asphalt, concrete, buildings, or other impervious materials and areas of strongly sloping to gently sloping, moderately well drained Vincent silt loam. It is on stream terraces in the urbanized parts of the survey. The areas of Urban land and Vincent silt loam are in such an intricate pattern that it was not practical to map them separately. The complex is about 40 percent Urban land, 30 percent Vincent silt loam, and 30 percent other soils.

Typically, the surface layer of this Vincent soil is dark brown silt loam about 7 inches thick. The subsoil is 38 inches thick. The upper 12 inches of the subsoil is strong brown silty clay loam, and the lower 26 inches is reddish brown silty clay mottled with strong brown and pinkish gray. The substratum is brown silty clay stratified with thin bands of strong brown silty clay.

Included with this complex in mapping are a few small areas of the well drained Allegheny soils, the moderately well drained Monongahela soils, and the somewhat poorly drained Tyler soils. Also included are a few small areas of nearly level soils, moderately steep soils, and soils that have alluvium to a depth of more than 20 inches over slack water deposits.

The available water capacity of the Vincent soil is high. Permeability is slow in the subsoil. Runoff is medium to rapid, and natural fertility is moderate. Where unlimed, the soil is very strongly acid to medium acid in the surface layer and subsoil and medium acid or slightly acid in the substratum. Depth to bedrock is greater than 70 inches.

The slope, seasonal high water table, shrink-swell potential, and clayey texture are the main limitations of the Vincent soil for community development.

This unit is not assigned to a capability subclass.

VaC—Vandalia silt loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. It is on foot slopes, along drainageways, and in coves.

Typically, the surface layer is reddish brown silt loam about 7 inches thick. The subsoil is about 47 inches thick. The upper 5 inches of the subsoil is yellowish red channery silty clay loam, and the next 24 inches is reddish brown silty clay loam and silty clay. The lower 18 inches is reddish brown channery silty clay. The substratum is reddish brown channery silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Moshannon and Sensabaugh soils. Also included are a few small areas of moderately well drained soils; a few small areas of soils that are moderately well drained and have a firm and brittle layer in the subsoil; a few small areas of soils that have a loam surface layer and subsoil; and a few small areas of stony soils, severely eroded soils, gently sloping soils, and moderately steep soils. These inclusions make up about 30 percent of the unit.

The available water capacity of this Vandalia soil is moderate or high. Permeability is moderately slow or slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil, strongly acid or medium acid in the lower part of the subsoil, and strongly acid to slightly acid in the substratum. Depth to bedrock is greater than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is farmed. The hazard of erosion, which is severe in unprotected areas, is a management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

This soil has moderately high potential for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, low strength, clayey texture, and the hazard of slipping are the main limitations of this soil for community development.

This soil is in capability subclass IIIe.

VaD—Vandalia silt loam, 15 to 25 percent slopes. This soil is moderately steep and well drained. It is on foot slopes, along drainageways, and in coves.

Typically, the surface layer is reddish brown silt loam about 6 inches thick. The subsoil is about 46 inches thick. The upper 5 inches of the subsoil is yellowish red silty clay loam, and the next 23 inches is reddish brown silty clay loam and silty clay. The lower 18 inches is reddish brown channery silty clay. The substratum is reddish brown channery silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Moshannon, Sensabaugh, Gilpin, and Upshur soils. Also included are a few small areas of moderately well drained soils; a few small areas of soils that are moderately well drained and have a very firm and brittle layer in the subsoil; a few small areas of soils that have a loam surface layer and subsoil; and a few small areas of stony soils, severely eroded soils, strongly sloping soils, and steep soils. These inclusions make up about 30 percent of the unit.

The available water capacity of this Vandalia soil is moderate or high. Permeability is moderately slow or slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil, strongly acid or medium acid in the lower part of the subsoil, and strongly acid to slightly acid in the substratum. Depth to bedrock is greater than 60 inches.

This soil has limited suitability for cultivated crops. It is better suited to hay or pasture. The hazard of erosion, which is severe in unprotected areas, is a major management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

This soil has moderately high to high potential for trees, and about half of the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, low strength, clayey texture, and the hazard of slippage (fig. 8) are the main limitations of this soil for community development.

The capability subclass is IVe.

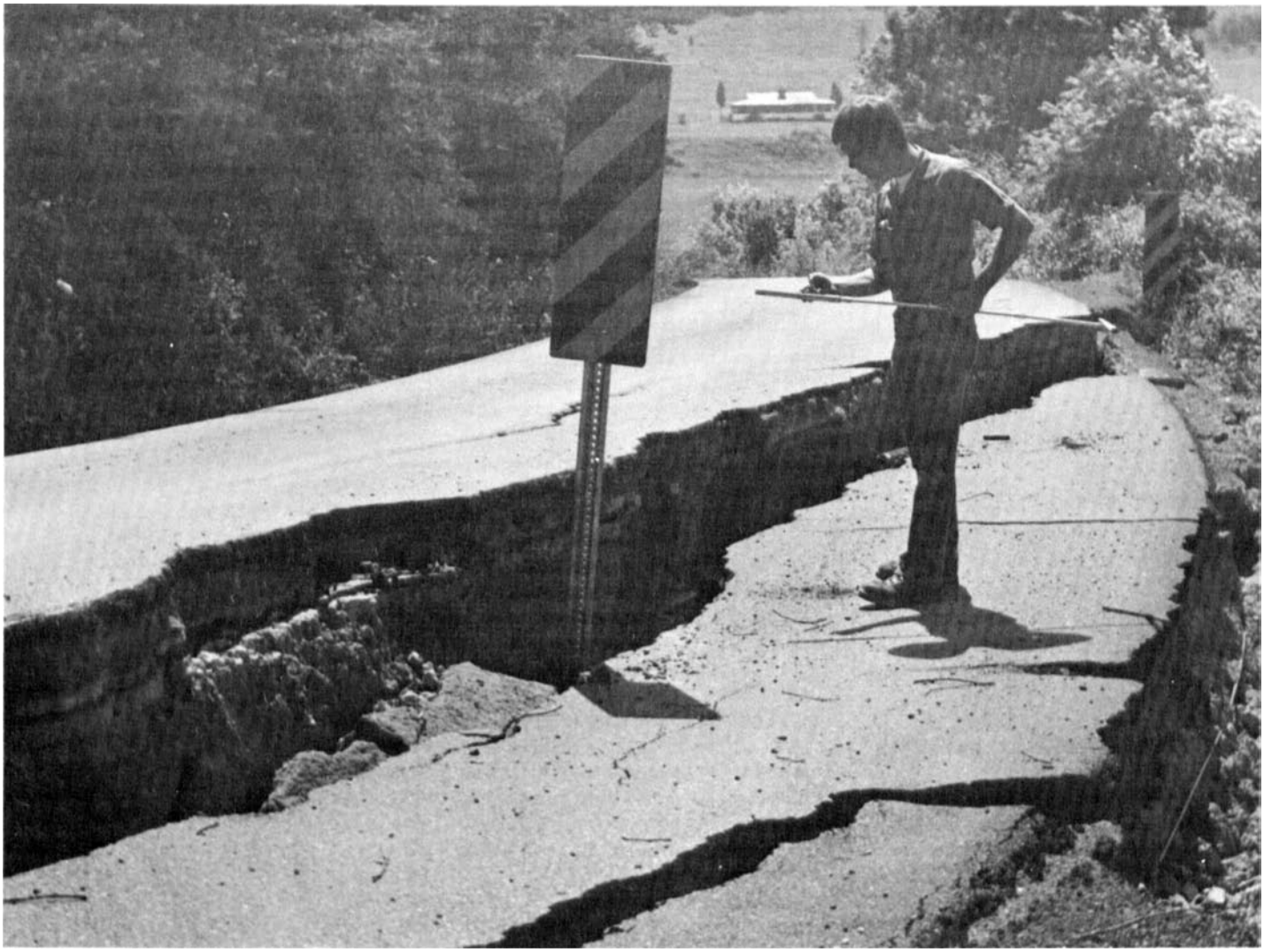


Figure 8.—Road failure due to slippage of Vandalia silt loam, 15 to 25 percent slopes.

VaE—Vandalia silt loam, 25 to 35 percent slopes. This soil is steep and well drained. It is on foot slopes, along drainageways, and in coves.

Typically, the surface layer is reddish brown silt loam about 5 inches thick. The subsoil is 43 inches thick. The upper 5 inches of the subsoil is yellowish red silty clay loam, and the next 21 inches is reddish brown silty clay loam and silty clay. The lower 17 inches is reddish brown channery silty clay. The substratum is reddish brown channery silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Moshannon, Sensabaugh, Gilpin, and Upshur soils. Also included are a few small areas of moderately well drained soils; a few small areas of soils that are moderately well drained and have a very firm and brittle layer in the subsoil; a few small areas of soils that have a loam surface layer and subsoil; and a few small areas of stony soils, severely eroded soils, moderately steep soils, and very steep soils. These inclusions make up about 30 percent of the unit.

The available water capacity of this Vandalia soil is moderate or high. Permeability is moderately slow or slow in the subsoil. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, the soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil, strongly acid or medium acid in the lower part of the subsoil, and strongly acid to slightly acid in the substratum. Depth to bedrock is greater than 60 inches.

This soil is not suited to cultivated crops or hay, but it is suited to pasture. The hazard of erosion, which is very severe in unprotected areas, is a major management concern. If this soil is used for pasture, overgrazing is a major management concern. Major pasture needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

This soil has moderately high to high potential for trees, and about two-thirds of the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, low strength, clayey texture, and the hazard of slipping are the main limitations of this soil for community development.

This soil is in capability subclass VIe.

VbD—Vandalia stony silt loam, 15 to 35 percent slopes. This soil is moderately steep to steep and well drained. It is on foot slopes, along drainageways, and in coves. Stones cover 1 to 3 percent of the surface.

Typically, the surface layer is reddish brown silt loam about 6 inches thick. The subsoil is 46 inches thick. The upper 5 inches of the subsoil is yellowish red silty clay loam, and the next 23 inches is reddish brown silty clay loam and silty clay. The lower 18 inches is reddish brown channery silty clay. The substratum is reddish brown channery silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Moshannon, Sensabaugh, Gilpin, and Upshur soils. Also included are a few small areas of soils that are moderately well drained; a few small areas of soils that are moderately well drained and have a very firm and brittle layer in the subsoil; a few small areas of soils that have a loam surface layer and subsoil, and a few small areas of nonstony soils, severely eroded soils, strongly sloping soils, and very steep soils. These inclusions make up about 30 percent of the unit.

The available water capacity of this Vandalia soil is moderate or high. Permeability is moderately slow or slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil, strongly acid or medium acid in the lower part of the subsoil, and strongly acid to slightly acid in the substratum. Depth to bedrock is greater than 60 inches.

This stony soil is not suited to cultivated crops or hay, but it is suited to pasture. Stones restrict the use of farm machinery. The hazard of erosion, which is severe in unprotected areas, is a major management concern. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

This soil has moderately high to high potential for trees, and about three-fourths of the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, low strength, hazard of slipping, and stony surface are the main limitations of this soil for community development.

This soil is in capability subclass VIs.

VdD3—Vandalia silty clay loam, 15 to 25 percent slopes, severely eroded. This soil is moderately steep and well drained. It is on foot slopes, along drainageways, and in coves. Erosion has removed most of the original surface layer, and the subsoil is exposed in places.

Typically, the surface layer is reddish brown silty clay loam about 4 inches thick. The subsoil is about 44 inches thick. The upper 3 inches of the subsoil is yellowish red silty clay loam, and the next 23 inches is reddish brown silty clay loam and silty clay. The lower 18 inches is reddish brown channery silty clay. The substratum is reddish brown channery silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained Moshannon, Sensabaugh, Gilpin, and Upshur soils. Also included are a few small areas of soils that are moderately well drained; a few small areas of soils that are moderately well drained and have a very firm and brittle layer in the subsoil; a few small areas of soils that have a loam surface layer and subsoil; and a few small areas of stony soils, soils that are moderately eroded, strongly sloping soils, and steep soils. These inclusions make up about 30 percent of the unit.

The available water capacity of this Vandalia soil is moderate or high. Permeability is moderately slow or slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil is very strongly acid to medium acid in the surface layer and upper part of the subsoil, strongly acid or medium acid in the lower part of the subsoil, and strongly acid to slightly acid in the substratum. Depth to bedrock is greater than 60 inches.

This soil is not suited to cultivated crops or hay, but it is suited to pasture. The hazard of erosion, which is very severe in unprotected areas, is a major management concern. If this soil is used for pasture, overgrazing is a major management concern. Major pasture needs include proper stocking rates to maintain desirable

grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

This soil has moderately high to high potential for trees, and about half of the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, but it can be reduced by placing the roads and trails on the contour.

The slope, slow permeability, high shrink-swell potential, low strength, clayey texture, and the hazard of slipping are the main limitations of this soil for community development.

This soil is in capability subclass VIe.

VeB—Vincent silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. It is on terraces, mainly in the Teays Valley.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 38 inches thick. The upper 12 inches of the subsoil is strong brown silty clay loam, and the lower 26 inches is yellowish red and reddish brown silty clay mottled with pinkish gray and strong brown. The substratum is reddish brown silty clay stratified with strong brown thin bands to a depth of 70 inches or more.

Included with this soil in mapping are a few small areas of the well drained Allegheny soils, the moderately well drained Monongahela soils, and the somewhat poorly drained Tyler soils. Also included are a few small areas where alluvium is more than 20 inches deep over the slack water deposits and a few small areas of nearly level soils, strongly sloping soils, and severely eroded soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Vincent soil is high. Permeability is slow in the subsoil. Runoff is medium, and natural fertility is moderate. Where unlimed, the soil is very strongly acid to medium acid in the surface layer and subsoil and medium acid or slightly acid in the substratum. The depth to bedrock is 60 inches or more.

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

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

The seasonal high water table, clayey texture, and moderate shrink-swell potential are the main limitations of this soil for community development.

This soil is in capability subclass IIe.

VeC—Vincent silt loam, 8 to 15 percent slopes. This soil is strongly sloping and moderately well drained. It is on terraces, mainly in the Teays Valley.

Typically, the surface layer is dark brown silt loam about 6 inches thick. The subsoil is about 36 inches thick. The upper 10 inches of the subsoil is strong brown silty clay loam, and the lower 26 inches is yellowish red and reddish brown silty clay mottled with pinkish gray and strong brown. The substratum is reddish brown silty clay stratified with strong brown thin bands to a depth of 70 inches or more.

Included with this soil in mapping are a few small areas of the well drained Allegheny soils, the moderately well drained Monongahela soils, and the somewhat poorly drained Tyler soils. Also included are a few small areas where alluvium is more than 20 inches deep over slack water deposits and a few small areas of gently sloping soils, moderately steep soils, and severely eroded soils. These inclusions make up about 20 percent of the unit.

The available water capacity of this Vincent soil is high. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate. Where unlimed, the soil is very strongly acid to medium acid in the surface layer and subsoil and medium acid or slightly acid in the substratum. The depth to bedrock is 60 inches or more.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion, which is severe in unprotected areas, is a management concern. Using a conservation tillage system, growing crops in contour strips, using a crop sequence that includes hay, and returning crop residue to the soil are practices that help to control erosion and to maintain fertility and tilth. If this soil is used for pasture, the major management needs include proper stocking rates to maintain desirable grasses and legumes, rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm.

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

The slope, seasonal high water table, clayey texture, and moderate shrink-swell potential are the main limitations of this soil for community development.

This soil is in capability subclass IIIe.

ZoB—Zoar silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained to

somewhat poorly drained. It is on terraces, mainly along Eighteenmile and Hurricane Creeks and the Pocatalico River.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 30 inches thick. The upper 4 inches of the subsoil is yellowish brown silty clay loam, the next 7 inches is strong brown silty clay loam mottled with pinkish gray, and the next 9 inches is reddish brown clay mottled with pinkish gray. The lower 10 inches is yellowish red silty clay loam mottled with pinkish gray. The substratum is yellowish red silty clay loam mottled with pinkish gray, light reddish brown, and yellowish red to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of the well drained and rarely flooded Hackers and Sensabaugh soils and the moderately well drained and rarely flooded Senecaville soils. Also included are a few small areas of poorly drained soils, nearly level soils, and strongly sloping soils. These inclusions make up about 15 percent of the unit.

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

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

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

The seasonal high water table, slow permeability, clayey texture, and moderate shrink-swell potential are the main limitations of this soil for community development.

This soil is in capability class IIe.

Prime Farmland

The best land for farming is called 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 providing the Nation's short- and long-range needs for food and fiber. Because the amount of this high-quality farmland is limited, it should be used with wisdom and foresight.

Prime farmland is the land best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops where it is treated and managed with acceptable farming methods. Given minimal inputs of energy and economic resources, prime farmland produces higher yields and causes less damage to the environment than other kinds of land.

Prime farmland may now be cropland, pasture, woodland, or anything other than urban and built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

The soils that make up prime farmland usually have an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity is suitable. These soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or

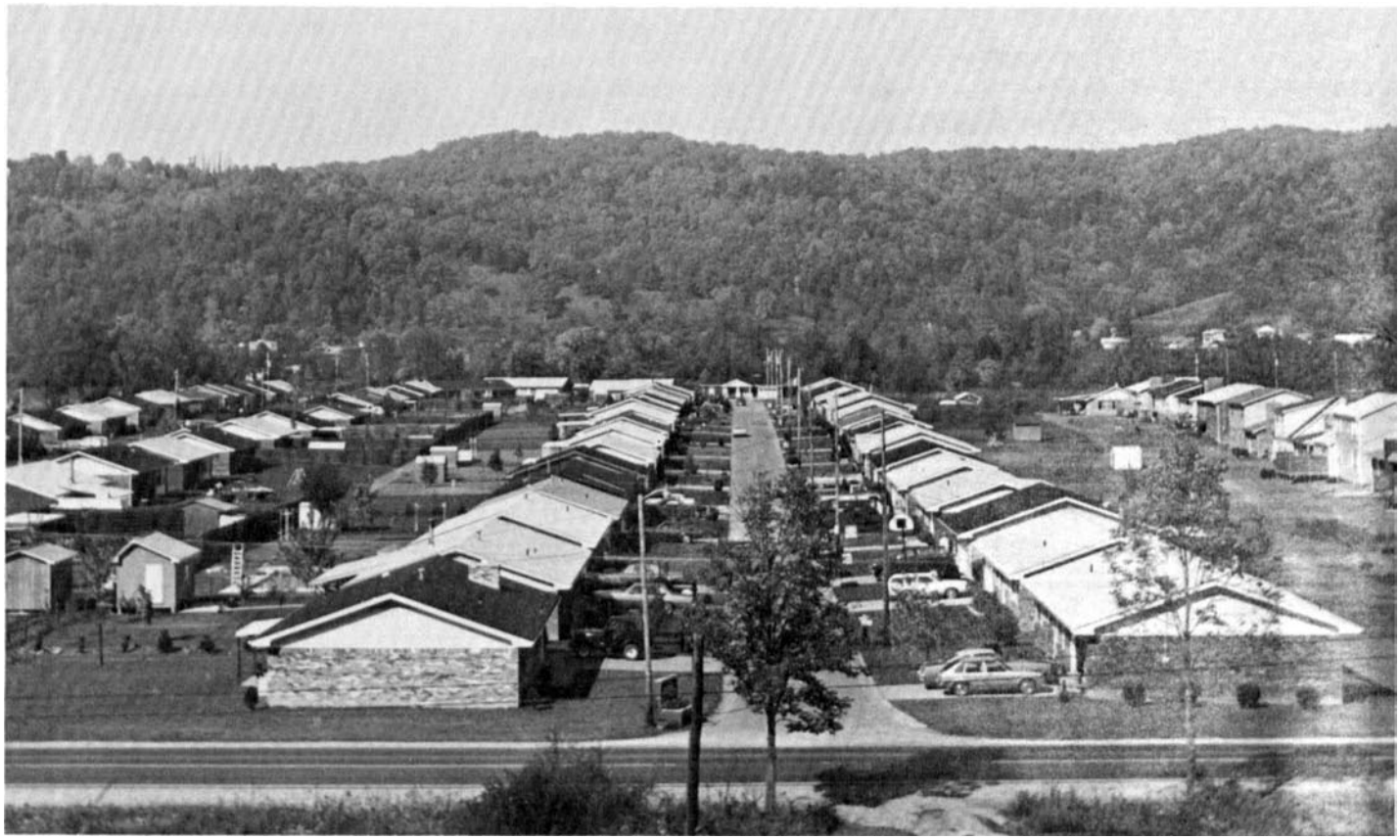


Figure 9.—This area of Kanawha loam, 3 to 8 percent slopes, was formerly prime farmland. It has been developed for housing.

saturated with water for long periods and are not frequently flooded during the growing season. The slope gradient is mostly less than 6 percent. For more detailed information on the criteria for prime farmland consult the local staff of the Soil Conservation Service.

About 8 percent of Putnam County, or about 18,260 acres, is prime farmland. The areas are scattered throughout the county adjacent to the major drainageways.

Urbanization and utilization of prime farmland for nonagricultural uses (fig. 9) is rapidly decreasing the amount of prime farmland in Putnam County. The loss of prime farmland to other uses also increases the agricultural use of less suitable soils, which generally are more erodible, droughty, and difficult to cultivate, and are usually less productive.

The map units that make up the prime farmland in Putnam County are listed in this section. This list, however, does not constitute a recommendation for a particular land use.

Some soils that have limitations such as a high water table or flooding may qualify for prime farmland if these limitations are overcome by corrective measures. In the following list, the corrective measures needed, if any, are shown in parentheses. Onsite evaluation is necessary, however, to see if these measures are effective.

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

AgA	Allegheny loam, 0 to 3 percent slopes
AgB	Allegheny loam, 3 to 8 percent slopes
AsA	Ashton silt loam, 0 to 3 percent slopes
AsB	Ashton silt loam, 3 to 8 percent slopes
HaA	Hackers silt loam, 0 to 3 percent slopes
HaB	Hackers silt loam, 3 to 8 percent slopes
Hu	Huntington loam
KaA	Kanawha loam, 0 to 3 percent slopes
KaB	Kanawha loam, 3 to 8 percent slopes
Ln	Lindside silt loam
Me	Melvin silt loam (where drained)
Mf	Melvin-Lindside silt loams (where drained)
Mo	Moshannon silt loam
Se	Senecaville silt loam
Sf	Senecaville silt loam, rarely flooded
Sn	Sensabaugh silt loam
SrB	Sensabaugh silt loam, rarely flooded, 3 to 8 percent slopes
Ty	Tyler silt loam (where drained)

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

Dixie 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.

According to the 1970 West Virginia Soil and Water Conservation Needs Inventory (*9*), there is about 45,000 acres of cropland and pasture in the county. Although the individual soils or groups of soils require different kinds of management, some general principles apply throughout the county to all of the soils suitable for farm crops and pasture.

Most of the soils in the county have a moderate or low supply of basic plant nutrients, making the application of lime and fertilizer necessary. The amounts to be applied depend on the type of soil, the cropping history, the type of crop grown, the level of yields desired, and tests and analyses of the individual soil.

The organic matter content is low in most of the soils, and it is generally not feasible to build it to a higher level. It is important, however, to maintain the current level 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 the soil structure of the surface layer and should be kept to the minimum necessary to prepare the seedbed and control weeds. Maintaining the organic matter content of the plow layer also helps to protect the soil structure.

Artificial drainage is needed in some of the soils to make them suitable for cultivated crops, hay, and pasture. Soils with a dense, brittle layer or clayey texture in the subsoil are difficult to drain with tile, however, and open-ditch drainage is more effective.

Runoff and erosion on farmland occur mainly while a cultivated crop is growing or soon after it has been harvested. All of the gently sloping and steeper soils that are cultivated are subject to erosion and thus require a cropping system suitable for erosion control. The main management needs of such a system include the proper rotation of crops, minimum tillage, mulch planting, using crop residue, growing cover crops and green-manure crops, and applying lime and fertilizer. Other major erosion control practices are contour cultivation, contour

stripcropping, diverting runoff, and using grassed waterways. The effectiveness of a particular combination of these measures differs from one soil to another, but different combinations can be equally effective on the same soil.

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

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

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

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

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

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

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

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

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification

of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Lewis Rowan, state staff forester, Soil Conservation Service, helped prepare this section.

About 70 percent of Putnam County, or 156,000 acres, is woodland. Most of this acreage is privately owned. Woodland tracts range from small woodlots to a large tract of several thousand acres owned by one corporation.

The most common forest types, or natural associations of tree species, and their proportion of the wooded area are the oak-hickory type, about 57 percent; the maple-beech-birch type, about 14 percent; other hardwood types, about 14 percent; and pine types, about 15 percent (*3*).

The pine forest principally occupies land that was formerly farmed. As farmland was abandoned during the past few decades, these areas regenerated in pine. There is a pulpwood collection yard at Hurricane, but not all mature pine is harvested. This is because of a lack of adequate markets and the price received for the product.

Nearly 47 percent of the woodland in the county is in sawtimber class, but there are no large permanent sawmills in the area. Most of the sawtimber is hauled 50 miles or more to market, which results in lower income to the landowner because of the cost of fuel. There are a few small portable mills that buy small tracts of timber in the county and do custom sawing.

Small plantations of commercial Christmas trees are also grown in the county. There is a ready market for high-quality Christmas trees.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

On sloping soils, the direction the slope faces, or aspect, affects the potential productivity. The north aspect is moister and cooler than the south aspect of the same soil and is usually rated one productivity class higher. Aspect also affects the kinds of trees and other plants that grow and the degree of management concerns. Table 7 gives north and south aspects for most of the soils that have slopes greater than 15 percent. North aspects are those slopes that have an azimuth of 315 degrees to 135 degrees. South aspects have an azimuth of 135 degrees to 315 degrees.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, f, and r.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well-managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

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

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

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

on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production or conservation plantings.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

Recreation

Putnam County has several community public parks with outdoor game courts and swimming and picnic facilities. In addition, a number of private clubs have facilities for camping, golfing, and boating.

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

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

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

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

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

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

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

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

Wildlife Habitat

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

The lands and waters of Putnam County provide habitat for a variety of fish and wildlife. Woodland game species are most abundant in the highly forested parts of the county. White-tailed deer, ruffed grouse, squirrels, and cottontails are found throughout the county. Although restricted by a lack of suitable habitat, huntable populations of bobwhite quail and mourning doves are found in some of the more agricultural areas. The rivers and streams of the county provide some nesting habitat for waterfowl such as wood ducks and mallards.

Common furbearers in the county include skunks, opossum, muskrat, mink, and foxes. Putnam County also has suitable habitat for numerous songbirds and a variety of small mammals.

Local streams, rivers, and ponds support various species of warmwater fish. Principal game fish include largemouth bass, channel catfish, crappie, muskellunge, freshwater drum (perch), bluegill, and other pan fish.

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, lovegrass, 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, beggarweed, and wheatgrass.

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

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

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

water areas are marshes, waterfowl feeding areas, and ponds.

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

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

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include 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, muskrat, mink, and beaver.

Engineering

James Dove, state 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 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements (fig. 10), 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;

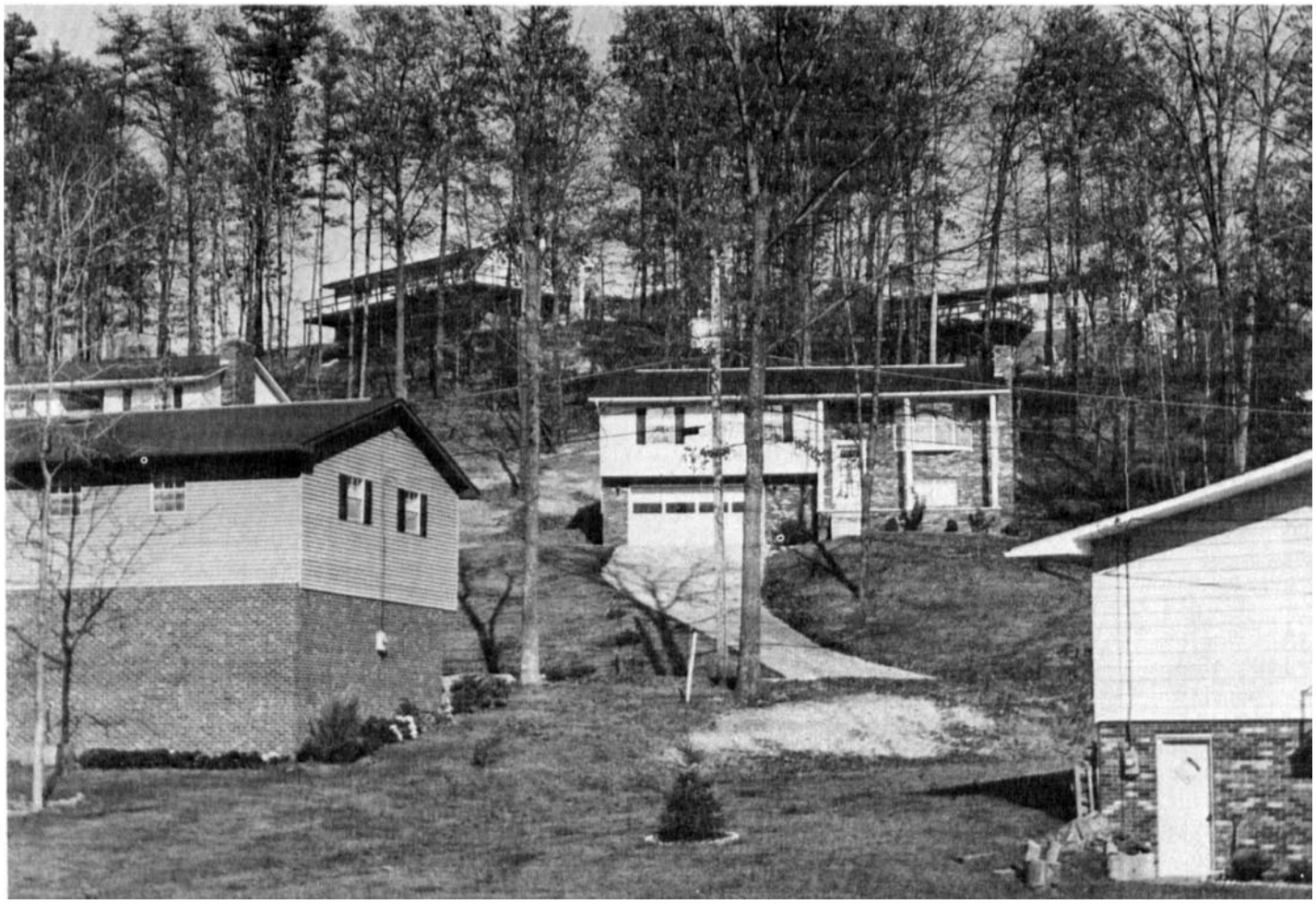


Figure 10.—Soil limitations can be overcome for building site development on the Gilpin-Upshur complex, 15 to 25 percent slopes.

stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

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

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

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site

features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

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

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

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

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

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

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

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

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

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

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

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

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

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

Construction Materials

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

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

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

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

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

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

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

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

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

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

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

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

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount

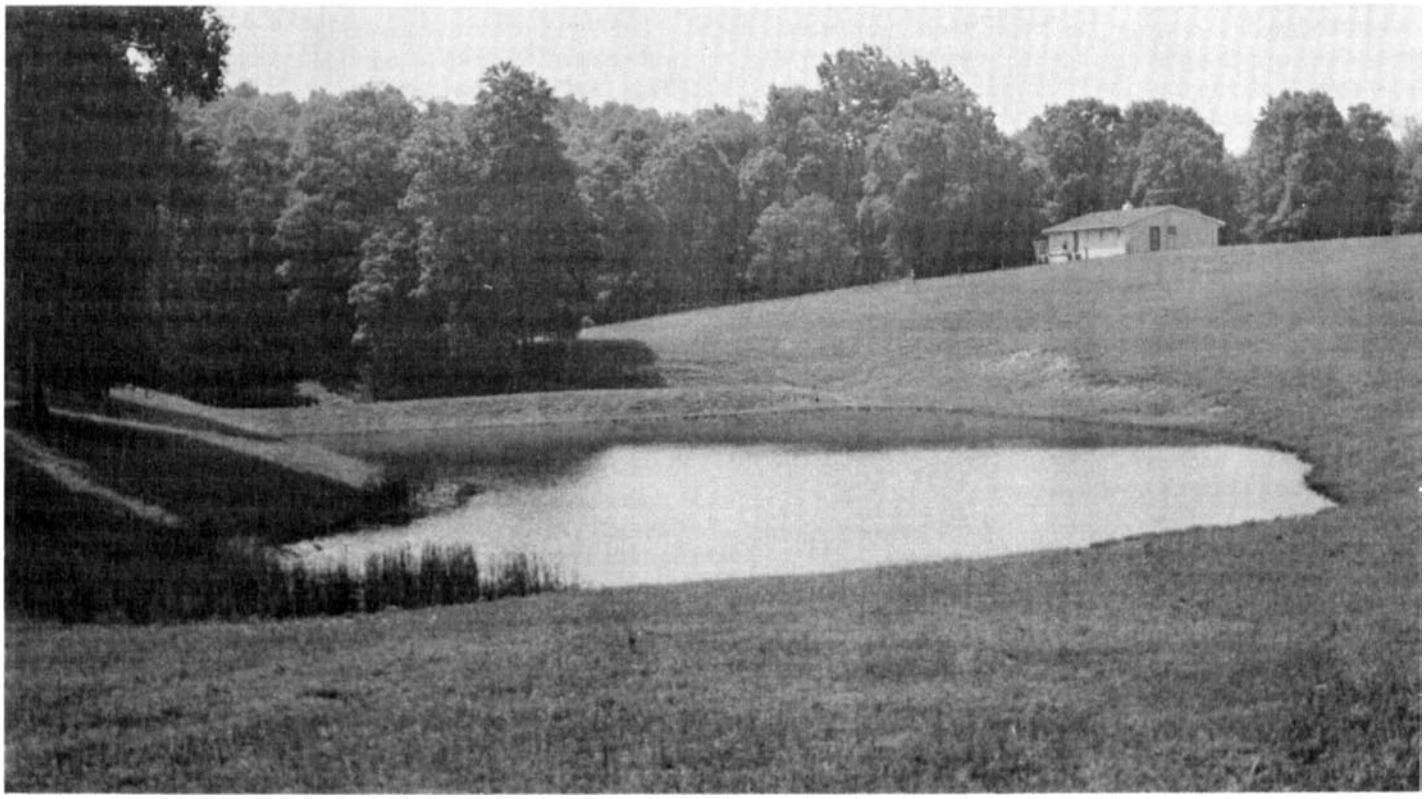


Figure 11.—Livestock pond in an area of Vincent silt loam, 8 to 15 percent slopes.

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

James Dove, state conservation engineer, Soil Conservation Service, helped prepare this section.

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 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 (fig. 11). 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 reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

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

Soil Properties

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

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

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

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 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

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

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

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

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

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

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

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

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

Physical and Chemical Properties

Table 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.

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.

Soil and Water Features

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

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

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after

rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency of flooding. Frequency is estimated and is expressed as none, rare, or occasional. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; and *occasional* that it occurs, on the average, no more than once in 2 years.

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

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

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

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

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

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.

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

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

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

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

SUBGROUP. Each 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 proceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

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

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

Soil Series and Their Morphology

Dr. John Sencindiver, assistant professor of soil science, West Virginia University, 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 similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*8*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*10*). 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."

Allegheny Series

The Allegheny series consists of deep, well drained soils formed in acid alluvial material washed from soils on uplands. The Allegheny soils are on stream terraces, mainly in the Teays Valley and along the Kanawha River. Slopes range from 0 to 15 percent.

Allegheny soils are on the landscape with the moderately well drained Monongahela and Vincent soils, the somewhat poorly drained Tyler soils, and

Fluvaquents and Udifluvents. They do not have the fragipan typical of the Monongahela and Tyler soils, and less clay in the B and C horizons and do not have the reddish color typical of the Vincent soils. The Allegheny soils do not flood as do the Fluvaquents and Udifluvents.

Typical pedon of Allegheny loam, 8 to 15 percent slopes, in a field about 500 yards east of the intersection of Hedrick Road and the Chesapeake and Ohio Railroad track, about 75 feet north of the railroad track.

Ap—0 to 8 inches; dark brown (10YR 4/3) loam; moderate fine and medium granular structure; very friable; many roots; very strongly acid; abrupt wavy boundary.
B1—8 to 15 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; many roots; very strongly acid; clear wavy boundary.
B21t—15 to 28 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.
B22t—28 to 40 inches; strong brown (7.5YR 5/8) clay loam; moderate medium angular and subangular blocky structure; friable; common roots; common discontinuous clay films and coatings on faces of peds; very strongly acid; gradual wavy boundary.
B3t—40 to 49 inches; strong brown (7.5YR 5/8) loam; weak and moderate medium and coarse subangular blocky structure; friable; common roots; few fine light gray (10YR 7/2) and light brown (7.5YR 6/4) mottles; common discontinuous clay films and coatings on faces of peds; very strongly acid; clear wavy boundary.
C—49 to 60 inches; strong brown (7.5YR 5/8) sandy loam; massive; friable; very strongly acid.

The solum thickness ranges from 30 to 55 inches and depth to bedrock is greater than 60 inches. Content of coarse fragments of gravel ranges from 0 to 10 percent in the upper part of the solum and 0 to 20 percent in the B3t and C horizons. In unlimed areas the soils are strongly acid to extremely acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 through 4.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is loam or clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 8. It is sandy loam, loam, sandy clay loam, or clay loam.

Ashton Series

The Ashton series consists of deep, well drained soils formed in alluvial material washed from soils on uplands. The Ashton soils are on high flood plains along the Kanawha River. The flooding frequency of these soils has been reduced by flood-control structures on the Kanawha River System. Slopes range from 0 to 8 percent.

Ashton soils are on the landscape with the well drained Huntington and Kanawha soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. The Ashton soils flood less frequently than the Huntington soils and have more silt in the A and B horizons and a darker surface layer than the Kanawha soils.

Typical pedon of Ashton silt loam, 0 to 3 percent slopes, in a cornfield about 450 yards east of U. S. Route 35 and about 1,600 yards south of McCausland Run.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; weak and moderate fine and medium granular structure; friable; many roots, neutral; abrupt smooth boundary.
B1—9 to 15 inches; dark brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; common roots; slightly acid; clear wavy boundary.
B2t—15 to 36 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on faces of peds; slightly acid; gradual wavy boundary.
B3t—36 to 48 inches; strong brown (7.5YR 4/6) silt loam; weak medium and coarse subangular blocky structure; friable; few roots; few discontinuous clay films on faces of peds; slightly acid; gradual wavy boundary.
C—48 to 72 inches; dark yellowish brown (10YR 4/6) loam with pockets of fine sandy loam; massive; friable; slightly acid.

The solum thickness ranges from 40 to 60 inches. Commonly, there are no coarse fragments, but the content of coarse fragments ranges up to 5 percent in individual subhorizons. In unlimed areas the soils are medium acid to neutral.

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

The B horizon has hue of 7.5YR, value of 3 through 5, and chroma of 3 through 6. It is silt loam or silty clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 3 through 6. It is silt loam, silty clay loam, loam, or fine sandy loam.

Coolville Series

The Coolville series consists of deep, moderately well drained soils formed in acid material weathered mainly from shale, siltstone, and some sandstone. These soils are on broad ridgetops, mainly in the northeastern part of the county. Slopes range from 3 to 15 percent.

Coolville soils are on the landscape with the well drained Gilpin, Lily, and Upshur soils and the moderately well drained Tilsit soils. The Coolville soils are deeper and have more clay in the B and C horizons than the Gilpin or Lily soils. They are not as red throughout the profile as the Upshur soils, and have more clay in the B and C horizons and do not have the fragipan typical of the Tilsit soils. They have reddish colors that are not typical of the Tilsit soils.

Typical pedon of Coolville silt loam, 3 to 8 percent slopes, in a meadow about 0.3 mile northwest of the confluence of Courtney Branch and Issacs Branch.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; weak fine and medium granular structure; very friable; many roots; slightly acid; abrupt smooth boundary.

B1t—7 to 11 inches; brownish yellow (10YR 6/6) silty clay loam; weak medium subangular blocky structure; friable; many roots; few discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

B21t—11 to 18 inches; yellowish brown (10YR 5/6) silty clay loam; many medium and coarse light brown (7.5YR 6/4) mottles; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on faces of peds; very strongly acid; abrupt wavy boundary.

IIB22t—18 to 27 inches; yellowish red (5YR 5/6) silty clay; many medium and coarse pinkish gray (5YR 6/2) and pink (5YR 7/4) mottles; weak and moderate medium subangular blocky structure; friable; few roots; common discontinuous clay films on faces of peds; extremely acid; clear wavy boundary.

IIB3—27 to 33 inches; strong brown (7.5YR 5/6) channery silty clay loam; many medium and coarse reddish yellow (5YR 6/6) and light brownish gray (10YR 6/2) mottles; weak medium and coarse subangular blocky structure; friable; 15 percent coarse fragments; very strongly acid; clear wavy boundary.

IIC—33 to 40 inches; brownish yellow (10YR 6/6) channery silty clay loam; many coarse light gray (10YR 7/2) mottles; massive; friable; 20 percent coarse fragments; very strongly acid; gradual wavy boundary.

IICr—40 to 50 inches; soft siltstone and fine grained sandstone.

R—50 inches; siltstone and fine grained sandstone.

The solum thickness is mainly 30 to 36 inches, but ranges from 30 to 40 inches. Depth to bedrock ranges from 40 to 50 inches. Content of coarse fragments of shale, siltstone, and some sandstone ranges from 0 to 15 percent in the Ap and B2t horizons and from 5 to 30 percent in the B3 and C horizons. In unlimed areas the soils are strongly acid to extremely acid.

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

The upper part of the B horizon has hue of 10YR or 7.5YR and value and chroma of 4 through 6. The lower part of the B horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. It is silty clay loam, silty clay, or their shaly or channery analogs.

The C horizon has hue of 10YR or 7.5YR, value of 4 through 8, and chroma of 2 through 6. It is silty clay loam, silty clay, or shaly or channery analogs.

The Coolville soils in Putnam County are a taxadjunct to the Coolville series because the solum is typically less than 36 inches thick, and it has a value of 6 in the upper part of the subsoil. These differences, however, do not significantly affect the use and management of the soils.

Fluvaquents

Fluvaquents consist of deep, poorly drained soils. The soils have formed in alluvium washed from soils on terraces in the Teays Valley. Fluvaquents are along the major drainageways and in depressions. Slopes range from 0 to 3 percent.

Fluvaquents are on the landscape with the well drained Allegheny soils, the moderately well drained Monongahela and Vincent soils, the somewhat poorly drained Tyler soils, and the excessively drained to moderately well drained Udifluvents. Fluvaquents are subject to flooding, which is not a characteristic of any of these soils except the Udifluvents.

Because of the variability of Fluvaquents, a typical pedon is not given. Depth to bedrock is generally greater than 60 inches. Content of coarse fragments of rounded gravel ranges from 0 to 30 percent in individual subhorizons. In unlimed areas the soils are slightly acid to strongly acid.

The A horizon dominantly has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 1 through 4. It is silt loam or loam.

The underlying horizons dominantly show stratification and have hues of 7.5YR through 5Y, value of 3 through 7, and chroma of 1 through 4. They range from sandy loam to silty clay loam.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils formed in acid material weathered from interbedded siltstone, shale, and sandstone. The Gilpin soils are on ridgetops, rounded knobs, benches, and side slopes throughout the county. Slopes range from 8 to 65 percent.

Gilpin soils are on the landscape with the well drained Lily, Upshur, and Vandalia soils and the moderately well drained Coolville and Tilsit soils. Gilpin soils contain less sand throughout the profile than do Lily soils, and they are shallower, have less clay throughout the profile, and

do not have the reddish color typical of the Upshur and Vandalia soils. They are shallower and have less clay in the B and C horizons than the Coolville soils. They are shallower and do not have the fragipan typical of the Tilsit soils.

Typical pedon of Gilpin silt loam, in an area of Gilpin-Upshur complex, 15 to 25 percent slopes, in a wooded area about 10 feet east of Buffs Branch Road, about 50 yards west of Mount Olive Church.

O1—2 inches to 1 inch; hardwood leaf litter.
O2—1 inch to 0; decomposed leaves.
A1—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; weak very fine and fine granular structure; very friable; many roots; 5 percent coarse fragments; very strongly acid; abrupt smooth boundary.
A2—2 to 5 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; many roots; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B1—5 to 13 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable; many roots; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B2t—13 to 27 inches; strong brown (7.5YR 5/6) channery light silty clay loam; moderate fine and medium subangular blocky structure; friable; many roots; common discontinuous clay films on faces of peds; 15 percent coarse fragments; very strongly acid; clear wavy boundary.
C—27 to 35 inches; strong brown (7.5YR 5/6) very channery silt loam; massive; friable, few roots; 40 percent coarse fragments; extremely acid; abrupt wavy boundary.
R—35 inches; shale and siltstone.

The solum thickness ranges from 20 to 36 inches, and depth to bedrock is 20 to 40 inches. Content of coarse fragments of shale, siltstone, and sandstone ranges from 5 to 30 percent in the solum and 30 to 80 percent in the C horizon. In unlimed areas the soils are strongly acid to extremely acid.

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

The B horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 through 8. It is silt loam, light silty clay loam, or their shaly or channery analogs.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 through 8. It is shaly, very shaly, channery, or very channery analogs of loam or silt loam.

Hackers Series

The Hackers series consists of deep, well drained soils formed in alluvial material washed from lime-influenced and acid soils on uplands. The Hackers soils are on high flood plains, mainly along Eighteenmile and Hurricane Creeks and the Pocatalico River. Slopes range from 0 to 8 percent.

Hackers soils are on the landscape with the well drained Moshannon and Sensabaugh soils and the moderately well drained Senecaville and Zoar soils. The Hackers soils are flooded less frequently than the Moshannon soils and most areas of the Senecaville soils. They have fewer coarse fragments in the B and C horizons and are flooded less frequently than most areas of Sensabaugh soils. They have less clay in the B and C horizons than do the Zoar soils.

Typical pedon of Hackers silt loam, 0 to 3 percent slopes, in a cultivated field along Eighteenmile Creek about 0.4 mile northeast of its confluence with Jakes Run.

Ap—0 to 9 inches; dark brown (7.5YR 4/4) silt loam; weak and moderate medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.
B21t—9 to 30 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; many roots; common discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.
B22t—30 to 39 inches; reddish brown (5YR 4/4) silty clay loam; weak and moderate medium subangular blocky structure; friable; few roots; common discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.
B3—39 to 45 inches; dark reddish brown (5YR 3/4) loam; weak medium subangular blocky structure; friable; few roots; strongly acid; clear wavy boundary.
C—45 to 60 inches; dark reddish brown (5YR 3/4) fine sandy loam with pockets of loam; common medium yellowish red (5YR 4/8) mottles; massive; friable; medium acid.

The solum thickness ranges from 30 to 48 inches, and depth to bedrock is greater than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in individual subhorizons. In unlimed areas the soils are strongly acid or medium acid.

The Ap horizon has hue of 7.5YR or 5YR and value and chroma of 3 or 4.

The B horizon has hue of 5YR or 2.5YR, value of 3 or 4, and chroma of 4 through 6. It is silt loam or silty clay loam.

The C horizon has hue of 5YR or 2.5YR and value and chroma of 3 or 4. It is fine sandy loam or loam, and in some pedons it is stratified with silt loam, clay loam, and sandy loam.

Huntington Series

The Huntington series consists of deep, well drained soils formed in alluvial material washed from lime-influenced and acid soils on uplands. The Huntington soils are on flood plains along the Kanawha River. The flooding frequency of these soils has been reduced by flood-control structures on the Kanawha River System. Slopes range from 0 to 3 percent.

Huntington soils are on the landscape with the well drained Ashton and Kanawha soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. They are flooded more frequently than either the Ashton or Kanawha soils and have a darker surface layer than the Kanawha soils.

Typical pedon of Huntington loam, in an idle field about 1,000 yards northeast of Interstate 64 and U.S. 35 exit and 20 yards northwest of the Kanawha River.

Ap—0 to 10 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; weak fine and medium granular structure; very friable; many roots; medium acid; abrupt smooth boundary.
B2—10 to 31 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; common roots; slightly acid; clear wavy boundary.
B3—31 to 45 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak coarse subangular blocky structure; friable; slightly acid; gradual wavy boundary.
C—45 to 60 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; friable; medium acid.

The solum thickness ranges from 40 to 50 inches, and depth to bedrock is greater than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in individual subhorizons. In unlimed areas the soils are medium acid to neutral.

The Ap horizon has hue of 10YR or 7.5YR and value and chroma of 2 or 3.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, loam, or fine sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is loam or sandy loam.

The Huntington soils in Putnam County are a taxadjunct to the Huntington series because they are more than 15 percent sand coarser than very fine sand in the textural control section. This difference, however, does not significantly affect the use and management of the soils.

Kanawha Series

The Kanawha series consists of deep, well drained soils formed in alluvial material that washed from lime-influenced and acid soils on uplands. The Kanawha soils are on high flood plains and low terraces along the Kanawha River. These soils are protected from flooding by flood-control structures on the Kanawha River System. Slopes range from 0 to 8 percent.

Kanawha soils are on the landscape with the well drained Ashton and Huntington soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils. They do not have the dark surface layer characteristic of either the Ashton or the Huntington soils, and they have less silt in the A and B horizons than do the Ashton soils.

Typical pedon of Kanawha loam, 3 to 8 percent slopes, in a meadow about 50 yards northeast of the junction of Rockstep Road with U.S. 35.

Ap—0 to 10 inches; dark brown (10YR 4/3) loam; weak medium coarse granular structure; very friable; many roots; slightly acid; abrupt smooth boundary.
B21t—10 to 22 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; many roots; few discontinuous clay films on faces of peds; medium acid; clear wavy boundary.
B22t—22 to 31 inches; strong brown (7.5YR 5/6) fine sandy loam; weak and moderate, fine and medium subangular blocky structure; friable; common roots; few discontinuous clay films on faces of peds; medium acid; clear wavy boundary.
B3—31 to 42 inches; strong brown (7.5YR 5/6) sandy loam; weak fine and medium subangular blocky structure; friable; few roots; medium acid; clear wavy boundary.
C—42 to 60 inches; strong brown (7.5YR 5/6) loamy sand; massive; very friable; medium acid.

The solum thickness ranges from 40 to 50 inches, and depth to bedrock is greater than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in individual subhorizons. In unlimed areas the soils are strongly acid or medium acid in the upper part of the solum and medium acid or slightly acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR and value and chroma of 3 or 4.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 8. It is loam, silt loam, clay loam, or sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6, and in some pedons there are high- and low-chroma mottles. Texture is loam, sandy loam, or loamy sand.

Lily Series

The Lily series consists of moderately deep, well drained soils formed in acid material weathered from sandstone. Lily soils are on upland ridges and rounded

knobs throughout the county. Slopes range from 8 to 35 percent.

Lily soils are on the landscape with the well drained Gilpin and Upshur soils and the moderately well drained Coolville and Tilsit soils. Lily soils contain more sand throughout the profile than do the Gilpin soils. They have less clay throughout the profile, are shallower, and do not have the reddish color typical of the Upshur soils. They have less clay in the B and C horizons than do the Coolville soils, do not have the fragipan typical of the Tilsit soils, and are shallower than either of these soils.

Typical pedon of Lily loam, 15 to 25 percent slopes, in a meadow about 500 feet south of Bowles Ridge Church and the junction of Routes 4 and 5/3.

Ap—0 to 7 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure parting to weak medium granular; friable; many roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.

B21t—7 to 12 inches; yellowish brown (10YR 5/6) loam; weak and moderate medium subangular blocky structure; friable; many roots; few discontinuous clay films on faces of peds; 5 percent coarse fragments; medium acid; clear wavy boundary.

B22t—12 to 20 inches; yellowish brown (10YR 5/8) loam; weak and moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on faces of peds; 10 percent coarse fragments; very strongly acid; clear wavy boundary.

C—20 to 24 inches; strong brown (7.5YR 5/8) channery fine sandy loam; massive; friable; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.

R—24 inches; sandstone.

The solum thickness ranges from 20 to 32 inches, and depth to bedrock is 20 to 40 inches. Content of coarse fragments of sandstone ranges from 5 to 10 percent in the solum and 10 to 30 percent in the C horizon. In unlimed areas the soils are strongly acid to extremely acid.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 6 through 8. It is loam or clay loam.

The C horizon has hue of 10YR through 5YR, value of 5 or 6, and chroma of 4 through 8. It is sandy loam, loamy sand, fine sandy loam, loam, or their channery analogs.

Lindside Series

The Lindside series consists of deep, moderately well drained soils formed in alluvial material washed from lime-influenced and acid soils on uplands. The Lindside soils are on flood plains along the Kanawha River. The flooding frequency of these soils has been reduced by flood-control structures on the Kanawha River System. Slopes range from 0 to 5 percent, but are dominantly less than 3 percent.

Lindside soils are on the landscape with the well drained Ashton, Huntington, and Kanawha soils and the poorly drained Melvin soils.

Typical pedon of Lindside silt loam, in a meadow about 400 yards northwest of the junction of Cross Creek Road and WV Route 62.

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

B21—8 to 19 inches; brown (7.5YR 5/4) silty clay loam; weak medium subangular blocky structure; friable; common roots; strongly acid; clear wavy boundary.

B22—19 to 40 inches; brown (7.5YR 5/4) silty clay loam; many medium and coarse light brownish gray (10YR 6/2) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; few roots; medium acid; clear wavy boundary.

C—40 to 60 inches; brown (7.5YR 5/4) silty clay loam; many medium and coarse light gray (10YR 7/2) mottles; massive; friable and firm; medium acid.

The solum thickness ranges from 25 to 46 inches, and depth to bedrock is greater than 60 inches. Coarse fragments range from 0 to 5 percent in individual subhorizons. In unlimed areas the soils are strongly acid or medium acid in the upper part of the solum and medium acid or slightly acid in the lower part of the solum and in the C horizon.

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

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. It is silt loam or silty clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 through 4. It is silt loam or silty clay loam.

Melvin Series

The Melvin series consists of deep, poorly drained soils formed in alluvial material washed from lime-influenced and acid soils on uplands. The Melvin soils are on flood plains along the Kanawha River. The flooding frequency of these soils has been reduced by flood-control structures on the Kanawha River System. Slopes range from 0 to 3 percent.

Melvin soils are on the landscape with the well drained Ashton, Huntington, and Kanawha soils and the moderately well drained Lindside soils.

Typical pedon of Melvin silt loam, in a meadow about 165 yards west of WV Route 62, about 325 yards south of Eighteenmile Creek.

Ap—0 to 9 inches; pale brown (10YR 6/3) silt loam; common fine and medium gray (10YR 6/1) mottles; weak fine and medium granular structure; friable; many roots; neutral; abrupt smooth boundary.
B2g—9 to 30 inches; gray (10YR 6/1) silty clay loam; common medium pale brown (10YR 6/3) and strong brown (7.5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; common roots; medium acid; gradual wavy boundary.
Cg—30 to 60 inches; gray (N 6/0) silty clay loam; many medium and coarse strong brown (7.5YR 5/8) mottles; massive; firm; medium acid.

The solum thickness ranges from 20 to 40 inches, and depth to bedrock is greater than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in individual subhorizons. In unlimed areas the soils are medium acid to neutral.

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

The B horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2. It is silty clay loam or silt loam.

The C horizon has hue of 10YR or neutral, value of 4 through 6, and chroma of 0 through 2. It is silty clay loam or silt loam, and in some pedons below a depth of 40 inches it is stratified with silty clay.

Monongahela Series

The Monongahela series consists of deep, moderately well drained soils formed in alluvial material washed from acid soils on uplands. The Monongahela soils are on stream terraces mainly in the Teays Valley and in some areas along the Kanawha River. Slopes range from 3 to 15 percent.

Monongahela soils are on the landscape with the well drained Allegheny soils, the moderately well drained Vincent soils, the somewhat poorly drained Tyler soils, and the Udifluvents and Fluvaquents soils. Monongahela soils have a fragipan, which is not a characteristic of Allegheny and Vincent soils. They have less clay in the B and C horizons and do not have the reddish color typical of the Vincent soils. The Monongahela soils are not subject to flooding as are the Udifluvents and Fluvaquents soils.

Typical pedon of Monongahela silt loam, 3 to 8 percent slopes, in a meadow about 0.4 mile southwest of Hurricane Elementary School, about 0.2 mile west of the confluence of an intermittent drain and Hurricane Creek.

Ap—0 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak fine and medium granular structure; very friable; many roots; mildly alkaline; abrupt smooth boundary.
B1—9 to 14 inches; brownish yellow (10YR 6/6) silt loam; weak medium subangular blocky structure; friable; many roots; mildly alkaline; clear wavy boundary.
B2t—14 to 25 inches; brownish yellow (10YR 6/8) silt loam; weak and moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on faces of peds; neutral; clear wavy boundary.
Bx1—25 to 38 inches; yellowish brown (10YR 5/8) silt loam; common fine and medium light gray (10YR 7/2) mottles; weak very coarse prismatic structure parting to weak medium and coarse subangular blocky; very firm and brittle; few discontinuous clay films on faces of peds; common black concretions; strongly acid; gradual wavy boundary.
Bx2—38 to 60 inches; brownish yellow (10YR 6/6) silt loam; common medium and coarse light gray (10YR 7/2) mottles; weak very coarse prismatic structure; very firm and brittle; few discontinuous clay films on faces of peds; many black concretions; strongly acid; gradual wavy boundary.
C—60 to 72 inches; mixed yellow (10YR 7/6), very pale brown (10YR 7/4), and light gray (10YR 7/2) silt loam; massive; friable; 5 percent coarse fragments; very strongly acid.

The solum thickness ranges from 40 to 60 inches or more. Depth to bedrock is greater than 60 inches. There are commonly no coarse fragments, but the content of coarse fragments ranges up to 10 percent in individual subhorizons. In unlimed areas the soils are strongly acid or very strongly acid.

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

The upper part of the B horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. The lower part of the B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 through 8.

The C horizon has hue of 10YR or 7.5YR, value of 5 through 7, and chroma of 2 through 8. It is generally silt loam or loam, but has subhorizons of sandy loam.

Moshannon Series

The Moshannon series consists of deep, well drained soils formed in alluvial material washed from lime-influenced and acid soils on uplands. The Moshannon soils are on flood plains, mainly along the larger streams throughout the county. Slopes range from 0 to 3 percent.

Moshannon soils are on the landscape with the well drained Hackers and Sensabaugh soils and the moderately well drained Senecaville and Zoar soils. They flood more frequently than the Hackers soils. They have fewer coarse fragments in the B and C horizons than do the Sensabaugh soils. They have less clay in the B and C horizons than do the Zoar soils and are subject to flooding.

Typical pedon of Moshannon silt loam, in a cultivated field along Eighteenmile Creek about 0.4 mile northeast of its confluence with Jakes Run.

Ap—0 to 9 inches; dark brown (7.5YR 4/4) silt loam; moderate medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.
B1—9 to 14 inches; reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure; friable; many roots; medium acid, clear wavy boundary.
B2—14 to 26 inches; yellowish red (5YR 4/6) silt loam; weak medium subangular blocky structure; friable; common roots; few discontinuous clay films on faces of peds; medium acid; clear wavy boundary.
B3—26 to 37 inches; yellowish red (5YR 4/6) loam; weak medium and coarse subangular blocky structure; friable; medium acid; gradual wavy boundary.
C—37 to 60 inches; dark brown (7.5YR 4/4) stratified loam, sandy loam, and loamy sand; massive; very friable; medium acid.

The solum thickness ranges from 32 to 44 inches and depth to bedrock is greater than 60 inches. Coarse fragments range from 0 to 10 percent in individual subhorizons. In unlimed areas the soils are slightly acid or medium acid.

The Ap horizon has hue of 7.5YR or 10YR and value and chroma of 3 or 4.

The B horizon has hue of 5YR or 7.5YR, value of 3 through 5, and chroma of 3 through 6. It is silt loam, loam, or silty clay loam.

The C horizon has hue of 7.5YR or 5YR, value of 3 through 5, and chroma of 3 through 6. It is stratified silt loam, loam, sandy loam, and loamy sand.

The Moshannon soils in Putnam County are a taxadjunct to the Moshannon series because they are more than 15 percent sand coarser than very fine sand in the textural control section and have a hue of 7.5YR in the substratum. These differences, however, do not significantly affect the use and management of the soils.

Senecaville Series

The Senecaville series consists of deep, moderately well drained soils formed in alluvial material washed from lime-influenced and acid soils on uplands. The Senecaville soils are on flood plains, mainly along Eighteenmile, Hurricane, and Trace Creeks and the Pocatalico River. Slopes range from 0 to 3 percent.

Senecaville soils are on the landscape with the well drained Hackers, Moshannon, and Sensabaugh soils and the moderately well drained Zoar soils. Most areas of the Senecaville soils are flooded more frequently than the Hackers soils. Senecaville soils have fewer coarse fragments in the B and C horizons than do the Sensabaugh soils. They have less clay in the B and C horizons than do the Zoar soils and are subject to flooding.

Typical pedon of Senecaville silt loam, in a meadow at the confluence of Bridge Creek and Trace Fork, about 50 yards north of Route 39, and about 30 yards west of Route 52.

Ap—0 to 6 inches; dark brown (7.5YR 4/4) silt loam; weak fine and medium subangular blocky structure parting to weak medium granular; very friable; many roots; medium acid; abrupt wavy boundary.
B2—6 to 16 inches; reddish brown (5YR 4/4) silt loam; weak and moderate medium subangular blocky structure; very friable; many roots; common discontinucus fine silt coats on faces of peds; medium acid; gradual wavy boundary.
B3—16 to 30 inches; reddish brown (5YR 4/3) silt loam; common medium and coarse dark brown (7.5YR 4/2), brown (7.5YR 5/2), and yellowish red (5YR 5/8) mottles; weak coarse subangular blocky structure; very friable; common roots; slightly acid; gradual wavy boundary.
C1g—30 to 48 inches; dark reddish gray (5YR 4/2) silt loam; common coarse yellowish red (5YR 5/8) mottles; massive; friable; few roots; 10 percent dark concretions; slightly acid; gradual wavy boundary.
C2g—48 to 60 inches; gray (N 6/0) fine sandy loam; massive; friable; 5 percent dark concretions; slightly acid.

The solum thickness ranges from 30 to 42 inches, and depth to bedrock is greater than 60 inches. Content of coarse fragments ranges from 0 to 5 percent in individual subhorizons. In unlimed areas the soils are slightly acid to strongly acid.

The Ap horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 2 through 4.

The B horizon has hue of 5YR, value of 4 or 5, and chroma of 3 through 6. It is silt loam or silty clay loam.

The C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 through 4 or it is neutral, has value of 6, and chroma of 0. It is silt loam, loam, or fine sandy loam.

Sensabaugh Series

The Sensabaugh series consists of deep, well drained soils formed in alluvial material washed from lime-influenced and acid soils on uplands. The Sensabaugh soils are on narrow flood plains along small streams and on alluvial fans at the mouth of hollows throughout the county. Slopes range from 0 to 8 percent.

Sensabaugh soils are on the landscape with the well drained Hackers and Moshannon soils and the moderately well drained Senecaville and Zoar soils. Sensabaugh soils have more coarse fragments in the B and C horizons than do either the Hackers or Moshannon soils. Most areas are flooded more frequently than the Hackers soils. They have less clay in the B and C horizons than do the Zoar soils and are subject to flooding.

Typical pedon of Sensabaugh silt loam, in a meadow about 0.4 mile northeast of Providence Church and about 50 yards east of Rockstep Road.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; weak fine and medium granular structure; very friable; many roots; 10 percent coarse fragments; slightly acid; abrupt smooth boundary.
B21—7 to 14 inches; reddish brown (5YR 4/3) gravelly loam; weak medium subangular blocky structure; friable; many roots; 20 percent coarse fragments; slightly acid; clear wavy boundary.
B22—14 to 21 inches; reddish brown (5YR 4/3) gravelly loam; weak fine and medium subangular blocky structure; friable; common roots; 30 percent coarse fragments; medium acid; clear wavy boundary.
B23—21 to 29 inches; reddish brown (5YR 4/4) gravelly loam with pockets of gravelly clay loam; weak fine and medium subangular blocky structure; friable; few roots; 25 percent coarse fragments; mildly alkaline; clear wavy boundary.
C—29 to 60 inches; reddish brown (5YR 4/4) very gravelly loam with pockets of very gravelly clay loam and sandy loam; massive; very friable; 50 percent coarse fragments; mildly alkaline.

The solum thickness ranges from 24 to 40 inches, and depth to bedrock is greater than 60 inches. Content of coarse fragments of gravel ranges from 0 to 15 percent in the A horizon, from 10 to 30 percent in individual subhorizons of the B horizon, and from 20 to 60 percent in the C horizon. In unlimed areas the soils are medium acid to mildly alkaline.

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

The B horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 3 through 6. It is loam, clay loam, fine sandy loam, silt loam, silty clay loam, or their gravelly analogs.

The C horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 3 through 6. It is gravelly or very gravelly analogs of loam, clay loam, fine sandy loam, or silt loam.

Tilsit Series

The Tilsit series consists of deep, moderately well drained soils formed in acid material weathered mainly from siltstone and fine grained sandstone. The Tilsit soils are on broad ridgetops and benches throughout the county. Slopes range from 3 to 8 percent.

Tilsit soils are on the landscape with the well drained Gilpin, Lily, and Upshur soils and the moderately well drained Coolville soils. They have a fragipan, which is not a characteristic of any of these soils. Tilsit soils are deeper than Gilpin and Lily soils, and they have less clay in the B and C horizons and do not have the reddish color typical of the Upshur and Coolville soils.

Typical pedon of Tilsit silt loam, 3 to 8 percent slopes, in an idle field about 100 yards south of the junction of Stave Branch Road and Evergreen Road.

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; weak fine and medium granular structure; very friable; many roots; medium acid; abrupt smooth boundary.
B1—6 to 12 inches; brownish yellow (10YR 6/6) silt loam; weak medium subangular blocky structure; friable; many roots; medium acid; clear wavy boundary.
B21t—12 to 20 inches; brownish yellow (10YR 6/6) silt loam; weak and moderate medium subangular blocky structure; friable; many roots; few discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.
B22t—20 to 24 inches; brownish yellow (10YR 6/6) silt loam; common medium light gray (10YR 7/2) mottles; weak and moderate medium subangular blocky structure; friable; common roots; few discontinuous clay films on faces of peds; very strongly acid; abrupt wavy boundary.
Bx—24 to 49 inches; brownish yellow (10YR 6/6) silt loam; many medium and coarse light gray (10YR 7/2) mottles; moderate very coarse prismatic structure parting to weak coarse subangular blocky; very firm and brittle; few roots along faces of prisms; few discontinuous clay films on faces of peds; very strongly acid; gradual wavy boundary.
C—49 to 62 inches; mixed yellowish red (5YR 5/6) and reddish yellow (7.5YR 6/6) channery silty clay loam with pockets of loam and sandy loam; many medium and coarse light gray (10YR 7/2) mottles; massive; friable; 15 percent coarse fragments; very strongly acid; clear wavy boundary.
R—62 inches; siltstone and fine grained sandstone.

The solum thickness ranges from 40 to 50 inches, and depth to bedrock ranges from 40 to 62 inches or more. Content of coarse fragments of siltstone and sandstone ranges from 0 to 5 percent in the solum and 10 to 20 percent in the C horizon. In unlimed areas the soils are strongly acid to extremely acid.

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

The upper part of the B horizon has hue of 10YR, value of 5 or 6, and chroma of 6 through 8. The lower part of the B horizon has hue of 10YR, value of 5 or 6, and chroma of 2 through 8. The B horizon is silt loam or silty clay loam.

The C horizon has hue of 10YR through 5YR, value of 5 or 6, and chroma of 2 through 8. It is silty clay loam, silt loam, loam, or their channery analogs.

The Tilsit soils in Putnam County are a taxadjunct to the Tilsit series because they have low-chroma mottles at slightly shallower depths in the argillic horizon and a redder substratum than defined for the series. These

differences, however, do not significantly affect the use and management of the soils.

Tyler Series

The Tyler series consists of deep, somewhat poorly drained soils formed in alluvial material washed from acid soils on uplands. The Tyler soils are on terraces, mainly in the Teays Valley. Slopes range from 0 to 5 percent.

Tyler soils are on the landscape with the well drained Allegheny soils, the moderately well drained Vincent and Monongahela soils, and the Udifluvents and Fluvaquents. They have a fragipan, which is not a characteristic of the Allegheny soils, Vincent soils, Udifluvents, and Fluvaquents. They have less clay in the B and C horizons and do not have the reddish color characteristic of the Vincent soils. The Tyler soils are not subject to flooding as are the Udifluvents and Fluvaquents.

Typical pedon of Tyler silt loam, in a meadow about 0.2 mile northwest of clubhouse on Sleepy Hollow Golf Course.

Ap—0 to 9 inches; brown (10YR 5/3) silt loam; weak to moderate medium granular structure; friable; many roots;. slightly acid; abrupt smooth boundary.

B1—9 to 15 inches; pale brown (10YR 6/3) silt loam; common medium light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; common roots; few discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

B2tg—15 to 24 inches; light brownish gray (10YR 6/2) silty clay loam; many medium and coarse brownish yellow (10YR 6/8) mottles; weak medium and coarse subangular blocky structure; friable; few roots; common discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

Bx1—24 to 42 inches; pale brown (10YR 6/3) silty clay loam; many coarse strong brown (7.5YR 5/8) and gray (10YR 6/1) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; firm; common discontinuous clay films on faces of prisms; common black concretions; very strongly acid; gradual wavy boundary.

Bx2—42 to 52 inches; pale brown (10YR 6/3) silty clay loam; many coarse strong brown (7.5YR 5/8) and gray (10YR 6/1) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; firm; common discontinuous clay films on faces of prisms; common black concretions; very strongly acid; gradual wavy boundary.

C—52 to 60 inches; light gray (N 6/0) silty clay loam; many coarse strong brown (7.5YR 5/8) mottles; massive; friable; 5 percent pebbles; very strongly acid.

The solum thickness ranges from 40 to 60 inches, and depth to bedrock is greater than 60 inches. In unlimed areas, the soils are strongly or very strongly acid.

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

The upper part of the B horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. The lower part of the B horizon has hue of 10YR, value of 5 or 6, and chroma of 1 through 3. The B horizon is silt loam or silty clay loam.

The C horizon is neutral or has hue of 10YR, value of 5 or 6, and chroma of 0 through 2. It is silt loam or silty clay loam.

Udifluvents

Udifluvents consist of deep, excessively drained to moderately well drained soils. The soils have formed in alluvial material washed from soils on terraces in the Teays Valley. The Udifluvents are along drainageways of terraces in the Teays Valley. Slopes range from 0 to 3 percent.

Udifluvents are on the landscape with the well drained Allegheny soils, the moderately well drained Monongahela and Vincent soils, the somewhat poorly drained Tyler soils, and the poorly drained Fluvaquents. Udifluvents are subject to flooding, which is not a characteristic of any of these soils except Fluvaquents.

Because of the variability of Udifluvents, a typical pedon is not given. Depth to bedrock is generally greater than 60 inches. Content of coarse fragments of rounded river gravel ranges from 0 to 50 percent in individual subhorizons. In unlimed areas the soils are slightly acid to strongly acid.

The A horizon dominantly has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 2 through 4. It is silt loam or loam.

The underlying horizons dominantly show stratification and have hue of 7.5YR through 5Y, value of 3 through 7, and chroma of 1 through 6. They range from loamy sand to silty clay loam, or their gravelly or very gravelly analogs.

Udorthents

Udorthents consist of a mixture of soil and rock fragments that have been drastically disturbed by civilization.

Udorthents, smoothed, are soils that formed in areas that were cut and filled along highways, railroads, and construction sites. Most areas are along Interstate 64, U.S. Route 60, U.S. Route 35, and the Kanawha River.

Because of the variability of Udorthents, smoothed, a typical pedon is not given. Depth to bedrock is generally greater than 40 inches in the filled areas, and in places bedrock is exposed in the cut areas. Coarse fragments vary in kind, size, and amount. Pedons range from hue

of 10YR to 2.5YR, value of 3 through 6, and chroma of 2 through 8. They are sandy loam; loam; silt loam; clay loam; silty clay loam; silty clay; clay; or their gravelly, very gravelly, channery, or very channery analogs.

Udorthents, mudstone and sandstone, and Udorthents, burned, are soils that formed in areas disturbed by mining operations. These soils are associated with surface mining or deep mining of coal. They are mostly on side slopes and benches in the eastern part of the county, north of the Kanawha River.

Udorthents that have resulted from the mining of coal and that have at least three of the following properties are considered minesoils (*7*):

1. Coarse fragments constitute at least 10 percent of the volume of the control section, and they are disordered such that more than 50 percent will have their long axis at an angle of at least 10 percent relative to any plane in the profile. The test for disorder should exclude fragments with a maximum diameter of less than 3/4 inch or more than 10 inches and should be based on numbers of coarse fragments rather than on volume.
2. Mottles occur without regard to depth or spacing in the profile. The mottling involves color differences of at least two color chips in the standard Munsell soil color charts. This mottling occurs among fines as well as within coarse fragments or between fines and coarse fragments.
3. If coarse fragments are fissile, the edges are frayed or splintery rather than smooth.
4. Coarse fragments bridge across voids as a result of placement of materials, leaving discontinuous irregular pores larger than texture porosity. Such voids are consistently present but vary in frequency, prominence, and size.
5. The profile has a thin surface horizon or a horizon immediately below a surface pavement of coarse fragments that contains more fines than any other horizon in the profile in the control section. This horizon ranges from 1 inch to 4 inches thick in most minesoils, but it may be thicker in minesoils that have been covered with topsoil.
6. The profile has local pockets of materials, excluding single coarse fragments, that range from 3 to 40 inches in horizontal diameter. These pockets have no lateral continuity and are the result of the original placement of materials and not postdepositional processes. They may differ from surrounding material in color (two or more Munsell color chips), soil texture or particle-size class, or dominant rock type constituting the coarse fragments.
7. Artifacts are present (paper, wire, logs, cans, glass, etc.).
8. Carbolithic coarse fragments occur in noncarbolithic soils.
9. Oxidizable carbon is irregularly distributed with depth and not associated with stratification (laboratory determination).

Reference pedon of Udorthents, mudstone and sandstone, high base, in an area of Udorthents, mudstone and sandstone, high and low base, about 0.4 mile east of the Pocatalico River, about 1.2 miles southwest of Lanham.

A1—0 to 3 inches; brown (10YR 4/3) very channery loam; weak fine and medium granular structure; very friable; 45 percent coarse fragments (80 percent mudstone, 20 percent carbolithic fragments); common voids bridged by coarse fragments; many roots; neutral; abrupt wavy boundary.

C1—3 to 8 inches; yellowish brown (10YR 5/4) very channery loam; common medium gray (10YR 5/1) lithochromic mottles; massive; friable; 50 percent coarse fragments (60 percent mudstone, 30 percent sandstone, 10 percent carbolithic fragments); many voids bridged by coarse fragments; many roots; neutral; gradual wavy boundary.

C2—8 to 26 inches; yellowish brown (10YR 5/6) very channery loam; common medium brownish yellow (10YR 6/8) lithochromic mottles; massive; friable; 60 percent coarse fragments (50 percent mudstone, 35 percent sandstone, 15 percent carbolithic fragments); common voids bridged by coarse fragments; common roots; neutral; gradual wavy boundary.

C3—26 to 40 inches; yellowish brown (10YR 5/4) very channery loam; common medium gray (10YR 5/1); very dark gray (N 3/0), and dark reddish brown (5YR 3/4) lithochromic mottles; massive; friable; 40 percent coarse fragments (50 percent mudstone, 30 percent sandstone, 20 percent carbolithic fragments); common voids bridged by coarse fragments; common roots; neutral.

Depth to bedrock is generally greater than 40 inches, but ranges from outcrops on the highwalls to more than 30 feet on some benches and outslopes. Content of coarse fragments of mudstone, sandstone, some carbolithic fragments, and some shale ranges from 35 to 80 percent in individual layers. In unlimed areas the low base soils are extremely acid to strongly acid, and the high base soils are medium acid to neutral.

The layers have a hue of 10YR or 7.5YR and value and chroma of 2 through 8. Texture is very channery analogs of loam, sandy loam, silt loam, silty clay loam, or clay loam.

Reference pedon of Udorthents, burned, low base, about 200 yards north of Route 5, about 500 yards northwest of Washington Hollow.

A1—0 to 5 inches; very dark gray (10YR 3/1) very shaly sandy loam; few medium yellow (10YR 7/8) lithochromic mottles; massive; very friable; 55 percent coarse fragments (70 percent carbolithic

fragments, 20 percent burned carbolithic fragments, 10 percent sandstone); few voids bridged by coarse fragments; common roots; extremely acid; clear wavy boundary.

C1—5 to 20 inches; dark gray (10YR 4/1) very shaly loam with pockets of very gravelly sandy loam; many fine and medium yellowish brown (10YR 5/6), black (10YR 2/1), and red (2.5YR 4/6) lithochromic mottles; massive; friable; 50 percent coarse fragments (60 percent carbolithic fragments, 20 percent burned carbolithic and shale fragments, 20 percent sandstone); common voids bridged by coarse fragments; few roots; very strongly acid; abrupt wavy boundary.

C2—20 to 31 inches; reddish brown (5YR 5/4) very shaly sandy loam; many fine and medium dark yellowish brown (10YR 3/6) and white (2.5Y 8/2) lithochromic mottles; massive; friable; 60 percent coarse fragments (burned carbolithic); common voids bridged by coarse fragments; few roots; strongly acid; abrupt wavy boundary.

C3—31 to 40 inches; white (5Y 8/2) shaly clay loam; many fine and medium pink (5YR 8/3), red (2.5YR 4/8), and dusky red (2.5YR 3/2) lithochromic mottles; massive; friable to firm; 25 percent coarse fragments (burned carbolithic); no roots; extremely acid.

Depth to bedrock is generally greater than 40 inches, but ranges from 2 feet to more than 80 feet. Burned carbolithic fragments, carbolithic fragments, sandstone, and shale range from 20 to 80 percent in individual layers, but weighted average in the control section exceeds 35 percent. Unlimed soils are extremely acid to strongly acid.

The layers have a hue of 10YR through 5YR, value of 2 through 8, and chroma of 1 through 8. They are shaly or very shaly analogs of sandy loam, loam, silt loam, silty clay loam, or clay loam.

Upshur Series

The Upshur series consists of deep, well drained soils formed in lime-influenced material weathered mainly from clay shale. The Upshur soils are on ridgetops, rounded knobs, saddles, benches and side slopes throughout the county. Slopes range from 3 to 65 percent.

Upshur soils are on the landscape with the well drained Gilpin, Lily, and Vandalia soils and the moderately well drained Coolville and Tilsit soils. Upshur soils are deeper, have more clay throughout the profile, and have a reddish color that is not characteristic of the Gilpin and Lily soils. They have a reddish color and do not have the fragipan typical of the Tilsit soils. They have fewer coarse fragments in the A and B horizons, and they have more clay in the upper part of the B horizon than do the Vandalia soils.

Typical pedon of Upshur silty clay loam, 8 to 15 percent slopes, in a pasture field, about 0.1 mile west of Route 5/3 along a new gas well road, about 0.6 mile northeast of Bowles Ridge Church.

Ap—0 to 7 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium granular and weak medium subangular blocky structure; friable; many roots; 5 percent coarse fragments; medium acid; abrupt smooth boundary.

B21t—7 to 19 inches; dark red (2.5YR 3/6) clay; moderate medium angular blocky structure; friable and firm, very plastic, very sticky; many roots; continuous clay films on faces of peds; 10 percent coarse fragments; very strongly acid; clear wavy boundary.

B22t—19 to 27 inches; dark red (2.5YR 3/6) shaly clay; moderate fine subangular blocky structure; friable, very plastic, very sticky; common roots; continuous clay films on faces of peds; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B3t—27 to 36 inches; dark red (10YR 3/6) shaly clay; weak fine and medium subangular blocky structure; friable, very plastic, very sticky; common roots; common discontinuous clay films on faces of peds; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

C—36 to 44 inches; dusky red (10YR 3/4) very shaly clay; massive; friable; few roots; 50 percent coarse fragments; medium acid; clear wavy boundary.

Cr—44 inches; soft shale.

The solum thickness ranges from 26 to 42 inches, and depth to bedrock is 40 to 60 inches or more. Content of coarse fragments of shale ranges from 0 to 25 percent in the solum and 25 to 70 percent in the C horizon. In unlimed areas the soils are very strongly acid to slightly acid in the solum and strongly acid to slightly acid in the C horizon.

The Ap horizon has hue of 5YR through 10YR and value and chroma of 3 or 4. It is silty clay loam or silty clay.

The B horizon has hue of 10R through 5YR, value of 3 or 4, and chroma of 4 or 6. It is silty clay, clay, or their shaly analogs. The lower part of the B horizon in some pedons is silty clay loam or shaly silty clay loam.

The C horizon has hue of 10R through 5YR, value of 3 or 4, and chroma of 4 through 6. It is shaly or very shaly analogs of silty clay loam, silty clay, or clay.

Vandalia Series

The Vandalia series consists of deep, well drained soils formed in lime-influenced and acid colluvial material that moved downslope mainly from Upshur and Gilpin soils on uplands. The Vandalia soils are on foot slopes along the base of steeper slopes and around the head

of drainageways throughout the county. Slopes range from 8 to 35 percent.

Vandalia soils are on the landscape with the well drained Gilpin and Upshur soils. Vandalia soils are deeper over bedrock, have more clay throughout the profile, and have a reddish color that is not characteristic of the Gilpin soils. They have more coarse fragments in the A and B horizons, and they have less clay in the upper part of the B horizon than do the Upshur soils.

Typical pedon of Vandalia silt loam, 15 to 25 percent slopes, in a wooded area about 300 yards northeast of Cross Creek Road and 0.6 mile east of U.S. Route 62.

O1—1 to 1/2 inch; leaves and pine needles.
O2—1/2 inch to 0; partially decomposed leaves and pine needles.
Ap—0 to 6 inches; reddish brown (5YR 4/3) silt loam; weak medium granular and weak fine subangular blocky structure; friable; many roots; 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.
B1—6 to 11 inches; yellowish red (5YR 5/6) channery silty clay loam; weak medium subangular blocky structure; friable; many roots; 15 percent coarse fragments; very strongly acid; clear wavy boundary.
B21t—11 to 19 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; many roots; common discontinuous clay films on faces of peds; 10 percent coarse fragments; very strongly acid; gradual wavy boundary.
B22t—19 to 34 inches; reddish brown (2.5YR 4/4) silty clay; moderate and strong medium subangular blocky structure; firm, sticky and plastic; common roots; continuous clay films on faces of peds; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B23t—34 to 52 inches; reddish brown (2.5YR 4/4) channery silty clay; weak and moderate medium subangular blocky structure; friable, sticky and plastic; few roots; continuous clay films on faces of peds; 15 percent coarse fragments; medium acid; gradual wavy boundary.
C—52 to 60 inches; reddish brown (2.5YR 4/4) channery silty clay loam; massive; friable; 20 percent coarse fragments; medium acid.

The solum thickness ranges from 40 to 60 inches, and depth to bedrock is greater than 60 inches. Content of coarse fragments of shale, siltstone, and sandstone ranges from 5 to 30 percent in individual subhorizons of the solum and up to 50 percent in the C horizon. In unlimed areas the soils range from medium acid to very strongly acid in the upper part of the solum, strongly acid or medium acid in the lower part of the solum, and strongly acid to slightly acid in the C horizon.

The Ap horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 through 4. It is silt loam or silty clay loam.

The upper part of the B horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6. It is silty clay loam, silty clay, or their channery or shaly analogs. The lower part of the B horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 through 6. It is silty clay, clay, or their channery or shaly analogs.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 through 6. It is silty clay loam; silty clay; clay; or their channery, very channery, shaly, or very shaly analogs.

Vincent Series

The Vincent series consists of deep, moderately well drained soils formed in alluvium and in lacustrine sediments washed from lime-influenced and acid soils on uplands. The Vincent soils are on terraces in the Teays Valley. Slopes range from 3 to 15 percent.

Vincent soils are on the landscape with the well drained Allegheny soils, the moderately well drained Monongahela soils, the somewhat poorly drained Tyler soils, and the Udifluvents and Fluvaquents. Vincent soils have more clay in the B and C horizons and a reddish color that is not characteristic of any of these soils. They do not have the fragipan typical of the Monongahela and Tyler series. Vincent soils are not subject to flooding as are the Udifluvents and Fluvaquents.

Typical pedon of Vincent silt loam, 3 to 8 percent slopes, in a meadow about 0.2 mile west of Teays Depot, about 100 feet north of Chesapeake and Ohio Railroad track.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many roots; slightly acid; abrupt smooth boundary.
B21t—7 to 19 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; many roots; common discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.
IIB22t—19 to 30 inches; yellowish red (5YR 5/6) silty clay; common medium pinkish gray (5YR 6/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few roots; continuous clay films on faces of peds; very strongly acid; clear wavy boundary.
IIB23t—30 to 41 inches; reddish brown (5YR 4/4) silty clay; many medium and coarse pinkish gray (5YR 6/2) and strong brown (7.5YR 5/8) mottles; moderate medium and coarse angular blocky structure; firm; few roots; many discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

IIB3t—41 to 45 inches; reddish brown (5YR 4/4) silty clay; many medium and coarse strong brown (7.5YR 5/8) and pinkish gray (5YR 6/2) mottles; weak coarse angular blocky structure; firm; common discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.

IIC—45 to 70 inches; reddish brown (5YR 5/4) silty clay; massive; firm; 1/8 inch and less stratified strong brown (7.5YR 5/6) bands at 50 to 70 inches; medium acid.

The solum thickness ranges from 40 to 55 inches, and depth to bedrock is greater than 60 inches. In unlimed areas the soils are very strongly acid to medium acid in the solum and medium acid or 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 or 3.

The upper part of the B horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 through 6. The lower part of the B horizon has hue of 5YR, value of 4 or 5, and chroma of 4 through 6. The B horizon is silty clay, clay, or silty clay loam.

The C horizon has hue of 5YR, value of 4 or 5, and chroma of 4 through 6. It is silty clay or clay and is usually varied.

Zoar Series

The Zoar series consists of deep, moderately well drained soils formed in acid slack water deposits washed from acid and lime-influenced soils on uplands. The Zoar soils are on terraces, mainly along Eighteenmile and Hurricane Creeks and the Pocatalico River. Slopes range from 3 to 8 percent.

Zoar soils are on the landscape with the well drained Hackers, Sensabaugh, and Moshannon soils, and the moderately well drained Senecaville soils. The Zoar soils have more clay in the B and C horizons than do any of these soils and are not likely to be flooded.

Typical pedon of Zoar silt loam, 3 to 8 percent slopes, in a cornfield about 0.4 mile northeast of the confluence of Jakes Run and Eighteenmile Creek, about 100 feet north of old barn.

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many roots; very strongly acid; abrupt smooth boundary.

B1t—9 to 13 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; many roots; few discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

B21t—13 to 20 inches; strong brown (7.5YR 5/6) silty clay loam; few fine and medium pinkish gray (7.5YR 7/2) mottles; weak medium prismatic structure parting to moderate and medium subangular blocky; friable; common roots; continuous clay films on faces of peds; very strongly acid; clear wavy boundary.

IIB22t—20 to 29 inches; reddish brown (5YR 4/4) clay; many medium and coarse pinkish gray (7.5YR 7/2) mottles; weak and moderate medium subangular blocky structure; friable; few roots; continuous clay films on faces of peds; very strongly acid; clear wavy boundary.

IIB3t—29 to 39 inches; yellowish red (YR 4/6) silty clay loam; many medium and coarse pinkish gray (7.5YR 6/2) mottles; weak medium subangular blocky structure; friable; few roots; continuous clay films on faces of peds; very strongly acid; clear wavy boundary.

IIC—39 to 60 inches; yellowish red (5YR 4/6) silty clay loam; common medium pinkish gray (5YR 6/2), light reddish brown (5YR 6/3), and yellowish red (5YR 5/8) mottles; massive; friable and firm; very strongly acid.

The solum thickness ranges from 30 to 50 inches, and depth to bedrock is greater than 60 inches. In unlimed areas the soils are very strongly acid or strongly acid.

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

The upper part of the B horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 through 6. The lower part of the B horizon has hue of 5YR or 7.5YR, value of 4 through 6, and chroma of 6 or 8. It is silty clay loam, silty clay, or clay.

The C horizon has hue of 5YR or 7.5YR, value of 4 through 6, and chroma of 2 through 8. It is silty clay loam, silty clay, or clay.

The Zoar soils in Putnam County are a taxadjunct to the Zoar series because the low-chroma mottles are at a slightly shallower depth in the argillic horizon than is defined for the series. This difference, however, does not significantly affect the use and management of the soils.

Formation of the Soils

The origin and development of the soils in Putnam County are explained in this section. The five factors of soil formation are listed, and their influence is described. Also described are the morphology of the soils as related to horizon nomenclature, the processes involved in horizon development, and the geologic characteristics of the area.

Factors of Soil Formation

The soils in Putnam County have resulted from the interaction of the five major factors of soil formation: parent material, time, climate, living organisms, and topography (*4*). Each factor modifies the effect of the others. Parent material, topography, and time have produced the major differences among the soils in the county. Climate and living organisms generally show their influence over broad areas, and their effects are relatively uniform throughout the county.

Parent Material, Time, and Climate

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

The residual material is the oldest parent material in the county. The soil-forming factors have been retarded by clayey material, by resistant rock, by slope, and by constant soil erosion. Consequently, some of the soils that formed under these conditions have a less well-developed profile than some of the soils that formed in younger material.

Colluvial material is along foot slopes and at the head of drainageways. This material moved downslope from the acid and lime-influenced residual soils. The Vandalia soils have formed in colluvium lower than the Upshur soils and soils of the Gilpin-Upshur and Upshur-Gilpin complexes.

The parent material on terraces and flood plains has washed from acid and lime-influenced soils on uplands. The soil-forming processes have had considerable time to act on the material on the terraces. Many additions, losses, and alterations have taken place. The resulting soils, such as the Allegheny and Monongahela soils, are strongly leached and have a moderately well-developed profile. The alluvial deposits on the low flood plains make up the youngest parent material in the county. Most of this material is physically well-suited to soil formation, but the soil-forming processes have had little time to operate. The soils on flood plains usually exhibit a weakly developed profile. Moshannon, Senecaville, and Sensabaugh soils are examples of low flood plain soils.

The climate is relatively uniform throughout the county. It is not responsible for any major differences in the soils, but it causes the development of horizons in the soil profile. A detailed description of the climate is given in the section "General Nature of the County."

Living Organisms

All living organisms, including vegetation, animals, bacteria, and fungi, affect soil formation. The kind and amount of vegetation is generally responsible for the amount of organic matter, the color of the surface layer, and, in part, the amount of nutrients present. Earthworms and burrowing animals help keep the soil open and porous, and they mix organic matter and mineral matter by moving the soil to the surface. Bacteria and fungi decompose organic matter, and some are very instrumental in the weathering and decomposing of minerals, thus releasing nutrients for plant food. The addition of a few plant nutrients and better management techniques can increase the earthworm activity, biological activity, and vegetation and develop a much more productive surface layer.

Topography

Topography affects soil formation by its effect on the amount of water moving through the soil, the amount and rate of runoff, and the rate of erosion.

Gently sloping and strongly sloping soils have had large amounts of water moving through them. Water may percolate freely through the soil as in the Gilpin soil, or the water movement may be restricted as in the Coolville and Tilsit soils on uplands and the Monongahela and Tyler soils on terraces. On the steep and very steep hillsides, less water moves through the soil and the amount and rate of runoff are greater. The soil material

is washed away almost as rapidly as it forms. It is likely that the soils on the steeper hillsides will be less deep over bedrock than the soils on the more gentle slopes.

The topography of Putnam County is favorable for 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, mainly because too little time has elapsed since the material was deposited.

Morphology of Soils

The results of the soil-forming processes can be observed in the different layers, or horizons, in the soil profile. The profile extends from the surface downward to materials that are little changed by the soil-forming processes. Most soils contain three major horizons, called the A, B, and C horizons. These horizons can be further subdivided by the use of numbers and letters to indicate changes within a major horizon.

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

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. The B horizon commonly has a blocky structure and is generally 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 is little altered by the soil-forming processes.

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

Most of the well drained and moderately well drained soils on the uplands in the county have a yellowish brown, strong brown, or dark red B horizon. These colors are caused mainly by iron oxides. The B horizon of these soils has a blocky structure and contains translocated clay minerals.

A fragipan has formed in the B horizon of the moderately well drained Tilsit soils on uplands and the Monongahela and Tyler soils on terraces. This layer is dense and brittle, is mottled, and is slowly or very slowly permeable to water and air. Most fragipans are grayish, or mottled with gray, and the soil is moderately well drained or somewhat poorly drained. The gray color is the result of intense reduction of iron during soil formation, a process called gleying.

Geology

Brian Ganoe, geologist, Soil Conservation Service, helped prepare this section.

Most of the exposed rock in the county is part of the Dunkard, Monongahela, and Conemaugh Groups. The Allegheny Formation is exposed in a much smaller extent in the southernmost part of the county. The exposed rock includes interbedded, limy red and olive gray shale; acid gray and brown siltstone; sandstone; coal; and limestone.

The dominant rock types of the Dunkard and Monongahela Groups are limy red and olive gray shale, siltstone, and sandstone. The only commercial coal seam, the Pittsburgh, is the basal unit of the Monongahela Group and is in the southern part of the county. Acid sandstone, siltstone, and olive gray and red shale beds are dominant in the Conemaugh Group and Allegheny Formation; however, a few thin beds of limestone are in some areas.

The soils in the northeastern section of the county have formed in material weathered mainly from younger Dunkard rocks. The soils in the northwestern and central section have formed from the weathering of older Monongahela rocks. The southernmost soils in the county have formed mainly in material weathered from rocks of the Conemaugh Group and Allegheny Formation.

Soils in the Teays Valley from Nitro to Culloden have formed in the lacustrine sediments of the Pleistocene Teays Lake (*6*). The soils along the Kanawha River have formed in alluvial sediments of the Kanawha River drainage area.

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Glossary

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 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

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

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

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

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

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

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

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.

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

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, 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.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

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

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

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

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 grazingland for a prescribed period.

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

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the

activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

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.

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 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

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.

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 upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, alluminum, 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) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration 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.

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 (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

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.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor 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 degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the

soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

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).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace (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.

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.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by melt water streams, in 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.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Based on data recorded in the period 1951-78 at Winfield Locks, W. Va.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F		In	In	In		In
January	41.9	22.3	32.2	72	-3	63	3.25	1.89	4.45	8	5.3
February	45.0	23.8	34.4	73	1	65	2.83	1.36	4.10	7	3.7
March	54.5	31.4	43.0	83	13	186	3.98	2.33	5.45	9	2.1
April	66.5	40.3	53.4	88	24	402	3.63	2.16	4.94	9	.1
May	75.9	50.0	63.0	91	32	713	3.95	2.24	5.45	9	.0
June	82.8	59.1	71.0	94	44	930	3.22	2.13	4.21	7	.0
July	86.3	63.8	75.0	96	51	1,085	4.39	2.46	6.09	8	.0
August	85.3	62.8	71.4	95	49	1,083	3.67	1.89	5.22	7	.0
September	79.8	56.4	68.2	94	39	846	3.37	2.05	4.54	6	.0
October	69.0	44.3	56.7	86	27	518	2.51	.97	3.80	5	.0
November	56.2	34.2	45.2	79	14	180	2.84	1.61	3.92	7	.8
December	45.9	26.5	36.3	73	5	92	3.14	1.47	4.57	7	1.8
Yearly:											
Average	65.8	42.9	54.2	---	---	---	---	---	---	---	---
Extreme	---	---	---	98	-4	---	---	---	---	---	---
Total	---	---	---	---	---	6,163	40.78	35.63	45.75	89	13.8

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Based on data recorded in the period 1951-76 at Winfield Locks, W. Va.]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 9	April 21	May 6
2 years in 10 later than--	April 3	April 15	May 1
5 years in 10 later than--	March 23	April 5	April 21
First freezing temperature in fall:			
1 year in 10 earlier than--	October 29	October 20	October 9
2 years in 10 earlier than--	November 5	October 25	October 14
5 years in 10 earlier than--	November 18	November 5	October 23

TABLE 3.--GROWING SEASON

[Based on data recorded in the period 1951-78 at Winfield Locks, W. Va.]

Probability	Length of growing season if daily minimum temperature is		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	213	188	165
8 years in 10	222	197	171
5 years in 10	239	213	184
2 years in 10	257	230	196
1 year in 10	266	239	202

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AgA	Allegheny loam, 0 to 3 percent slopes	90	*
AgB	Allegheny loam, 3 to 8 percent slopes	270	0.1
AgC	Allegheny loam, 8 to 15 percent slopes	830	0.4
AsA	Ashton silt loam, 0 to 3 percent slopes	840	0.4
AsB	Ashton silt loam, 3 to 8 percent slopes	240	0.1
CoB	Coolville silt loam, 3 to 8 percent slopes	830	0.4
CoC	Coolville silt loam, 8 to 15 percent slopes	240	0.1
GlC	Gilpin silt loam, 8 to 15 percent slopes	310	0.1
GuC	Gilpin-Upshur complex, 8 to 15 percent slopes	3,320	1.5
GuC3	Gilpin-Upshur complex, 8 to 15 percent slopes, severely eroded	720	0.3
GuD	Gilpin-Upshur complex, 15 to 25 percent slopes	16,610	7.3
GuD3	Gilpin-Upshur complex, 15 to 25 percent slopes, severely eroded	5,520	2.5
GuE	Gilpin-Upshur complex, 25 to 35 percent slopes	18,190	8.0
GuE3	Gilpin-Upshur complex, 25 to 35 percent slopes, severely eroded	10,980	4.8
GuF	Gilpin-Upshur complex, 35 to 65 percent slopes	25,820	11.4
GuF3	Gilpin-Upshur complex, 35 to 65 percent slopes, severely eroded	4,030	1.8
GvE	Gilpin-Upshur complex, stony, 15 to 35 percent slopes	3,300	1.5
GvF	Gilpin-Upshur complex, stony, 35 to 65 percent slopes	54,680	24.1
HaA	Hackers silt loam, 0 to 3 percent slopes	220	0.1
HaB	Hackers silt loam, 3 to 8 percent slopes	540	0.2
Hu	Huntington loam	500	0.2
KaA	Kanawha loam, 0 to 3 percent slopes	430	0.2
KaB	Kanawha loam, 3 to 8 percent slopes	890	0.4
LlC	Lily loam, 8 to 15 percent slopes	240	0.1
LlD	Lily loam, 15 to 25 percent slopes	670	0.3
LlE	Lily loam, 25 to 35 percent slopes	500	0.2
Ln	Lindside silt loam	1,010	0.4
Me	Melvin silt loam	570	0.3
Mf	Melvin-Lindside silt loams	1,100	0.5
MgB	Monongahela silt loam, 3 to 8 percent slopes	1,380	0.6
MgC	Monongahela silt loam, 8 to 15 percent slopes	900	0.4
Mo	Moshannon silt loam	3,740	1.7
Se	Senecaville silt loam	790	0.4
Sf	Senecaville silt loam, rarely flooded	420	0.2
Sn	Sensabaugh silt loam	4,710	2.1
SrB	Sensabaugh silt loam, rarely flooded, 3 to 8 percent slopes	1,500	0.7
TlB	Tilsit silt loam, 3 to 8 percent slopes	700	0.3
Ty	Tyler silt loam	400	0.2
UA	Udifluvents and Fluvaquents, frequently flooded	520	0.2
UB	Udorthents, burned, low base	180	0.1
UC	Udorthents, mudstone and sandstone, high and low base	930	0.4
UD	Udorthents, smoothed	2,850	1.3
UeB	Upshur silty clay loam, 3 to 8 percent slopes	350	0.2
UeC	Upshur silty clay loam, 8 to 15 percent slopes	290	0.1
UfC3	Upshur silty clay, 8 to 15 percent slopes, severely eroded	360	0.2
UgC	Upshur-Gilpin complex, 8 to 15 percent slopes	2,850	1.3
UgC3	Upshur-Gilpin complex, 8 to 15 percent slopes, severely eroded	1,270	0.6
UgD	Upshur-Gilpin complex, 15 to 25 percent slopes	6,080	2.7
UgD3	Upshur-Gilpin complex, 15 to 25 percent slopes, severely eroded	6,200	2.8
UgE	Upshur-Gilpin complex, 25 to 35 percent slopes	6,100	2.7
UgE3	Upshur-Gilpin complex, 25 to 35 percent slopes, severely eroded	6,680	3.0
Uh	Urban land	620	0.3
UkB	Urban land-Kanawha complex, 0 to 8 percent slopes	650	0.3
Un	Urban land-Lindside complex	420	0.2
UoB	Urban land-Monongahela complex, 3 to 15 percent slopes	1,020	0.5
UvC	Urban land-Vincent complex, 3 to 15 percent slopes	750	0.3
VaC	Vandalia silt loam, 8 to 15 percent slopes	630	0.3
VaD	Vandalia silt loam, 15 to 25 percent slopes	8,000	3.5
VaE	Vandalia silt loam, 25 to 35 percent slopes	420	0.2
VbD	Vandalia stony silt loam, 15 to 35 percent slopes	2,940	1.3
VdD3	Vandalia silty clay loam, 15 to 25 percent slopes, severely eroded	2,240	1.0
VeB	Vincent silt loam, 3 to 8 percent slopes	360	0.2
VeC	Vincent silt loam, 8 to 15 percent slopes	1,020	0.5
ZoB	Zoar silt loam, 3 to 8 percent slopes	490	0.2
W	Water	3,030	1.3
	Total	225,280	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass	Tobacco
	Bu	Bu	Bu	Ton	Ton	AUM*	Lb
AgA---- Allegheny	125	75	45	3.5	4.5	5.5	3,000
AgB---- Allegheny	115	75	45	3.5	4.5	5.5	3,000
AgC---- Allegheny	105	70	40	3.5	4.0	4.5	2,750
AsA---- Ashton	140	80	50	5.0	5.5	5.5	3,200
AsB---- Ashton	130	80	45	5.0	5.5	5.5	3,000
CoB---- Coolville	90	65	40	3.0	3.5	4.5	---
CoC---- Coolville	75	60	35	3.0	3.5	4.5	---
GlC---- Gilpin	85	60	35	3.0	3.5	4.5	2,300
GuC---- Gilpin-Upshur	90	60	35	3.0	3.5	4.5	2,300
GuC3---- Gilpin-Upshur	85	55	30	2.5	3.0	4.0	---
GuD---- Gilpin-Upshur	85	55	30	2.5	3.0	4.0	---
GuD3---- Gilpin-Upshur	---	---	---	---	---	3.5	---
GuE---- Gilpin-Upshur	---	---	---	---	---	3.5	---
GuE3, GuF, GuF3, GvE, GvF Gilpin-Upshur	---	---	---	---	---	---	---
HaA---- Hackers	135	80	50	3.5	5.0	5.5	2,800
HaB---- Hackers	130	80	50	3.5	5.0	5.5	2,800
Hu---- Huntington	135	80	50	3.5	5.0	5.5	3,200
KaA---- Kanawha	135	80	50	3.5	5.0	5.5	3,000
KaB---- Kanawha	130	80	50	3.5	5.0	5.5	3,000
LlC---- Lily	85	60	35	3.0	3.5	4.5	2,300
LlD---- Lily	70	55	30	2.5	3.0	4.0	1,900

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass	Tobacco
	Bu	Bu	Bu	Ton	Ton	AUM*	Lb
LlE---- Lily	---	---	---	---	---	3.5	---
Ln---- Lindside	130	80	45	3.5	4.5	5.5	2,000
Me---- Melvin	100	60	---	3.5	---	4.5	---
Mf---- Melvin-Lindside	100	60	---	3.5	---	4.5	---
MgB---- Monongahela	110	65	40	3.0	3.5	4.5	2,500
MgC---- Monongahela	90	60	35	3.0	3.0	4.5	2,500
Mo---- Moshannon	130	80	45	3.5	5.0	5.5	3,000
Se, Sf---- Senecaville	130	80	45	3.5	4.5	5.5	2,000
Sn---- Sensabaugh	125	75	45	3.5	4.5	5.5	2,600
SrB---- Sensabaugh	120	70	45	3.5	4.5	5.5	2,500
TlB---- Tilsit	100	65	40	3.0	3.5	4.5	2,300
Ty---- Tyler	95	60	---	3.0	---	---	---
UA---- Udifluvents and Fluvaquents	---	---	---	---	---	---	---
UB, UC, UD. Udorthents							
UeB---- Upshur	95	65	40	3.0	4.0	4.5	2,400
UeC---- Upshur	90	60	35	3.0	4.0	4.5	2,400
UfC3---- Upshur	---	---	---	---	---	4.0	---
UgC---- Upshur-Gilpin	90	60	35	3.0	3.5	4.5	2,400
UgC3---- Upshur-Gilpin	85	55	30	2.5	3.0	4.0	---
UgD---- Upshur-Gilpin	85	55	30	2.5	3.0	4.0	---
UgD3, UgE---- Upshur-Gilpin	---	---	---	---	---	3.5	---
UgE3---- Upshur-Gilpin	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass	Tobacco
	Bu	Bu	Bu	Ton	Ton	AUM*	Lb
Uh**. Urban land							
UkB**---------- Urban land-Kanawha	---	---	---	---	---	---	---
Un**---------- Urban land-Lindside	---	---	---	---	---	---	---
UoB**---------- Urban land-Monongahela	---	---	---	---	---	---	---
UvC**---------- Urban land-Vincent	---	---	---	---	---	---	---
VaC---------- Vandalia	100	60	35	3.0	4.5	4.5	2,500
VaD---------- Vandalia	90	55	30	2.5	4.0	4.0	---
VaE---------- Vandalia	---	---	---	---	---	3.5	---
VbD---------- Vandalia	---	---	---	---	---	3.5	---
VdD3---------- Vandalia	---	---	---	---	---	3.5	---
VeB---------- Vincent	100	65	40	3.0	4.0	4.5	---
VeC---------- Vincent	95	60	35	3.0	4.0	4.5	---
ZoB---------- Zoar	90	65	40	3.0	3.5	4.5	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, fine sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--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	2,080	---	---	---
II	17,870	7,200	10,670	---
III	12,760	10,690	2,070	---
IV	33,640	33,640	---	---
V	---	---	---	---
VI	42,470	39,530	---	2,940
VII	105,490	47,510	---	57,980
VIII	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
AgA, AgB, AgC--- Allegheny	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Eastern white pine, Austrian pine, yellow-poplar, black walnut, European larch, red pine, Norway spruce.
						Yellow-poplar-------	90	
						Virginia pine-------	75	
						Eastern white pine--	90	
						Shortleaf pine------	75	
AsA, AsB--- Ashton	1o	Slight	Slight	Slight	Severe	Northern red oak----	85	Eastern white pine, yellow-poplar, black walnut, Norway spruce, Japanese larch.
						White oak----------	--	
						Yellow-poplar-------	95	
						White ash----------	---	
						Black walnut--------	---	
CoB, CoC--- Coolville	3o	Slight	Slight	Slight	Slight	Northern red oak----	66	Eastern white pine, shortleaf pine, yellow-poplar, red pine, black walnut, white ash, white oak, northern red oak.
						Shortleaf pine------	68	
						White oak----------	---	
						Black cherry--------	---	
						Black walnut--------	---	
						Sugar maple---------	---	
						White ash----------	---	
						Yellow-poplar-------	---	
GlC--- Gilpin	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	
GuC*, GuC3*: Gilpin---	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	
Upshur---	3c	Severe	Severe	Slight	Severe	Northern red oak----	65	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
						Virginia pine-------	66	
GuD*: Gilpin--- (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	
Upshur--- (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak----	70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
						Virginia pine-------	70	
GuD*: Gilpin--- (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	90	
Upshur--- (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak----	65	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
						Eastern white pine--	75	
						Virginia pine-------	60	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
GuD3*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GuD3*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GuE*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GuE*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GuE3*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GuE3*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
GuE3*:								
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GuF*:								
Gilpin (North aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GuF*:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GuF3*:								
Gilpin (North aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GuF3*:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GvE*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
GvE*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
GvF*:								
Gilpin (North aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
GvF*:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
HaA, HaB Hackers	1o	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar White ash	85 95 85	Eastern white pine, black walnut, yellow-poplar, Norway spruce.
Hu Huntington	1o	Slight	Slight	Slight	Severe	Yellow-poplar Northern red oak	95 85	Yellow-poplar, black walnut, black locust, eastern white pine.
KaA, KaB Kanawha	2o	Slight	Slight	Slight	Severe	Northern red oak Black oak White oak Yellow-poplar White ash Black walnut Black locust	80 80 80 90 80 ---<br---	Eastern white pine, yellow-poplar, black walnut, Norway spruce, black locust.
L1C Lily	4o	Slight	Slight	Slight	Moderate	Shortleaf pine Virginia pine	63 65	Shortleaf pine, Virginia pine, white oak.
L1D, L1E Lily	4r	Moderate	Moderate	Slight	Moderate	Shortleaf pine Virginia pine	63 65	Shortleaf pine, Virginia pine, white oak.
Ln Lindside	1w	Slight	Moderate	Slight	Severe	Northern red oak Yellow-poplar Black walnut White ash White oak Red maple	86 95 --- 85 85<br---	Eastern white pine, yellow-poplar, Norway spruce, Japanese larch.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
Me Melvin	1w	Slight	Severe	Severe	Severe	Pin oak Sweetgum	101 95	Pin oak, American sycamore, sweetgum, Norway spruce, eastern white pine.
Mf*: Melvin	1w	Slight	Severe	Severe	Severe	Pin oak Sweetgum	101 95	Pin oak, American sycamore, sweetgum, Norway spruce, eastern white pine.
Lindside	1w	Slight	Moderate	Slight	Severe	Northern red oak Yellow-poplar Black walnut White ash White oak Red maple	86 95 --- 85 85 ---	Eastern white pine, yellow-poplar, Norway spruce, Japanese larch.
MgB Monongahela	3o	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine White ash Black walnut	70 85 72 66 --- ---	Eastern white pine, Virginia pine, Norway spruce, Japanese larch.
MgC Monongahela	3o	Moderate	Slight	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine White ash Black walnut	70 85 72 66 --- ---	Eastern white pine, Virginia pine, Norway spruce, Japanese larch.
Mo Moshannon	1o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Sugar maple Black walnut White oak White ash Black cherry	85 95 85 --- --- --- ---	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
Se, Sf Senecaville	1o	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar White ash White oak	85 95 85 85	Eastern white pine, yellow-poplar, Norway spruce, Japanese larch.
Sn, SrB Sensabaugh	2o	Slight	Slight	Slight	Severe	Yellow-poplar White oak Shortleaf pine Virginia pine	100 80 80 75	Yellow-poplar, black walnut.
TlB Tilsit	3o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Eastern white pine Virginia pine Shortleaf pine	70 89 80 70 78	Eastern white pine, Virginia pine, shortleaf pine.
Ty Tyler	2d	Slight	Slight	Moderate	Moderate	Northern red oak White oak Slippery elm American beech White ash Sugar maple American sycamore	80 --- --- --- --- --- ---	Green ash, yellow-poplar, red pine, Virginia pine.
UeB Upshur	3c	Moderate	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	65 80 80 66	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
UeC, UfC3---------- Upshur	3c	Severe	Severe	Slight	Severe	Northern red oak----	65	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
						Virginia pine-------	66	
UgC*, UgC3*: Upshur----------	3c	Severe	Severe	Slight	Severe	Northern red oak----	65	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
						Yellow-poplar-------	80	
						Eastern white pine--	80	
						Virginia pine-------	66	
Gilpin----------	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	
UgD*: Upshur---------- (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak----	70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
						Virginia pine-------	70	
Gilpin---------- (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	
UgD*: Upshur---------- (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak----	65	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
						Eastern white pine--	75	
						Virginia pine-------	60	
Gilpin---------- (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	90	
UgD3*: Upshur---------- (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak----	70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
						Yellow-poplar-------	90	
						Eastern white pine--	90	
						Virginia pine-------	70	
Gilpin---------- (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	
UgD3*: Upshur---------- (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak----	65	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
						Eastern white pine--	75	
						Virginia pine-------	60	
Gilpin---------- (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	90	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
UgE*:								
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
UgE*:								
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
UgE3*:								
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Eastern white pine Virginia pine	70 90 90 70	Eastern white pine, Virginia pine, shortleaf pine, yellow-poplar.
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
UgE3*:								
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine Virginia pine	65 75 60	Virginia pine, eastern white pine, shortleaf pine, eastern redcedar.
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar	70 90	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
UkB*:								
Urban land.								
Kanawha	2o	Slight	Slight	Slight	Severe	Northern red oak Black oak White oak Yellow-poplar White ash Black walnut Black locust	80 80 80 90 80 --- ---	Eastern white pine, yellow-poplar, black walnut, Norway spruce, black locust.
Un*:								
Urban land.								
Lindside	1w	Slight	Moderate	Slight	Severe	Northern red oak Yellow-poplar Black walnut White ash White oak Red maple	86 95 --- 85 85 ---	Eastern white pine, yellow-poplar, Norway spruce, Japanese larch.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
UoB*:								
Urban land.								
Monongahela	3o	Slight	Slight	Slight	Severe	Northern red oak	70	Eastern white pine, Virginia pine, Norway spruce, Japanese larch.
						Yellow-poplar	85	
						Eastern white pine	72	
						Virginia pine	66	
						White ash	---	
						Black walnut	---	
UvC*:								
Urban land.								
Vincent	2c	Slight	Slight	Severe	Moderate	Northern red oak	70	Eastern white pine, Virginia pine, Japanese larch, Norway spruce, shortleaf pine, yellow-poplar.
						White oak	65	
						Yellow-poplar	75	
						White ash	---	
						Sugar maple	---	
						Red maple	---	
VaC Vandalia	3c	Moderate	Moderate	Slight	Severe	Northern red oak	73	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	75	
						Virginia pine	70	
VaD Vandalia (North aspect)	2c	Severe	Severe	Slight	Severe	Northern red oak	77	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	90	
						Virginia pine	80	
VaD Vandalia (South aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak	68	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	75	
						Virginia pine	70	
VaE Vandalia (North aspect)	2c	Severe	Severe	Slight	Severe	Northern red oak	77	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	90	
						Virginia pine	80	
VaE Vandalia (South aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak	68	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	75	
						Virginia pine	70	
VbD Vandalia (North aspect)	2c	Severe	Severe	Slight	Severe	Northern red oak	77	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	90	
						Virginia pine	80	
VbD Vandalia (South aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak	68	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	75	
						Virginia pine	70	
VdD3 Vandalia (North aspect)	2c	Severe	Severe	Slight	Severe	Northern red oak	77	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	90	
						Virginia pine	80	
VdD3 Vandalia (South aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak	68	Eastern white pine, Virginia pine, yellow-poplar, black walnut, shortleaf pine.
						Yellow-poplar	75	
						Virginia pine	70	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
VeB, VeC---------- Vincent	2c	Slight	Slight	Severe	Moderate	Northern red oak----	70	Eastern white pine, Virginia pine, Japanese larch, Norway spruce, shortleaf pine, yellow-poplar.
						White oak----------	65	
						Yellow-poplar-------	75	
						White ash----------	---	
						Sugar maple---------	---	
						Red maple----------	---	
ZoB---------- Zoar	3w	Slight	Moderate	Slight	Moderate	Northern red oak----	70	Eastern white pine, shortleaf pine, Virginia pine, yellow-poplar.
						Yellow-poplar-------	80	
						Virginia pine-------	70	
						Eastern white pine--	80	
						Black oak----------	70	
						White oak----------	70	
						Red maple----------	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil]

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AgA, AgB, AgC----- Allegheny	Regal privet------	Eastern redcedar	Eastern hemlock, northern white-cedar.	Norway spruce-----	Sweetgum, sourwood.
AsA, AsB---------- Ashton	Redosier dogwood, bayberry.	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
CoB, CoC---------- Coolville	Redosier dogwood, bayberry, northern white-cedar.	Eastern redcedar, Washington hawthorn, Amur privet, American cranberrybush.	Austrian pine, white spruce.	Eastern white pine, pin oak.	Red maple, sweetgum.
GlC--------------- Gilpin	Canada yew--------	European burningbush, blackhaw, late lilac, shadblow serviceberry, American cranberrybush.	Eastern hemlock, northern white-cedar.	---	Honeylocust, eastern white pine, Norway spruce.
GuC*, GuC3*, GuD*, GuD3*, GuE*, GuE3*, GuF*, GuF3*, GvE*, GvF*: Gilpin----------	Eastern redcedar, Sargent crabapple.	European burningbush, blackhaw, late lilac, shadblow serviceberry, American cranberrybush.	Eastern hemlock, northern white-cedar.	---	Sourwood, eastern white pine, Norway spruce, sweetgum.
Upshur----------	Redosier dogwood, northern white-cedar.	Eastern redcedar, Washington hawthorn, Amur privet, American cranberrybush.	Austrian pine-----	Eastern white pine, pin oak.	Norway spruce, Austrian pine.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
HaA, HaB---------- Hackers	Regal privet, Sargent crabapple.	Washington hawthorn, balsam fir, eastern hemlock, white spruce, Amur privet.	Northern white-cedar, pin oak, Austrian pine.	---	Sweetgum, sourwood, pin oak.
Hu---------- Huntington	Regal privet, Sargent crabapple, bayberry.	European burningbush, late lilac, shadblow serviceberry, blackhaw, American cranberrybush.	Eastern hemlock---	Norway spruce-----	Honeylocust, eastern white pine, sugar maple, pin oak, sweetgum.
KaA, KaB. Kanawha----------	Regal privet------	Eastern redcedar	Eastern hemlock, northern white-cedar.	Norway spruce-----	Sweetgum, sourwood.
LlC, LlD, LlE----- Lily	Bayberry----------	American plum-----	Amur maple, eastern redcedar.	American sycamore, Austrian pine, European alder, eastern white pine.	Sourwood, sweetgum, pin oak.
Ln. Lindside---------	Arborvitae--------	Amur privet-------	Virginia pine-----	Eastern white pine	Pin oak, sweetgum.
Me---------- Melvin	Redosier dogwood, elderberry.	Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, blue spruce, Norway spruce, Austrian pine, Washington hawthorn.	Eastern white pine	Pin oak, sweetgum.
Mf*: Melvin----------	Redosier dogwood, elderberry.	Amur privet, AMerican cranberrybush, silky dogwood.	Northern white-cedar, blue spruce, Norway spruce, Austrian pine, Washington hawthorn.	Eastern white pine	Pin oak.
Lindside---------	Arborvitae--------	Amur privet-------	Virginia pine-----	Eastern white pine	Pin oak, sweetgum
MgB, MgC---------- Monongahela	Arborvitae--------	Redosier dogwood, Amur privet, silky dogwood, white spruce, eastern redcedar.	European larch, northern white-cedar, red pine, Austrian pine.	Norway spruce-----	Eastern white pine.
Mo---------- Moshannon	Arborvitae--------	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak, sweetgum.
Se, Sf---------- Senecaville	Redosier dogwood	Washington hawthorn, balsam fir, eastern hemlock, Amur privet.	Northern white-cedar, Austrian pine, red pine, white spruce.	Eastern white pine	Sweetgum, pin oak.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Sn, SrB---------- Sensabaugh	Sargent crabapple	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak, sourwood, blackgum.
TlB---------- Tilsit	---	Blackhaw, cornelian cherry dogwood, American cranberrybush.	Austrian pine-----	American basswood, Norway spruce, white spruce.	Eastern white pine, sweetgum.
Ty---------- Tyler	Regal privet------	Medium purple willow, gray dogwood, silky dogwood, American cranberrybush, redosier dogwood.	Northern white-cedar, Norway spruce, white spruce.	European alder, pin oak, eastern white pine, sweetgum.	---
UA*: Udifluvents. Fluvaquents.					
UB, UC, UD. Udorthents					
UeB, UeC, UfC3---- Upshur	Redosier dogwood, eastern redcedar.	Eastern redcedar, Washington hawthorn, Amur privet, American cranberrybush.	Austrian pine-----	Eastern white pine, pin oak.	Norway spruce, Austrian pine.
UgC*, UgC3*, UgD*, UgD3*, UgE*, UgE3*: Upshur----------	Redosier dogwood, eastern redcedar.	Eastern redcedar, Washington hawthorn, Amur privet, American cranberrybush.	Austrian pine-----	Eastern white pine, pin oak.	Norway spruce, Austrian pine.
Gilpin----------	Eastern redcedar, Sargent crabapple.	European burningbush, blackhaw, late lilac, shadblow serviceberry, American cranberrybush.	Eastern hemlock, northern white-cedar.	---	Eastern white pine, Norway spruce, sweetgum, sourwood.
Uh*. Urban land					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
UkB*: Urban land.					
Kanawha----------	Regal privet------	Eastern redcedar	Eastern hemlock, northern white-cedar.	Norway spruce-----	Sweetgum, sourwood.
Un*: Urban land.					
Lindside---------	Arborvitae--------	Amur privet-------	Virginia pine-----	Eastern white pine	Pin oak, sweetgum.
UoB*: Urban land.					
Monongahela------	Arborvitae--------	Redosier dogwood, Amur privet, silky dogwood, white spruce, eastern redcedar.	European larch, northern white-cedar, red pine, Austrian pine.	Norway spruce-----	Eastern white pine.
UvC*: Urban land.					
Vincent----------	Sargent crabapple	Eastern redcedar, Washington hawthorn, Amur privet, American cranberrybush.	Austrian pine, white spruce.	Eastern white pine, pin oak.	---
VaC, VaD, VaE, VbD, VdD3-------- Vandalia	Northern white-cedar, redosier dogwood.	Forsythia, nannyberry viburnum, winged euonymus.	Norway spruce, Scotch pine, red pine.	Eastern white pine, Austrian pine.	Sourwood, sweetgum.
VeB, VeC---------- Vincent	Sargent crabapple	Eastern redcedar, Washington hawthorn, Amur privet, American cranberrybush.	Austrian pine, white spruce.	Eastern white pine, pin oak.	---
ZoB--------------- Zoar	Redosier dogwood, bayberry.	Silky dogwood, white spruce, common ninebark, blue spruce, American plum, Amur privet.	Eastern white pine, northern white-cedar.	---	Red maple, sweetgum.

* 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
AgA---- Allegheny	Slight	Slight	Moderate: small stones.	Slight	Slight.
AgB---- Allegheny	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
AgC---- Allegheny	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
AsA---- Ashton	Severe: flooding.	Slight	Slight	Slight	Slight.
AsB---- Ashton	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
CoB---- Coolville	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
CoC---- Coolville	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
GlC---- Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
GuC*:					
Gilpin----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
Upshur----	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
GuC3*:					
Gilpin----	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
Upshur----	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: too clayey.
GuD*:					
Gilpin----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GuD3*:					
Gilpin----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur----	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: slope, too clayey.
GuE*:					
Gilpin----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GuE*:					
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
GuE3*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.
GuF*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
GuF3*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.
GvE*, GvF*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Severe: slope.
HaA Hackers	Severe: flooding.	Slight	Slight	Slight	Slight.
HaB Hackers	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
Hu Huntington	Severe: flooding.	Slight	Slight	Slight	Slight.
KaA Kanawha	Slight	Slight	Slight	Slight	Slight.
KaB Kanawha	Moderate: slope.	Slight	Moderate: slope.	Slight	Slight.
L1C Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
L1D Lily	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
L1E Lily	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ln Lindside	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
Me Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Mf*: Melvin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Lindside	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
MgB Monongahela	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
MgC Monongahela	Moderate: wetness, slope, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Mo Moshannon	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Se Senecaville	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness, flooding.	Slight	Moderate: flooding.
Sf Senecaville	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: wetness.	Slight	Slight.
Sn Sensabaugh	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: flooding.
SrB Sensabaugh	Severe: flooding.	Slight	Moderate: slope, small stones.	Slight	Slight.
TlB Tilsit	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes, easily.	Moderate: wetness.
Ty Tyler	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, erodes easily.	Severe: wetness.
UA*: Udifluvents. Fluvaquents.					
UB, UC, UD. Udorthents					
UeB Upshur	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
UeC Upshur	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UfC3---------- Upshur	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: too clayey.
UgC*:					
Upshur----------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Gilpin----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
UgC3*:					
Upshur----------	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: too clayey.
Gilpin----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
UgD*:					
Upshur----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
UgD3*:					
Upshur----------	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: slope, too clayey.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
UgE*:					
Upshur----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UgE3*:					
Upshur----------	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey, erodes easily.	Severe: slope, too clayey.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Uh*. Urban land					
JkB*: Urban land.					
Kanawha----------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
Un*: Urban land.					
Lindside----------	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Slight----------	Slight.

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
UoB*: Urban land.					
Monongahela	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
UvC*: Urban land.					
Vincent	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
VaC--- Vandalia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
VaD--- Vandalia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
VaE--- Vandalia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
VbD--- Vandalia	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: erodes easily.	Severe: slope.
VdD3--- Vandalia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
VeB--- Vincent	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
VeC--- Vincent	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
ZoB--- Zoar	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.

* 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
AgA---------- Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AgB---------- Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AgC---------- Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AsA---------- Ashton	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AsB---------- Ashton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CoB---------- Coolville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CoC---------- Coolville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GlC---------- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GuC*, GuC3*:										
Gilpin----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Upshur----------	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuD*, GuD3*:										
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*, GuE3*:										
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.
GuF*, GuF3*:										
Gilpin----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Upshur----------	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
GvE*:										
Gilpin----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Upshur----------	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GvF*:										
Gilpin----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	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
GvF*: Upshur	Very poor.	Very poor.	Fair	Good	Good	Very poor.	Very poor.	Very poor.	Fair	Very poor.
HaA---- Hackers	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HaB---- Hackers	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Hu---- Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KaA---- Kanawha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KaB---- Kanawha	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.
Ln---- Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Me---- Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Mf*: Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MgB---- Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MgC---- Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Mo---- Moshannon	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Se, Sf---- Senecaville	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Sn, SrB---- Sensabaugh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TlB---- Tilsit	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ty---- Tyler	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
UA*: Udifluvents.										
Fluvaquents.										

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
UB, UC, UD. Udorthents										
UeB---------- Upshur	Fair	Good	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
UeC, UfC3---------- Upshur	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
UgC*, UgC3*: Upshur----------	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin----------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
UgD*, UgD3*: Upshur----------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin----------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UgE*, UgE3*: Upshur----------	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Gilpin----------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Uh*. Urban land										
UkB*: Urban land.										
Kanawha----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Un*: Urban land.										
Lindside.										
UoB*: Urban land.										
Monongahela--------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UvC*: Urban land.										
Vincent----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
VaC---------- Vandalia	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VaD---------- Vandalia	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VaE---------- Vandalia	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	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 herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
VbD---------- Vandalia	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
VdD3---------- Vandalia	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VeB---------- Vincent	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
VeC---------- Vincent	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ZoB---------- Zoar	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

* 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]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AgA---------- Allegheny	Slight---------	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
AgB---------- Allegheny	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
AgC---------- Allegheny	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
AsA, AsB---------- Ashton	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
CoB---------- Coolville	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.
CoC---------- Coolville	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
GlC---------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer.
GuC*:						
Gilpin----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer.
Upshur----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.
GuC3*:						
Gilpin----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer.
Upshur----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Severe: too clayey.
GuD*:						
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.
GuD3*:						
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, too clayey.

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
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.
GuE3*:						
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, too clayey.
GuF*:						
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.
GuF3*:						
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, too clayey.
GvE*, GvF*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, shrink-swell.	
HaA, HaB Hackers	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding, frost action.	Slight.
Hu Huntington	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
KaA, KaB Kanawha	Slight	Slight	Slight	Slight	Moderate: low strength.	Slight.
LlC Lily	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, thin layer.
LlD, LlE Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ln Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: flooding, low strength.	Slight.

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
Mc---------- Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Mf*:						
Melvin----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Lindside---------	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, low strength.	Slight.
MgB---------- Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.
MgC---------- Monongahela	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: slope, low strength, wetness.	Moderate: slope.
Mo---------- Moshannon	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Se---------- Senecaville	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Sf---------- Senecaville	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: flooding, low strength.	Slight.
Sn---------- Sensabaugh	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
SrB---------- Sensabaugh	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
TlB---------- Tilsit	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Moderate: wetness.
Ty---------- Tyler	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
UA*: Udifluvents. Fluvaquents.						
UB, UC, UD. Udorthents						
UeB---------- Upshur	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
UeC---------- Upshur	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.

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
UfC3---------- Upshur	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Severe: too clayey.
UgC*:						
Upshur----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.
Gilpin----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer.
UgC3*:						
Upshur----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Severe: too clayey.
Gilpin----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer.
UgD*:						
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.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UgD3*:						
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, too clayey.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UgE*:						
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.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UgE3*:						
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, too clayey.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Uh*. Urban land						
UkB*: Urban land.						
Kanawha----------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.

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
Un*: Urban land.						
Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: flooding, low strength.	Slight.
UoB*: Urban land.						
Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.
UvC*: Urban land.						
Vincent	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
VaC Vandalia	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope, slippage.	Severe: low strength, shrink-swell.	Moderate: slope.
VaD, VaE, VbD, VdD3 Vandalia	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, shrink-swell.	Severe: slope.
VeB Vincent	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
VeC Vincent	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
ZoB Zoar	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AgA---------- Allegheny	Slight----------	Moderate: seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
AgB---------- Allegheny	Slight----------	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
AgC---------- Allegheny	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
AsA, AsB---------- Ashton	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Fair: too clayey.
CoB---------- Coolville	Severe: wetness, percs slowly.	Moderate: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
CoC---------- Coolville	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness, slope.	Poor: too clayey, hard to pack.
GlC---------- Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GuC*, GuC3*: Gilpin----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
Upshur----------	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
GuD*, GuD3*, GuE*, GuE3*, GuF*, GuF3*: 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, slippage.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
GvE*, GvF*: 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.
Upshur----------	Severe: percs slowly, slope, slippage.	Severe: slope.	Severe: slippage, slope, too clayey.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
HaA, HaB---------- Hackers	Moderate: flooding.	Severe: flooding.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.

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
Hu Huntington	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good.
KaA, KaB Kanawha	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.
L1C Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, thin layer.
L1D, L1E Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope, thin layer.
Ln Lindside	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
Me Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Mf*:					
Melvin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Lindside	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
MgB Monongahela	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
MgC Monongahela	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Fair: small stones, wetness, slope.
Mo Moshannon	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: too clayey.
Se Senecaville	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
Sf Senecaville	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Sn Sensabaugh	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: small stones.
SrB Sensabaugh	Moderate: flooding, wetness.	Severe: seepage, flooding.	Severe: seepage, wetness.	Severe: seepage.	Poor: small stones.
TlB Tilsit	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Moderate: wetness, depth to rock.	Fair: area reclaim, too clayey, wetness.

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
Ty---------- Tyler	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
UA*: Udifluvents.					
Fluvaquents.					
UB, UC, UD. Udorthents					
UeB---------- Upshur	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: too clayey, depth to rock.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
UeC, UfC3---------- Upshur	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
UgC*, UgC3*: Upshur----------	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Gilpin----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
UgD*, UgD3*, UgE*, UgE3*: Upshur----------	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, slippage.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
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.
Uh*. Urban land					
UkB*: Urban land.					
Kanawha----------	Slight----------	Severe: seepage.	Severe: seepage.	Slight----------	Good.
Un*: Urban land.					
Lindside----------	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
UoB*: Urban land.					
Monongahela--------	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
UvC*: Urban land.					

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
UvC*: Vincent	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
VaC--- Vandalia	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
VaD, VaE, VbD, VdD3- Vandalia	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, slippage.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
VeB--- Vincent	Severe: wetness, percs slowly.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
VeC--- Vincent	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
ZoB--- Zoar	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AgA, AgB---------- Allegheny	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
AgC---------- Allegheny	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
AsA, AsB---------- Ashton	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
CoB, CoC---------- Coolville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GlC---------- Gilpin	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GuC*, GuC3*: Gilpin----------	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Upshur----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GuD*, GuD3*: Gilpin----------	Poor: thin layer, area reclaim.	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*, GuE3*, GuF*, GuF3*: Gilpin----------	Poor: thin layer, slope, area reclaim.	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.
GvE*, GvF*: Gilpin----------	Poor: slope, area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, large stones, small stones.
Upshur----------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
HaA, HaB---------- Hackers	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hu---------- Huntington	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
KaA, KaB---------- Kanawha	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
LlC---------- Lily	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
LlD---------- Lily	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
LlE---------- Lily	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Ln---------- Lindside	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Me---------- Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Mf*:				
Melvin----------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Lindside----------	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
MgB---------- Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MgC---------- Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
Mo---------- Moshannon	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Se, Sf---------- Senecaville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Sn, SrB---------- Sensabaugh	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
TlB---------- Tilsit	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Ty---------- Tyler	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.
UA*: Udifluvents.				
Fluvaquents.				
UB, UC, UD. Udorthents				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UeB, UeC, UfC3-------- Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
UgC*, UgC3*: Upshur----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Gilpin----------	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
UgD*, UgD3*: Upshur----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Gilpin----------	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
UgE*, UgE3*: Upshur----------	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Gilpin----------	Poor: thin layer, slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Uh*. Urban land				
UkB*: Urban land.				
Kanawha----------	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Un*: Urban land.				
Lindside----------	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
UoB*: Urban land.				
Monongahela----------	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
UvC*: Urban land.				
Vincent----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
VaC---------- Vandalia	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
VaD---------- Vandalia	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
VaE---------- Vandalia	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
VbD, VdD3---------- Vandalia	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
VeB, VeC---------- Vincent	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
ZoB---------- Zoar	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 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]

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
AgA, AgB---------- Allegheny	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
AgC---------- Allegheny	Moderate: seepage.	Severe: piping.	Deep to water----	Slope----------	Slope.
AsA, AsB---------- Ashton	Moderate: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
CoB---------- Coolville	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
CoC---------- Coolville	Severe: slope.	Moderate: thin layer, hard to pack, wetness.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
GlC---------- Gilpin	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
GuC*, GuC3*, GuD*, GuD3*, GuE*, GuE3*, GuF*, GuF3*:					
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.
GvE*, GvF*:					
Gilpin----------	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Upshur----------	Severe: slope, slippage.	Severe: hard to pack.	Deep to water----		
HaA---------- Hackers	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
HaB---------- Hackers	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
Hu---------- Huntington	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
KaA---------- Kanawha	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
KaB---------- Kanawha	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
LlC, LlD, LlE----- Lily	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
Ln---------- Lindside	Moderate: seepage.	Severe: piping.	Flooding---------	Wetness, erodes easily.	Erodes easily.
Me---------- Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding---------	Erodes easily, wetness.	Wetness, erodes easily.
Mf*: Melvin----------	Moderate: seepage.	Severe: piping, wetness.	Flooding---------	Erodes easily, wetness.	Wetness, erodes easily.
Lindside---------	Moderate: seepage.	Severe: piping.	Flooding---------	Wetness, erodes easily.	Erodes easily.
MgB---------- Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
MgC---------- Monongahela	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Mo---------- Moshannon	Moderate: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
Se---------- Senecaville	Moderate: seepage.	Severe: piping.	Flooding---------	Wetness----------	Favorable.
Sf---------- Senecaville	Moderate: seepage.	Severe: piping.	Favorable--------	Wetness----------	Favorable.
Sn, SrB---------- Sensabaugh	Severe: seepage.	Moderate: large stones.	Deep to water----	Large stones-----	Large stones.
TlB---------- Tilsit	Moderate: depth to rock, seepage.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Ty---------- Tyler	Slight----------	Severe: wetness.	Percs slowly-----	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
UA*: Udifluvents. Fluvaquents.					
UB, UC, UD. Udorthents					
UeB---------- Upshur	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water----	Erodes easily, percs slowly.	Erodes easily, percs slowly.
UeC, UfC3--------- Upshur	Severe: slope, slippage.	Severe: hard to pack.	Deep to water----	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
UgC*, UgC3*, UgD*, UgD3*, UgE*, UgE3*:					
Upshur	Severe: slope, slippage.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Uh*. Urban land					
UkB*: Urban land.					
Kanawha	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
Un*: Urban land.					
Lindside	Moderate: seepage.	Severe: piping.	Flooding	Wetness, erodes easily.	Erodes easily.
UoB*: Urban land.					
Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
UvC*: Urban land.					
Vincent	Severe: slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
VaC, VaD, VaE, VbD, VdD3 Vandalia	Severe: slope, slippage.	Moderate: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily, percs slowly.
VeB Vincent	Moderate: slope.	Severe: hard to pack.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
VeC Vincent	Severe: slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
ZoB Zoar	Moderate: slope.	Severe: hard to pack, thin layer.	Slope, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.

* 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		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AgA, AgB, AgC---- Allegheny	0-8	Loam----------	ML, CL, CL-ML	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	8-49	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	49-60	Clay loam, sandy loam, gravelly sandy loam.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
AsA, AsB---------- Ashton	0-9	Silt loam--------	ML, CL	A-4	0	95-100	90-100	75-100	60-95	<35	NP-10
	9-48	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	80-100	25-42	5-20
	48-72	Silt loam, loam, fine sandy loam.	ML, CL, SM, CL-ML	A-4, A-6	0-5	90-100	85-100	65-95	40-90	<40	NP-20
CoB, CoC---------- Coolville	0-7	Silt loam--------	ML, CL-ML	A-4, A-6	0	95-100	90-100	80-100	70-90	24-40	4-12
	7-18	Silty clay loam, silt loam.	CL	A-7, A-6	0	95-100	85-100	80-100	75-95	35-50	15-25
	18-40	Clay, silty clay, silty clay loam.	CH	A-7	0-5	95-100	85-100	80-100	75-95	50-65	28-36
	40-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
GlC---------- Gilpin	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GuC*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuC3*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	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	
GuC3*:											
Upshur----------	0-5	Silty clay-------	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuD*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuD3*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-5	Silty clay-------	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuE*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GuE3*:											
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur	0-5	Silty clay	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuF*:											
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuF3*:											
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur	0-5	Silty clay	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered 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	
GvE*, GvF*:											
Gilpin----------	0-5	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
	5-27	Shaly 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
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-7	Stony silty clay loam.	CL, ML	A-6, A-7	3-10	95-100	95-100	90-100	80-95	35-50	11-25
	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
HaA, HaB---------- Hackers	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	90-100	90-100	75-100	60-90	20-35	3-12
	9-39	Silt loam, clay loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	90-100	90-100	90-100	75-95	25-40	4-18
	39-60	Stratified fine sandy loam to silty clay loam.	ML, CL, SM, SC	A-4, A-6	0	85-100	60-100	55-95	40-85	20-40	1-15
Hu---------- Huntington	0-10	Loam----------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	10-45	Silt loam, loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	45-60	Stratified sandy clay loam to silt loam.	SM, SC, ML, CL	A-2, A-4	0	85-100	60-100	50-90	30-75	<30	NP-10
KaA, KaB---------- Kanawha	0-10	Loam----------	ML, CL	A-4, A-6	0	80-100	75-100	65-100	50-90	20-35	2-10
	10-31	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	20-40	4-15
	31-60	Fine sandy loam, gravelly fine sandy loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	60-100	55-100	40-95	20-60	20-35	2-12
L1C, L1D, L1E---- Lily	0-7	Loam----------	ML	A-4	0-5	90-100	85-100	70-95	55-75	<35	NP-7
	7-20	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
	20-24	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6, A-1	0-10	65-100	50-100	40-95	20-75	<35	3-15
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ln---------- Lindside	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	8-60	Silty clay loam, silt loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
Me---------- Melvin	0-9	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	9-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-95	25-40	5-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Mf*:											
Melvin	0-9	Silt loam	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	9-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-95	25-40	5-20
Lindside	0-8	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	8-60	Silty clay loam, silt loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
MgB, MgC Monongahela	0-9	Silt loam	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	9-25	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	25-60	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	60-72	Silt loam	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
Mo Moshannon	0-9	Silt loam	ML, CL-ML, CL	A-4, A-6	0	95-100	95-100	90-100	70-95	22-40	3-15
	9-37	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	90-100	80-95	25-40	3-15
	37-60	Stratified silt loam to fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	80-100	70-100	65-95	50-85	25-40	3-15
Se, Sf Senecaville	0-6	Silt loam	ML, CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	60-90	20-35	3-12
	6-30	Silty clay loam, silt loam.	CL, ML, CL-ML	A-4, A-6	0	90-100	90-100	85-100	75-95	25-40	4-18
	30-60	Silt loam, fine sandy loam, loam.	ML, SM, SC, CL	A-4, A-6	0-5	90-100	70-100	65-95	45-90	20-40	1-15
Sn, SrB Sensabaugh	0-7	Silt loam	CL-ML, CL, ML	A-4	0-5	90-100	75-95	65-85	55-75	16-29	3-9
	7-29	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	2-18	70-95	55-90	45-75	35-65	20-35	5-14
	29-60	Gravelly loam, gravelly clay loam, gravelly fine sandy loam.	SM-SC, SC, GM-GC, GC	A-4, A-6, A-2	5-30	55-90	25-75	25-65	20-55	20-36	6-15
TlB Tilsit	0-6	Silt loam	ML, CL, CL-ML	A-4	0	90-100	85-100	75-100	60-100	20-35	4-10
	6-24	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	65-100	25-40	5-20
	24-49	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	90-100	85-100	75-100	65-100	25-45	5-25
	49-62	Silt loam, silty clay loam, silty clay.	CL, CH, CL-ML	A-4, A-6, A-7	0-30	70-100	65-85	60-85	55-80	25-60	5-35
	62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ty	0-9	Silt loam	ML	A-4	0	100	100	95-100	80-95	30-40	4-10
Tyler	9-24	Silty clay loam, silt loam.	CL	A-6, A-7, A-4	0	100	100	95-100	85-100	25-45	8-20
	24-52	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7, A-4	0	100	100	80-100	70-95	25-45	8-20
	52-60	Stratified loam to silty clay loam.	CL, ML, CL-ML	A-6, A-4, A-7	0	95-100	90-100	75-100	60-90	20-45	4-18
UA*:											
Udifluvents.											
Fluvaquents.											
UB, UC, UD.											
Udorthents											
UeB, UeC	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
Upshur	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
UfC3	0-5	Silty clay	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
Upshur	5-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
UgC*:											
Upshur	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UgC3*:											
Upshur	0-5	Silty clay	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
UgC3*:											
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UgD*:											
Upshur	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UgD3*:											
Upshur	0-5	Silty clay	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UgE*:											
Upshur	0-7	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	7-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
UgE*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UgE3*:											
Upshur----------	0-5	Silty clay-------	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-36	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	36-44	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	44	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-27	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	27-35	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Uh*. Urban land											
UkB*: Urban land.											
Kanawha----------	0-10	Loam----------	ML, CL	A-4, A-6	0	80-100	75-100	65-100	50-90	20-35	2-10
	10-31	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	20-40	4-15
	31-60	Fine sandy loam, gravelly fine sandy loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	60-100	55-100	40-95	20-60	20-35	2-12
Un*: Urban land.											
Lindside--------	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	8-60	Silty clay loam, silt loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
UoB*: Urban land.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
UoB*:											
Monongahela	0-9	Silt loam	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	9-25	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	25-60	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	60-72	Silt loam	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
UvC*:											
Urban land.											
Vincent	0-19	Silt loam	ML, CL, CL-ML	A-6, A-4	0	100	100	95-100	80-95	25-40	4-14
	19-45	Silty clay, silty clay loam, clay.	CH, MH, CL, ML	A-7, A-6	0	100	95-100	90-100	80-100	38-66	14-34
	45-70	Silty clay, silty clay loam, clay.	CH, MH, CL, ML	A-7, A-6	0	100	95-100	85-100	75-100	38-66	14-34
VaC, VaD, VaE----- Vandalia	0-6	Silt loam	ML, CL	A-4, A-6, A-7	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	6-52	Silty clay loam, channery silty clay, clay.	CL, CH, ML	A-6, A-7	0-5	75-100	70-95	65-90	60-85	35-55	15-30
	52-60	Silty clay, clay, channery silty clay loam.	CL, CH, ML, MH	A-6, A-7	0-5	70-100	65-100	60-100	55-100	30-55	10-30
VbD---------- Vandalia	0-6	Stony silt loam.	ML, CL	A-4, A-6, A-7	2-15	65-95	60-80	55-75	55-65	25-45	5-20
	6-52	Silty clay loam, clay loam, silty clay.	MH, CL, CH, ML	A-6, A-7	0-5	70-100	70-95	65-90	60-85	35-55	15-30
	52-60	Silty clay, clay, silty clay loam.	MH, CH, CL, ML	A-6, A-7	0-5	70-100	65-100	60-100	55-100	30-55	10-30
VdD3---------- Vandalia	0-6	Silty clay loam	ML, CL	A-4, A-6, A-7	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	6-52	Silty clay loam, channery silty clay, clay.	CL, CH, ML	A-6, A-7	0-5	75-100	70-95	65-90	60-85	35-55	15-30
	52-60	Silty clay, clay, channery silty clay loam.	CL, CH, ML, MH	A-6, A-7	0-5	70-100	65-100	60-100	55-100	30-55	10-30
VeB, VeC---------- Vincent	0-19	Silt loam	ML, CL, CL-ML	A-6, A-4	0	100	100	95-100	80-95	25-40	4-14
	19-45	Silty clay, silty clay loam, clay.	CH, MH, CL, ML	A-7, A-6	0	100	95-100	90-100	80-100	38-66	14-34
	45-70	Silty clay, silty clay loam, clay.	CH, MH, CL, ML	A-7, A-6	0	100	95-100	85-100	75-100	38-66	14-34
ZoB---------- Zoar	0-9	Silt loam	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	75-95	20-40	3-15
	9-20	Silty clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	85-100	30-55	11-32
	20-60	Clay loam, silty clay loam, clay.	CL, CH, ML, MH	A-6, A-7	0	95-100	95-100	90-100	75-95	30-60	11-35

* 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. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
AgA, AgB, AgC---- Allegheny	0-8	0.6-2.0	0.12-0.22	3.6-5.5	Low----------	0.32	4
	8-49	0.6-2.0	0.13-0.18	3.6-5.5	Low----------	0.28	
	49-60	0.6-2.0	0.08-0.17	3.6-5.5	Low----------	0.28	
AsA, AsB--------- Ashton	0-9	0.6-2.0	0.16-0.23	5.6-7.3	Low----------	0.28	4
	9-48	0.6-2.0	0.18-0.23	5.6-7.3	Low----------	0.43	
	48-72	0.6-2.0	0.14-0.20	5.6-7.3	Low----------	0.43	
CoB, CoC--------- Coolville	0-7	0.6-2.0	0.18-0.22	3.6-6.5	Low----------	0.43	4
	7-18	0.6-2.0	0.16-0.19	3.6-5.5	Moderate-------	0.43	
	18-40	<0.2	0.10-0.15	3.6-5.5	Moderate-------	0.32	
	40-50	---	---	---	----------	----	
GlC---------- Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	35	---	---	---	----------	----	
GuC*:							
Gilpin----------	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	35	---	---	---	----------	----	
Upshur----------	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-------	0.37	3
	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-------	0.32	
	44	---	---	---	----------	----	
GuC3*:							
Gilpin----------	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	35	---	---	---	----------	----	
Upshur----------	0-5	0.2-0.6	0.12-0.16	4.5-6.5	High----------	0.32	2
	5-36	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-------	0.32	
	44	---	---	---	----------	----	
GuD*:							
Gilpin----------	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	35	---	---	---	----------	----	
Upshur----------	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-------	0.37	3
	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-------	0.32	
	44	---	---	---	----------	----	
GuD3*:							
Gilpin----------	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	35	---	---	---	----------	----	
Upshur----------	0-5	0.2-0.6	0.12-0.16	4.5-6.5	High----------	0.32	2
	5-36	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-------	0.32	
	44	---	---	---	----------	----	

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
GuE*:							
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	----	
Upshur	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate	0.37	3
	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	----	
GuE3*:							
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	----	
Upshur	0-5	0.2-0.6	0.12-0.16	4.5-6.5	High	0.32	2
	5-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	----	
GuF*:							
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	----	
Upshur	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate	0.37	3
	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	----	
GuF3*:							
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	----	
Upshur	0-5	0.2-0.6	0.12-0.16	4.5-6.5	High	0.32	2
	5-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	----	
GvE*, GvF*:							
Gilpin	0-5	0.6-2.0	0.08-0.14	3.6-5.5	Low	0.17	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	----	
Upshur	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate	0.32	3
	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	----	
HaA, HaB	0-9	0.6-2.0	0.18-0.24	5.1-6.5	Low	0.32	4
Hackers	9-39	0.6-2.0	0.12-0.18	5.1-6.5	Moderate	0.37	
	39-60	0.6-2.0	0.12-0.18	5.1-6.5	Low	0.28	
Hu	0-10	0.6-2.0	0.18-0.24	5.6-7.8	Low	0.28	5
Huntington	10-45	0.6-2.0	0.16-0.22	5.6-7.8	Low	0.32	
	45-60	0.6-2.0	0.10-0.16	5.6-7.8	Low	0.28	
KaA, KaB	0-10	0.6-2.0	0.16-0.22	5.1-6.0	Low	0.32	4
Kanawha	10-31	0.6-2.0	0.14-0.18	5.1-7.3	Low	0.28	
	31-60	0.6-6.0	0.10-0.18	5.6-7.3	Low	0.24	

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
L1C, L1D, L1E----	0-7	0.6-6.0	0.13-0.18	3.6-5.5	Low----------	0.28	3
Lily	7-20	2.0-6.0	0.12-0.18	3.6-5.5	Low----------	0.28	
	20-24	2.0-6.0	0.08-0.17	3.6-5.5	Low----------	0.17	
	24	---	---	---	----------	----	
Ln----------	0-8	0.6-2.0	0.20-0.26	5.1-7.8	Low----------	0.32	5
Lindside	8-60	0.2-2.0	0.17-0.22	5.1-7.8	Low----------	0.37	
Me----------	0-9	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43	5
Melvin	9-60	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43	
Mf*:							
Melvin----------	0-9	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43	5
	9-60	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43	
Lindside--------	0-8	0.6-2.0	0.20-0.26	5.1-7.8	Low----------	0.32	5
	8-60	0.2-2.0	0.17-0.22	5.1-7.8	Low----------	0.37	
MgB, MgC---------	0-9	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.43	3
Monongahela	9-25	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43	
	25-60	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43	
	60-72	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37	
Mo----------	0-9	0.6-2.0	0.20-0.24	5.6-6.5	Low----------	0.32	5
Moshannon	9-37	0.6-2.0	0.18-0.22	5.6-6.5	Low----------	0.37	
	37-60	0.6-2.0	0.14-0.18	5.6-6.5	Low----------	0.28	
Se, Sf----------	0-6	0.6-2.0	0.18-0.24	5.1-6.5	Low----------	0.32	5
Senecaville	6-30	0.2-2.0	0.12-0.18	5.1-6.5	Moderate-------	0.37	
	30-60	0.6-2.0	0.12-0.18	5.1-6.5	Low----------	0.28	
Sn, SrB----------	0-7	0.6-6.0	0.12-0.18	5.6-7.8	Low----------	0.20	5
Sensabaugh	7-29	0.6-6.0	0.10-0.16	5.6-7.8	Low----------	0.20	
	29-60	0.6-6.0	0.08-0.14	5.6-7.8	Low----------	0.20	
T1B----------	0-6	0.6-2.0	0.16-0.22	3.6-5.5	Low----------	0.43	3
Tilsit	6-24	0.6-2.0	0.16-0.22	3.6-5.5	Low----------	0.43	
	24-49	0.06-0.2	0.08-0.12	3.6-5.5	Low----------	0.43	
	49-62	0.06-0.6	0.08-0.12	3.6-5.5	Low----------	0.43	
	62	---	---	---	----------	----	
Ty----------	0-9	0.6-2.0	0.18-0.22	3.6-6.5	Low----------	0.43	3
Tyler	9-24	0.2-0.6	0.16-0.20	3.6-5.5	Moderate-------	0.43	
	24-52	<0.2	0.04-0.12	3.6-5.5	Low----------	0.43	
	52-60	0.2-0.6	0.04-0.12	4.5-6.0	Low----------	0.43	
UA*:							
Udifluvents.							
Fluvaquents.							
UB, UC, UD.							
Udorthents							
UeB, UeC---------	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-------	0.37	3
Upshur	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-------	0.32	
	44	---	---	---	----------	----	
UfC3----------	0-5	0.2-0.6	0.12-0.16	4.5-6.5	High----------	0.32	2
Upshur	5-36	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-------	0.32	
	44	---	---	---	----------	----	

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
UgC*:							
Upshur	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate	0.37	3
	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	---	
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	---	
UgC3*:							
Upshur	0-5	0.2-0.6	0.12-0.16	4.5-6.5	High	0.32	2
	5-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	---	
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	---	
UgD*:							
Upshur	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate	0.37	3
	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	---	
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	---	
UgD3*:							
Upshur	0-5	0.2-0.6	0.12-0.16	4.5-6.5	High	0.32	2
	5-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	---	
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	---	
UgE*:							
Upshur	0-7	0.2-0.6	0.12-0.16	4.5-6.5	Moderate	0.37	3
	7-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	---	
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	---	
UgE3*:							
Upshur	0-5	0.2-0.6	0.12-0.16	4.5-6.5	High	0.32	2
	5-36	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	36-44	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	44	---	---	---	---	---	
Gilpin	0-5	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3
	5-27	0.6-2.0	0.10-0.16	3.6-5.5	Low	0.24	
	27-35	0.6-2.0	0.06-0.10	3.6-5.5	Low	0.24	
	35	---	---	---	---	---	
Uh*.							
Urban land							

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
UkB*:							
Urban land.							
Kanawha	0-10	0.6-2.0	0.16-0.22	5.1-6.0	Low	0.32	4
	10-31	0.6-2.0	0.14-0.18	5.1-7.3	Low	0.28	
	31-60	0.6-6.0	0.10-0.18	5.6-7.3	Low	0.24	
Un*:							
Urban land.							
Lindside	0-8	0.6-2.0	0.20-0.26	5.1-7.8	Low	0.32	5
	8-60	0.2-2.0	0.17-0.22	5.1-7.8	Low	0.37	
UoB*:							
Urban land.							
Monongahela	0-9	0.6-2.0	0.18-0.24	4.5-5.5	Low	0.43	3
	9-25	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.43	
	25-60	0.06-0.6	0.08-0.12	4.5-5.5	Low	0.43	
	60-72	0.2-0.6	0.08-0.12	4.5-5.5	Low	0.37	
UvC*:							
Urban land.							
Vincent	0-19	0.06-2.0	0.20-0.24	5.1-7.3	Low	0.43	3
	19-45	0.06-0.2	0.10-0.18	4.5-7.3	High	0.32	
	45-70	0.06-0.2	0.08-0.18	5.6-7.8	High	0.32	
VaC, VaD, VaE	0-6	0.2-2.0	0.12-0.18	4.5-6.0	Moderate	0.37	4
Vandalia	6-52	0.06-0.6	0.12-0.15	4.5-6.0	High	0.32	
	52-60	0.06-0.6	0.08-0.12	5.1-7.3	High	0.32	
VbD	0-6	0.2-2.0	0.12-0.18	4.5-6.0	Moderate	0.32	4
Vandalia	6-52	0.06-0.6	0.12-0.15	4.5-6.0	High	0.32	
	52-60	0.06-0.6	0.08-0.12	5.1-7.3	High	0.32	
VdD3	0-6	0.2-2.0	0.12-0.18	4.5-6.0	Moderate	0.37	4
Vandalia	6-52	0.06-0.6	0.12-0.15	4.5-6.0	High	0.32	
	52-60	0.06-0.6	0.08-0.12	5.1-7.3	High	0.32	
VeB, VeC	0-19	0.06-2.0	0.20-0.24	5.1-7.3	Low	0.43	3
Vincent	19-45	0.06-0.2	0.10-0.18	4.5-7.3	High	0.32	
	45-70	0.06-0.2	0.08-0.18	5.6-7.8	High	0.32	
ZoB	0-9	0.6-2.0	0.15-0.18	4.5-5.5	Low	0.43	3
Zoar	9-20	0.06-0.6	0.12-0.15	4.5-5.5	Moderate	0.32	
	20-60	0.06-0.2	0.08-0.12	4.5-5.5	Moderate	0.32	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

[See text for definition of terms. 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 frequency	High water table			Bedrock		Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
			Ft			In			
AgA, AgB, AgC----- Allegheny	B	None	>6.0	---	---	>60	---	Low------	High.
AsA, AsB---------- Ashton	B	Rare	>6.0	---	---	>60	---	Low------	Low.
CoB, CoC---------- Coolville	C	None	2.0-3.5	Perched	Feb-Apr	40-50	Soft	High-----	High.
GlC--------------- Gilpin	C	None	>6.0	---	---	20-40	Soft	Low------	High.
GuC*:									
Gilpin----------	C	None	>6.0	---	---	20-40	Soft	Low------	High.
Upshur----------	D	None	>6.0	---	---	40-60	Soft	High-----	Moderate.
GuC3*, GuD*, GuD3*, GuE*, GuE3*:									
Gilpin----------	C	None	>6.0	---	---	20-40	Soft	Low------	High.
Upshur----------	D	None	>6.0	---	---	40-60	Soft	High-----	Moderate.
GuF*, GuF3*:									
Gilpin----------	C	None	>6.0	---	---	20-40	Soft	Low------	High.
Upshur----------	D	None	>6.0	---	---	40-60	Soft	High-----	Moderate.
GvE*, GvF*:									
Gilpin----------	C	None	>6.0	---	---	20-40	Soft	Low------	High.
Upshur----------	D	None	>6.0	---	---	40-60	Soft	High-----	Moderate.
HaA, HaB---------- Hackers	B	Rare	>6.0	---	---	>60	---	Low------	Moderate.
Hu---------------- Huntington	B	Rare	>6.0	---	---	>60	---	Low------	Moderate.
KaA, KaB---------- Kanawha	B	None	>6.0	---	---	>60	---	Low------	Moderate.
LlC, LlD, LlE----- Lily	B	None	>6.0	---	---	20-40	Hard	Moderate	High.
Ln---------------- Lindside	C	Rare	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
Me---------------- Melvin	D	Rare	0-1.0	Apparent	Dec-May	>60	---	High-----	Low.
Mf*:									
Melvin----------	D	None	0-1.0	Apparent	Dec-May	>60	---	High-----	Low.
Lindside----------	C	None	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
MgB, MgC---------- Monongahela	C	None	1.5-3.0	Perched	Dec-Apr	>60	---	High-----	High.
Mo---------------- Moshannon	B	Occasional	4.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding frequency	High water table			Bedrock		Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
			Ft			In			
Se---------- Senecaville	B	Occasional	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Moderate.
Sf---------- Senecaville	B	Rare	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Moderate.
Sn---------- Sensabaugh	B	Occasional	4.0-6.0	Apparent	Jan-Apr	>60	---	Low-------	Low.
SrB---------- Sensabaugh	B	Rare	4.0-6.0	Apparent	Jan-Apr	>60	---	Low-------	Low.
TlB---------- Tilsit	C	None	1.5-2.5	Perched	Jan-Apr	40-60	Hard	High------	High.
Ty---------- Tyler	D	None	0.5-2.0	Perched	Nov-May	>60	---	High------	High.
UA*: Udifluvents.									
Fluvaquents.									
UB, UC, UD. Udorthents									
UeB, UeC, UfC3---- Upshur	D	None	>6.0	---	---	40-60	Soft	High------	Moderate.
UgC*, UgC3*, UgD*, UgD3*: Upshur----------	D	None	>6.0	---	---	40-60	Soft	High------	Moderate.
Gilpin----------	C	None	>6.0	---	---	20-40	Soft	Low-------	High.
UgE*, UgE3*: Upshur----------	D	None	>6.0	---	---	40-60	Soft	High------	Moderate.
Gilpin----------	C	None	>6.0	---	---	20-40	Soft	Low-------	High.
Uh*. Urban land									
UkB*: Urban land.									
Kanawha----------	B	None	>6.0	---	---	>60	---	Low-------	Moderate.
Un*: Urban land.									
Lindside---------	C	Rare	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate	Low.
UoB*: Urban land.									
Monongahela------	C	None	1.5-3.0	Perched	Dec-Apr	>60	---	High------	High.
UvC*: Urban land.									
Vincent----------	C	None	2.0-4.0	Perched	Jan-Apr	>60	---	High------	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding frequency	High water table			Bedrock		Risk of corrosion	
			Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
			Ft			In			
VaC, VaD, VaE, VbD, VdD3--------- Vandalia	D	None	4.0-6.0	Perched	Feb-Apr	>60	---	High-----	Moderate.
Veb, VeC---------- Vincent	C	None	2.0-4.0	Perched	Jan-Apr	>60	---	High-----	Moderate.
ZoB---------- Zoar	C	None	1.5-2.5	Perched	Dec-Apr	>60	---	High-----	High.

*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
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Ashton	Fine-silty, mixed, mesic Mollic Hapludalfs
*Coolville	Clayey, mixed, mesic Aquic Hapludults
Fluvaquents	Fluvaquents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Hackers	Fine-silty, mixed, mesic Typic Hapludalfs
*Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
Kanawha	Fine-loamy, mixed, mesic Typic Hapludalfs
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
*Moshannon	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Senecaville	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Sensabaugh	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
*Tilsit	Fine-silty, mixed, mesic Typic Fragiudults
Tyler	Fine-silty, mixed, mesic Aeric Fragiaquults
Udifluvents	Udifluvents
Udorthents	Udorthents
Upshur	Fine, mixed, mesic Typic Hapludalfs
Vandalia	Fine, mixed, mesic Typic Hapludalfs
Vincent	Fine, mixed, mesic Typic Hapludalfs
*Zoar	Clayey, mixed, mesic Aquic Hapludults

*This soil is a taxadjunct to the series. See text for description of those characteristics of the soil that are outside the range of the series.

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