United States Department of Agriculture

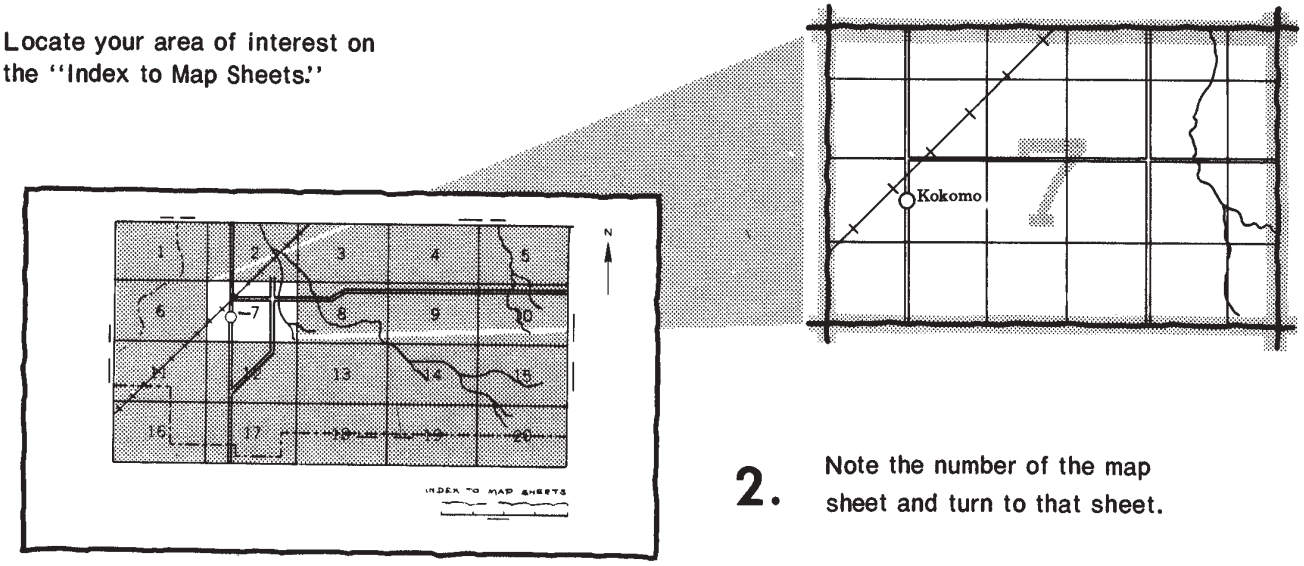
Soil Conservation Service

In cooperation with West Virginia University Agricultural and Forestry Experiment Station

Soil Survey of Upshur County, West Virginia

HOW TO USE

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



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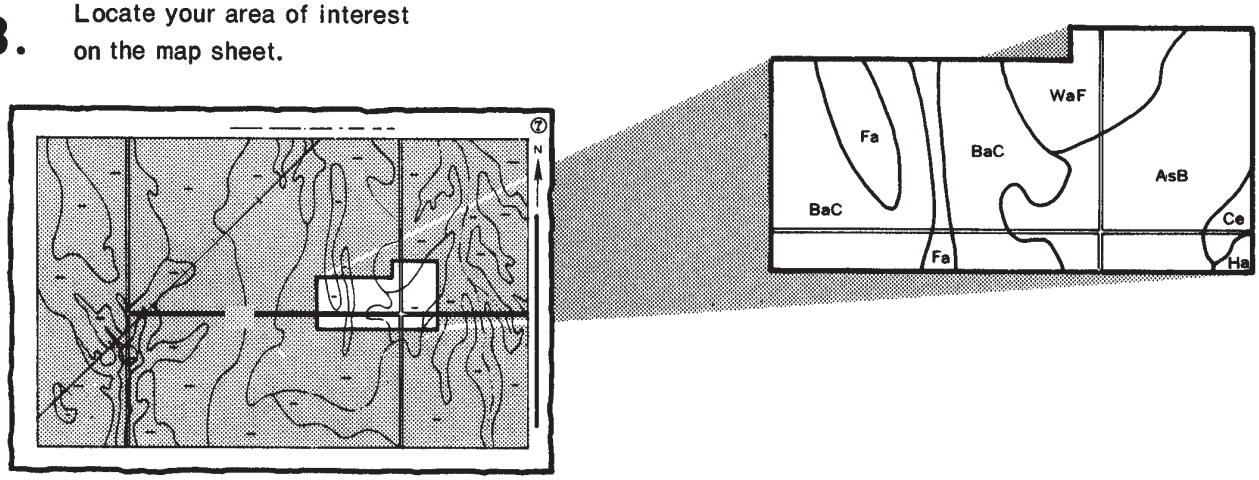

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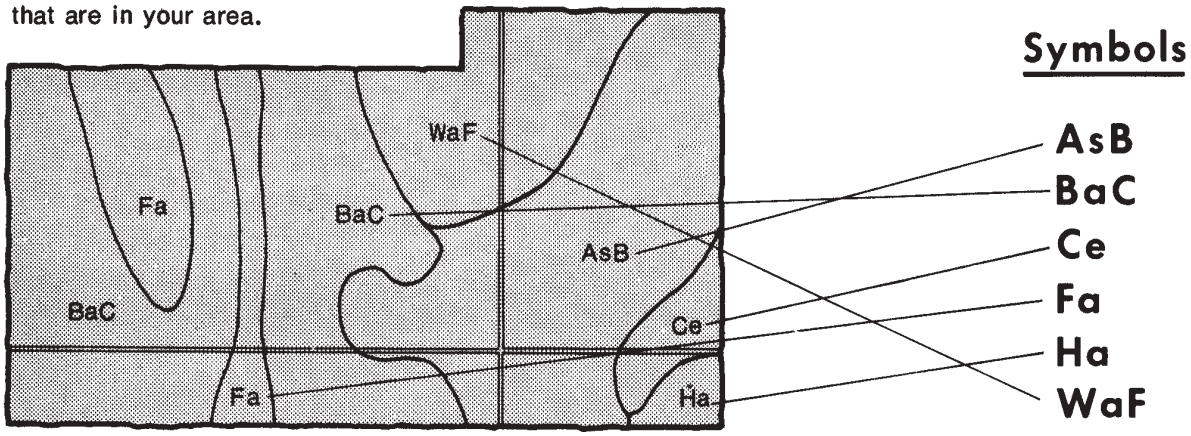
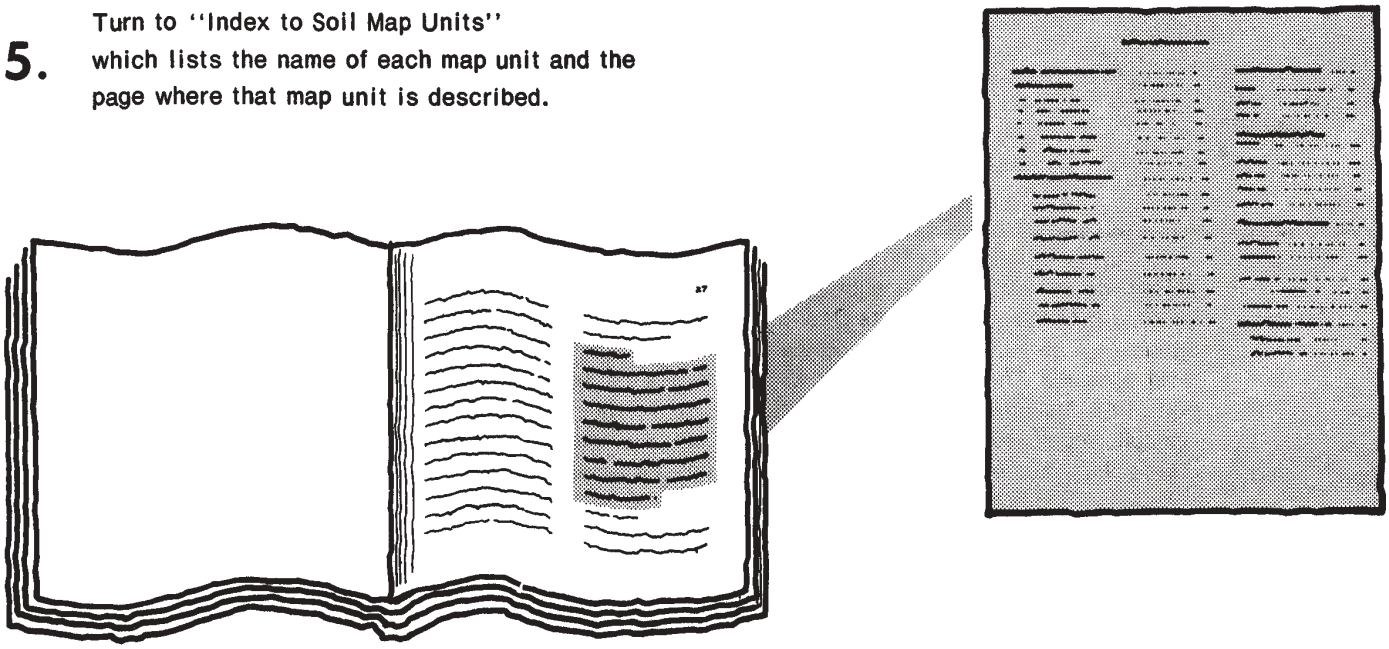
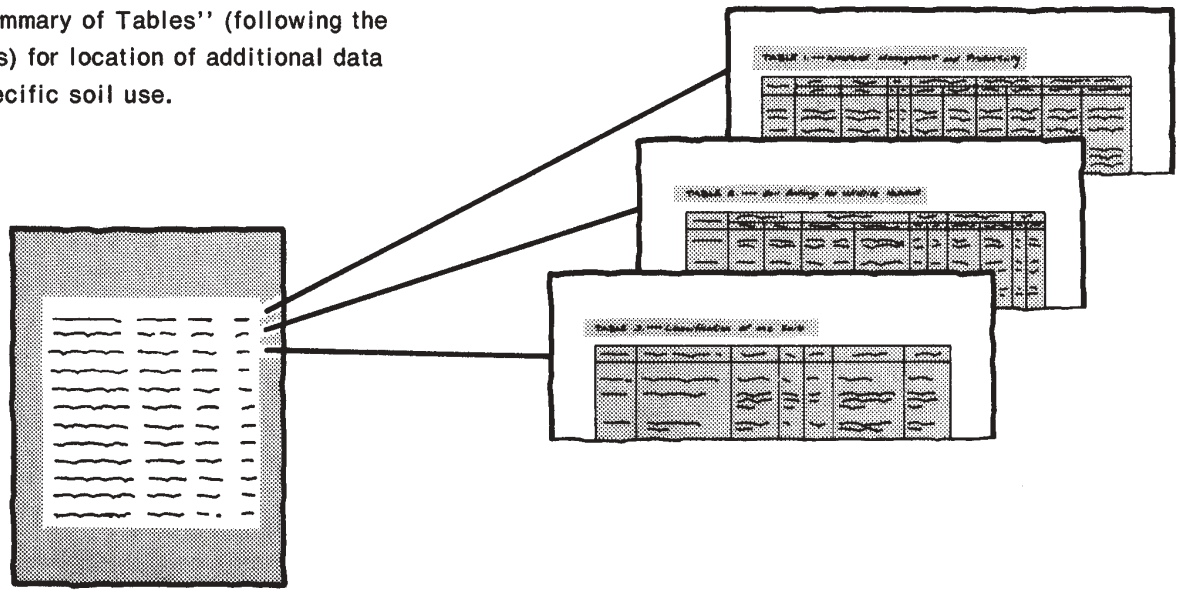


THIS SOIL SURVEY

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.

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

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

Cover: Farmland mainly on Orrville-Holly silt loams. Gilpin and Upshur soils are on uplands in the background.

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Foreword

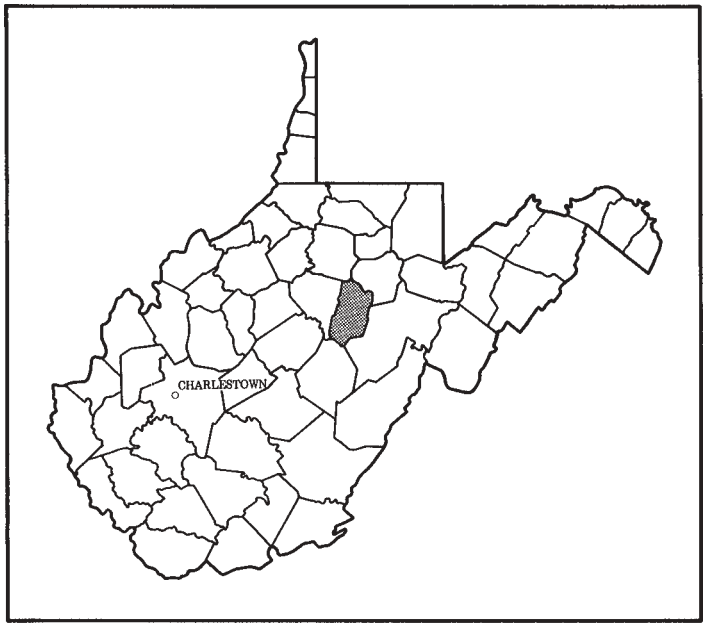
This soil survey contains information that can be used in land-planning programs in Upshur County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

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

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

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

Rollin N. Swank
State Conservationist
Soil Conservation Service



Location of Upshur County in West Virginia.

Soil Survey of
Upshur County, West Virginia

By Roy E. Pyle, Soil Conservation Service

Fieldwork by Roy E. Pyle, Troy Yoakum, George A. Hanczar,
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United States Department of Agriculture, Soil Conservation Service
In cooperation with
West Virginia University Agricultural and Forestry Experiment Station

UPSHUR COUNTY is in the north-central part of West Virginia and consists of 352 square miles, or 225,280 acres.

The population of Upshur County in 1970 was 19,092. Buckhannon, the county seat, is the largest city in the survey area. The main enterprises in the county are farming, mining, natural gas and oil production, timber production, and small factories. Hay, corn, and small grains are the main crops. Cattle and sheep are the main livestock. Industry, especially mining and drilling, provides the bulk of jobs in the survey area.

The first settlement in what is now Upshur County was established about 1700, but it was not until about 1800 that permanent settlers came in large numbers, mainly from Virginia, Maryland, and Pennsylvania. Buckhannon was established in 1816 and is the only incorporated town in Upshur County.

The establishment of Upshur County preceded the formation of West Virginia by 12 years. The county was formed from parts of Randolph, Barbour, and Lewis Counties and was named in honor of Abel Parker Upshur of Virginia.

The transportation needs of the survey area are served by a network of highways, including State routes 4 and 20 and U.S. routes 33 and 119. Two railroads serve the area, and air freight and charter service are available at the Buckannon-Upshur County Airport.

The survey area has many streams, springs, and wells which provide the county with its water supply. Many ponds and a few lakes have been constructed throughout the survey area. The ponds, lakes, streams and springs provide ample water for livestock and wildlife.

General Nature of the Survey Area

This section provides information about some of the natural and cultural factors that affect the soils in the county.

Physiography, Relief, and Drainage

The landforms in Upshur County are the result of erosion acting through successive ages of geologic history.

The elevation of the survey area ranges from 1,038 feet above sea level at Ingo on the Little Kanawha River to 3,050 feet at the southeastern corner of the county, about 1.7 miles southeast of the Palace Valley (*3*).

The Buckhannon River and its tributaries drain most of the survey area. It flows northward through the center of the county. Hackers Creek drains the northwestern part of the county, French Creek the western part, Middle Fork River the eastern part, and the Little Kanawha River the southwestern part.

Farming

The 1974 Census of Agriculture reports 401 farms in Upshur County and a total farm acreage of 60,316 (*8*). Between 1969 and 1974, the number of farms in the county decreased by 173 and the average-size farm increased from 139 to 150 acres.

The main types of farming in the county are raising beef cattle and producing corn, some wheat and oats, and pasture and hay. Cattle provide the greatest source of farm income.

Climate

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

Table 1 gives data on temperature and precipitation for the survey area as recorded at Buckhannon in the period 1951 to 1973. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 33 degrees F, and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Buckhannon on January 29, 1963, is -23 degrees. In summer the average temperature is 70 degrees, and the average daily maximum temperature is 83 degrees. The highest recorded temperature, which occurred on September 3, 1953, is 100 degrees.

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

Of the total annual precipitation, 25 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 22 inches. The heaviest 1-day rainfall during the period of record was 3.54 inches at Buckhannon on October 15, 1954. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 54 inches. The greatest snow depth at any one time during the period of record was 14 inches. On an average of 16 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 90 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, 9 miles per hour, in spring.

The climate in the southern part of the survey area is different than at Buckhannon, which is in the northern part. For example, data from Pickens, in adjacent Randolph County, show an annual precipitation of about 65 inches and an average annual temperature of about 48 degrees (*9*).

How This Survey was Made

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

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

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

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

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

General Soil Map Units

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

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

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

Soil Descriptions

1. Udorthents-Monongahela-Tygart-Orrville

Deep, nearly level and strongly sloping, moderately well drained and somewhat poorly drained, acid and lime-influenced soils; on flood plains and terraces

This map unit consists of soils along the Buckhannon River, Brushy Fork, Fink Run, and Turkey Run. The unit makes up about 2 percent of the county and is about 20 percent Udorthents, 18 percent Monongahela soils, 12 percent Tygart soils, 12 percent Orrville soils, and 38 percent soils of minor extent and water.

Udorthents consist of two main types of material: (1) soils that have been dredged mostly from the Buckhannon River and placed on some of the flood plains and terraces of the river; (2) soils in excavated or filled areas.

The Monongahela soils are moderately well drained and are gently sloping and strongly sloping. They are on terraces. They formed in alluvial material washed from acid soils on uplands. The Monongahela soils have a dark brown, medium-textured surface layer and a yellowish brown and reddish yellow, medium-textured subsoil that is mottled in the lower part.

The Tygart soils are somewhat poorly drained and nearly level. They are on slackwater terraces. They formed in alluvial material washed from acid and lime-influenced soils on uplands. The Tygart soils have a dark grayish brown, medium-textured surface layer and a light olive brown, light yellowish brown, and light brownish gray, medium-textured subsoil that is mottled.

The Orrville soils are somewhat poorly drained and nearly level. They are on flood plains. They formed in alluvial material washed from acid and lime-influenced soils on uplands. The Orrville soils have a dark grayish brown, medium-textured surface layer and a brown and grayish brown, medium-textured subsoil that is mottled.

The minor soils in the map unit are well drained Pope and Chavies soils, moderately well drained Philo soils, and poorly drained Atkins and Holly soils, all of which are on flood plains, and well drained Vandalia soils and moderately well drained Ernest soils on foot slopes.

Most of this unit is used for farming or urban development. Onsite investigation is needed to determine the limitations of the Udorthents for community development. The other soils in the unit and their limitations for community development are: Monongahela and Tygart soils—a seasonal high water table and moderately slow or slow permeability; Orrville soils—a seasonal high water table, moderately slow or slow permeability, and a hazard of flooding.

2. Gilpin-Upshur-Vandalia

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

This map unit is in the northwestern part of the county. The unit makes up about 16 percent of the area and is about 44 percent Gilpin soils, 17 percent Upshur soils, 8 percent Vandalia soils, and 31 percent soils of minor extent.

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

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

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

The minor soils in the map unit are well drained Lily and Westmoreland soils on uplands, moderately well drained Ernest soils on foot slopes, and somewhat poorly drained Orrville soils and poorly drained Holly soils on flood plains.

About two-thirds of this unit is wooded. A few areas are farmed, and some areas are reverting to woody species.

The soils in this unit and their main limitations for community development are: Gilpin soils—slope and the depth to bedrock; Upshur and Vandalia soils—slope, moderately slow or slow permeability, a high shrink-swell potential, a clayey texture, and a hazard of slipping; minor soils—a seasonal high water table, moderately slow or slow permeability, a hazard of flooding, and the depth to bedrock.

3. Gilpin-Upshur-Ernest

Moderately deep and deep, gently sloping to very steep, well drained and moderately well drained, acid and lime-influenced soils; on uplands and foot slopes

This map unit is mainly in the southwestern part of the county. The unit makes up about 12 percent of the county and is about 50 percent Gilpin soils, 16 percent Upshur soils, 11 percent Ernest soils, and 23 percent soils of minor extent.

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

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

The Ernest soils are deep, moderately well drained, and gently sloping to moderately steep. They are on foot slopes and near the heads of drainageways. They formed in acid material that moved downslope from soils on uplands. The Ernest soils have a very dark grayish brown, medium-textured surface layer and a yellowish brown, reddish yellow, and strong brown, medium-textured subsoil that is mottled in the lower part with light gray and light brownish gray.

The minor soils in the map unit are well drained Lily soils on ridgetops; well drained Vandalia soils on foot slopes; and moderately well drained Philo soils, somewhat poorly drained Orrville soils, and poorly drained Atkins and Holly soils on flood plains.

About half of this unit is wooded. A few areas are farmed, and some areas are reverting to woody species.

The soils in this unit and their limitations for community development are: Gilpin soils—slope and the depth to bedrock; Upshur soils—slope, slow permeability, a high shrink-swell potential, a clayey texture, and a hazard of slipping; Ernest soils—a seasonal high water table, slope, and moderately slow or slow permeability; minor soils—a seasonal high water table, a hazard of flooding, slope, the depth to bedrock, a hazard of slipping, a clayey texture, and moderately slow or slow permeability.

4. Gilpin-Buchanan-Ernest

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

This map unit is mainly in the central and northeastern parts of the county (fig. 1). The unit makes up about 24 percent of the area and is about 55 percent Gilpin soils, 10 percent Buchanan soils, 9 percent Ernest soils, and 26 percent soils of minor extent.

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

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

The Ernest soils are deep, moderately well drained, and gently sloping to steep. They are on foot slopes and near the heads of drainageways. They formed in acid material that moved downslope from soils on uplands. The Ernest soils have a very dark grayish brown, medium-textured surface layer and a yellowish brown, reddish yellow, and strong brown, medium-textured subsoil that is mottled in the lower part with light gray and light brownish gray.

The minor soils in the map unit are well drained Dekalb and Lily soils on uplands and well drained Pope and Chavies soils, moderately well drained Philo soils, and poorly drained Atkins soils, all on flood plains.

Most of this map unit is wooded, but some areas in the northeasten part of the county are farmed.

Figure 1.—A typical landscape in the Gilpin-Buchanan-Ernest general soil map unit.

The soils in this unit and their main limitations for community development are: Gilpin soils—slope and the depth to bedrock; Buchanan and Ernest soils—a seasonal high water table, slope, and moderately slow or slow permeability; minor soils—a seasonal high water table, a hazard of flooding, moderately slow or slow permeability, the depth to bedrock, and slope.

5. Gilpin-Dekalb-Buchanan

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

This map unit is mainly in the southern part of the county. The unit makes up about 46 percent of the county and is about 43 percent Gilpin soils, 15 percent Dekalb soils, 12 percent Buchanan soils, and 30 percent soils of minor extent.

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

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

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

The minor soils in the map unit are well drained Lily soils on uplands; moderately well drained Ernest soils on foot slopes; and well drained Pope soils, moderately well drained Philo soils, and Fluvaquents and Udifluvents on flood plains. Rock outcrops are common in some areas.

Most of this map unit is wooded, but some areas in the central and northwestern parts of the unit are farmed.

The soils in this unit and their main limitations for community development are: Gilpin and Dekalb soils—slope and the depth to bedrock; Buchanan soils—a seasonal high water table, slope, and slow permeability; minor soils—a seasonal high water table, a hazard of flooding, moderately slow or slow permeability, the depth to bedrock, and slope.

Detailed Soil Map Units

Dr. John Sencindiver, assistant professor of soil science, West Virginia University Agricultural and Forestry Experiment Station, assisted with the preparation of this section and the section "Soil Series and their Morphology."

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, Gilpin silt loam, 3 to 8 percent slopes, is one of several phases in the Gilpin series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Gilpin-Upshur complex 25 to 35 percent slopes, severely eroded, 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. Buchanan and Ernest very stony loams, 3 to 15 percent slopes, is an undifferentiated group in this survey area.

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

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

Soil Descriptions

At—Atkins silt loam. This soil is nearly level and poorly drained. It is on flood plains mainly along the major streams in the southern and eastern parts of the survey area. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is light brownish gray mottled with yellowish brown and is about 25 inches thick. The upper 11 inches is loam, and the lower 14 inches is silt loam. The substratum extends to a depth of 60 inches or more. The upper part is grayish brown silt loam mottled with strong brown. The lower part is gray very gravelly sandy loam mottled with strong brown and yellowish red.

Included with this soil in mapping are a few small areas of well drained Pope soils, moderately well drained Philo soils, and poorly drained Holly soils. Also included are a few areas of soils that have a thick, black surface layer and soils that have a subsoil of fine sandy loam, sandy loam, or silty clay. Included soils make up about 25 percent of this unit.

The available water capacity of this Atkins soil is high. Permeability is slow or moderately slow in the subsoil. Runoff is slow, and water is ponded on the surface of some areas. Natural fertility is moderate. Where unlimed,

the soil is strongly acid or very strongly acid. This Atkins soil has a seasonal high water table at or near the surface that restricts the root zone of many types of plants. The depth to bedrock is generally more than 60 inches.

This soil is suited to cultivated crops, but it is better suited to moisture-tolerant hay or pasture plants than to cultivated crops. The soil is used mainly for hay or pasture. Flooding is a hazard for crops in some areas of this soil. Artificial drainage is needed for cultivated crops or for hay or pasture, and providing drainage is a major management concern. Most areas lack suitable drainage outlets, but in places diversions help to intercept runoff from higher areas. Using conservation tillage and a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and mixing crop residue into the soil help to maintain fertility and tilth in cultivated areas. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is firm are major pasture management needs.

The soil has very high potential productivity for trees that tolerate wetness, 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, the seasonal high water table, and the slow or moderately slow permeability are the main limitations of this soil for community development.

The capability subclass is IIIw.

BeC—Buchanan and Ernest very stony silt loams, 3 to 15 percent slopes. This unit consists of strongly sloping or gently sloping, moderately well drained soils on foot slopes and around stream heads. It is mostly in the southern and eastern parts of the survey area. Stones cover 3 to 15 percent of the surface. The total acreage of this unit is about 50 percent Buchanan soils, 30 percent Ernest soils, and 20 percent other soils. Some areas consist mostly of Buchanan soils, some mostly of Ernest soils, and some of both. The soils were mapped together because they have no major differences in use and management.

Typically, the surface layer of the Buchanan soils is very dark grayish brown channery silt loam about 3 inches thick. The subsurface layer is dark yellowish brown channery silt loam about 6 inches thick. The subsoil is about 43 inches thick. The upper 8 inches is yellowish brown channery loam, and the next 13 inches is yellowish brown channery loam mottled with light brownish gray and strong brown. The lower 22 inches is very firm and brittle, yellowish brown very channery loam mottled with gray and strong brown. The substratum is mottled, yellowish brown very channery loam to a depth of 60 inches or more.

Typically, the surface layer of the Ernest soils is very dark grayish brown channery silt loam about 5 inches thick. The subsoil is about 44 inches thick. The upper 15 inches of the subsoil is yellowish brown and reddish yellow channery silt loam that is mottled in the lower part with strong brown and yellowish red. The next 9 inches is strong brown channery silty clay loam mottled with light brownish gray and yellowish red. The lower 20 inches is very firm and brittle, yellowish brown and strong brown very channery silt loam mottled with yellowish brown, light gray, yellowish red, and strong brown. The substratum is strong brown, mottled very channery loam to a depth to 60 inches or more.

Included with these soils in mapping are a few small areas of well drained Dekalb and Gilpin soils, moderately well drained Philo soils, and poorly drained Atkins soils. Also included are areas of other well drained soils and soils with a surface layer of loam. Stones cover less than 3 percent of some areas and as much as 50 percent of some others. Some other areas have boulders on the surface.

These Buchanan and Ernest soils have moderate available water capacity. Permeability is moderate above the brittle part of the subsoil and moderately slow or slow in the brittle part. Runoff is medium or rapid, and natural fertility is low or moderate. In unlimed areas the Buchanan soils are strongly acid to extremely acid and the Ernest soils are strongly acid or very strongly acid. These soils have a seasonal high water table at a depth of about 1 1/2 to 3 feet that restricts the root zone of some types of plants. The depth to bedrock generally is more than 60 inches in both soils.

The stones on the surface make these soils generally unsuitable for cultivated crops or hay and difficult to manage for pasture. The stones restrict the use of farm machinery. The soils have a high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a management concern on the Ernest soils, and placing the roads and trails on the contour helps to control this erosion. The use of equipment is restricted during wet seasons because the soils are soft.

The stones on the surface, slope, the moderately slow or slow permeability, and the seasonal high water table are the main limitations of these soils for community development.

The capability subclass is VIIs.

BeD—Buchanan and Ernest very stony silt loams, 15 to 25 percent slopes. This unit consists of moderately steep, moderately well drained soils on foot slopes and around stream heads. It is mostly in the southern and eastern parts of the survey area. Stones cover 3 to 15 percent of the surface. The total acreage of this unit is about 55 percent Buchanan soils, 25 percent Ernest soils, and 20 percent other soils. Some areas consist mostly of Buchanan soils, some mostly of Ernest soils, and some of both. The soils were mapped together because they have no major differences in use and management.

Typically, the surface layer of the Buchanan soils is very dark grayish brown channery silt loam about 3 inches thick. The subsurface layer is dark yellowish brown channery silt loam about 6 inches thick. The subsoil is about 43 inches thick. The upper 8 inches is yellowish brown channery loam, and the next 13 inches is yellowish brown channery loam mottled with light brownish gray and strong brown. The lower 22 inches is very firm and brittle, yellowish brown very channery loam mottled with gray and strong brown. The substratum is mottled, yellowish brown very channery loam to a depth of 60 inches or more.

Typically, the surface layer of the Ernest soils is very dark grayish brown channery silt loam about 5 inches thick. The subsoil is about 44 inches thick. The upper 15 inches of the subsoil is yellowish brown and reddish yellow channery silt loam that is mottled in the lower part with strong brown and yellowish red. The next 9 inches is strong brown channery silty clay loam mottled with light brownish gray and yellowish red. The lower 20 inches is very firm and brittle, yellowish brown and strong brown very channery silt loam mottled with yellowish brown, light gray, yellowish red, and strong brown. The substratum is strong brown, mottled very channery loam to a depth to 60 inches or more.

Included with these soils in mapping are a few small areas of well drained Dekalb and Gilpin soils, moderately well drained Philo soils, and poorly drained Atkins soils. Also included are other well drained soils, soils with a surface layer of loam, steep soils, and soils that are deeper than 40 inches to the very firm and brittle layer. Stones cover less than 3 percent of some areas and as much as 50 percent of some others. Some other areas have boulders on the surface.

These Buchanan and Ernest soils have moderate available water capacity. Permeability is moderate above the brittle part of the subsoil and moderately slow or slow in the brittle part. Runoff is rapid, and natural fertility is low or moderate. In unlimed areas, the Buchanan soils are strongly acid to extremely acid and the Ernest soils are strongly acid or very strongly acid. These soils have a seasonal high water table at a depth of about 1 1/2 to 3 feet that restricts the root zone of some types of plants. The depth to bedrock generally is more than 60 inches in both soils.

Slope and the stones on the surface make these soils generally unsuitable for cultivated crops or hay and difficult to manage for pasture. These soils have a high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helps to control this erosion. Slope and the stones on the surface limit the use of equipment, and its use is further limited during wet seasons because the soils are soft.

The stones on the surface, slope, the moderately slow or slow permeability, and the seasonal high water table are the main limitations of these soils for community development.

The capability subclass is VIIs.

Ch—Chavies loam. This soil is nearly level and well drained. It is on high flood plains mainly along the Middle Fork and Buckhannon Rivers. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil is about 39 inches thick. The upper 11 inches is yellowish brown fine sandy loam, and the lower 28 inches is yellowish brown loam. The substratum is mottled, yellowish brown loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Pope soils, moderately well drained Philo soils, and poorly drained Atkins soils. Also included are a few small areas of soils that are gravelly throughout. Included soils make up about 30 percent of this unit.

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

This soil is suited to cultivated crops and to hay and pasture (fig. 2). Much of the acreage is used for cultivated crops or hay. Crops can be grown continuously on this soil, but the soil needs the protection of a cover crop. Working the residue from the cover crop into the soil helps to maintain fertility and tilth. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

This soil has a high potential productivity for trees, and about one-third of the acreage is wooded.

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

The capability subclass is IIs.

DaC—Dekalb channery loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. Most areas are on ridgetops and benches in the eastern and southern parts of the survey area.

Typically, the surface layer is very dark brown channery loam about 4 inches thick. The subsurface layer is dark brown channery loam about 3 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin and Lily soils. Also included are soils that are less than 20 inches or more than 40 inches deep to bedrock, soils that have fewer rock fragments in the surface layer than the Dekalb soil, soils where stones cover 1 to 3 percent of the surface, and

Figure 2.—An area of Chavies loam used for grazing.

soils that have slopes of 3 to 8 percent. Included soils make up about 25 percent of this unit.

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

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. Using conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

The soil has moderately high potential productivity for trees, and most of the acreage is wooded.

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

The capability subclass is IIIe.

DaD—Dekalb channery loam, 15 to 25 percent slopes. This soil is moderately steep and well drained. Most areas are on ridgetops and side slopes in the eastern and southern parts of the survey area. Drainageways dissect some areas.

Typically, the surface layer is very dark brown channery loam about 4 inches thick. The subsurface layer is dark brown channery loam about 3 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin and Lily soils and moderately well drained Buchanan and Ernest soils. Also included are soils that are less than 20 inches or more than 40 inches deep to bedrock, soils that have fewer rock fragments in the surface layer than the Dekalb soils, and soils where stones cover 1 to 3 percent of the surface. Included soils make up about 20 percent of this unit.

The available water capacity of this Dekalb soil is very low to moderate. Permeability is moderately rapid or rapid. Runoff is rapid, and natural fertility is low. Where unlimed, this soil is strongly acid or very strongly acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil has limited suitability for cultivated crops and is better suited to hay or pasture than to cultivated crops. The hazard of erosion is severe in unprotected areas and is a major management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, maintaining sod in drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

The soil has moderately high or high potential productivity for trees, and most of the acreage is wooded. Slope limits the use of equipment.

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

The capability subclass is IVe.

DaE—Dekalb channery loam, 25 to 35 percent slopes. This soil is steep and well drained. Most areas are on side slopes near benches and surface-mined areas in the eastern and southern parts of the survey area. Drainageways generally dissect the areas.

Typically, the surface layer is very dark brown channery loam about 3 inches thick. The subsurface layer is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin and Lily soils and moderately well drained Buchanan and Ernest soils. Also included are soils that are less than 20 inches or more than 40 inches deep to bedrock, soils that have fewer rock fragments in the surface layer than the Dekalb soil, and soils where stones cover 1 to 3 percent of the surface. Included soils make up about 25 percent of this unit.

The available water capacity of this Dekalb soil is very low to moderate. Permeability is moderately rapid to rapid. Runoff is very rapid, and natural fertility is low. Where unlimed, this soil is strongly acid or very strongly acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

Slope makes this soil generally unsuited to cultivated crops or hay, but the soil is suited to pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

This soil has moderately high or high potential productivity for trees, and most of the acreage is wooded. Slope limits the use of equipment.

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

The capability subclass is VIe.

DaF—Dekalb channery loam, 35 to 70 percent slopes. This soil is very steep and well drained. Most areas are on side slopes near benches and surface-mined areas in the eastern and southern parts of the survey area. Drainageways dissect many areas.

Typically, the surface layer is very dark brown channery loam about 3 inches thick. The subsurface layer is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown very channery loam about 23 inches thick. The substratum is yellowish brown very channery loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin soils and moderately well drained Buchanan and Ernest soils. Also included are soils that are less than 20 inches or more than 40 inches deep to bedrock, soils that have fewer rock fragments in the surface layer than this Dekalb soil, and soils where stones cover 3 to 50 percent of the surface. Included soils make up about 25 percent of this unit.

The available water capacity of this Dekalb soil is very low to moderate. Permeability is moderately rapid or rapid. Runoff is very rapid, and natural fertility is low. Where unlimed, this soil is strongly acid or very strongly acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

Slope makes this soil generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soil has moderately high or high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

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

The capability subclass is VIIe.

DmC—Dekalb extremely stony loam, 3 to 15 percent slopes. This soil is strongly sloping or gently sloping and is well drained. The areas are mostly on

ridgetops and benches, and stones cover 15 to 40 percent of the surface.

Typically, the surface layer is very dark brown channery loam about 4 inches thick. The subsurface layer is dark brown channery loam about 3 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin soils and moderately well drained Buchanan and Ernest soils. Also included are areas where stones cover less than 15 percent or more than 40 percent of the surface and soils that have slopes of 15 to 25 percent. Included soils make up about 25 percent of this unit.

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

The stones on the surface make this soil generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soil has moderately high potential productivity for trees, and most of the acreage is wooded. The stones on the surface limit the use of equipment.

Slope, the depth to bedrock, and the stones on the surface are the main limitations of this soil for community development.

The capability subclass is VIIs.

DmE—Dekalb extremely stony loam, 15 to 35 percent slopes. This soil is steep or moderately steep and is well drained. Most areas are on side slopes, and stones cover 15 to 40 percent of the surface.

Typically, the surface layer is very dark brown channery loam about 3 inches thick. The subsurface layer is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin soils and moderately well drained Buchanan and Ernest soils. Also included are areas where stones cover less than 15 percent of the surface and soils that have a reddish subsoil. Included soils make up about 25 percent of this unit.

The available water capacity of this Dekalb soil is very low to moderate. Permeability is moderately rapid or rapid. Runoff is rapid or very rapid, and natural fertility is low. Where unlimed, this soil is strongly acid or very strongly acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

Slope and the stones on the surface make this soil generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soil has moderately high to high potential productivity for trees, and most of the acreage is wooded. Slope and the stones on the surface limit the use of equipment.

Slope, the depth to bedrock, and the stones on the surface are the main limitations of this soil for community development.

The capability subclass is VIIs.

DmF—Dekalb extremely stony loam, 35 to 70 percent slopes. This soil is very steep and well drained. Most areas are on side slopes, and stones cover 15 to 40 percent of the surface.

Typically, the surface layer is very dark brown channery loam about 3 inches thick. The subsurface layer is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin soils and moderately well drained Buchanan and Ernest soils. Also included are areas where stones cover less than 15 percent or more than 40 percent of the surface, soils that have slopes less than 35 percent, and areas of rock outcrop. Included areas make up about 25 percent of this unit.

The available water capacity of this Dekalb soil is very low to moderate. Permeability is moderately rapid or rapid. Runoff is very rapid, and natural fertility is low. Where unlimed, this soil is strongly acid or very strongly acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

Slope and the stones on the surface make this soil generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soil has moderately high or high potential for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails on the contour helps to control this erosion. Slope and the stones on the surface limit the use of equipment.

Slope, the depth to bedrock, and the stones on the surface are the main limitations of this soil for community development.

The capability subclass is VIIs.

EnB—Ernest silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. Most areas are on alluvial fans and foot slopes.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 46 inches thick. In sequence downward, it is 5 inches of a yellowish brown channery silt loam; 9 inches of reddish yellow channery silt loam mottled with strong brown and

yellowish red; 10 inches of strong brown channery silty clay loam mottled with light brownish gray and yellowish red; and 22 inches of very firm and brittle, yellowish brown and strong brown very channery silt loam mottled with yellowish brown, light gray, yellowish red, and strong brown. The substratum is mottled, strong brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Gilpin soils, moderately well drained Buchanan soils, and poorly drained Atkins and Holly soils. Also included are soils that have a reddish subsoil, soils where stones cover 1 to 3 percent of the surface, soils that are less than 40 inches deep to bedrock, and soils that have slopes of 8 to 15 percent. Some areas have soils that are less acid in the subsoil than this Ernest soil. Included soils make up about 20 percent of this unit.

The available water capacity of this Ernest soil is moderate. Permeability is moderate above the brittle part of the subsoil and moderately slow or slow in the brittle part. Runoff is medium, and natural fertility is low or moderate. Where unlimed, this soil is strongly acid or very strongly acid. A seasonal high water table at a depth of about 1 1/2 to 3 feet restricts the root zone of some types of plants. The depth to bedrock generally is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is moderate in unprotected areas and is a management concern. Some places have small wet areas that need drainage for crops, and some other areas need diversions to intercept runoff from higher areas. Planting on the contour, using a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is reasonably firm are major pasture management needs.

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

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

The capability subclass is IIe.

EnC—Ernest silt loam, 8 to 15 percent slopes. This soil is strongly sloping and moderately well drained. Most areas are on foot slopes, along drainageways, and in coves. Drainageways dissect some areas.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 44 inches thick. In sequence downward, it is 5 inches of a yellowish brown channery silt loam; 9 inches of reddish yellow channery silt loam mottled with strong brown and yellowish red; 10 inches of strong brown channery silty clay loam mottled with light brownish gray and yellowish red; and 20 inches of very firm and brittle, yellowish brown and strong brown very channery silt loam mottled with yellowish brown, light gray, yellowish red, and strong brown. The substratum is mottled, strong brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Gilpin and Vandalia soils and moderately well drained Buchanan soils. Also included are other well drained soils, soils where stones cover 1 to 3 percent of the surface, poorly drained soils, and soils that are less acid in the subsoil and substratum than this Ernest soils. Included soils make up about 25 percent of this unit.

The available water capacity of this Ernest soil is moderate. Permeability is moderate above the brittle part of the subsoil and moderately slow or slow in the brittle part. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this soil is strongly acid or very strongly acid. A seasonal high water table at a depth of about 1 1/2 to 3 feet restricts the root zone of some types of plants. The depth to bedrock generally is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. Some places have small wet areas that need drainage for crops, and some other areas need diversions to intercept runoff from higher areas. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, maintaining sod in drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is reasonably firm are major pasture management needs.

This soil has high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a management concern, and placing roads and trails on the contour helps to control this erosion. The use of equipment is restricted during wet seasons because the soil is soft.

Slope, the seasonal high water table, and the moderately slow or slow permeability in the lower part of the subsoil are the main limitations of this soil for community development.

The capability subclass is IIIe.

EnD—Ernest silt loam, 15 to 25 percent slopes. This soil is moderately steep and moderately well drained. Most areas are on foot slopes, along drainageways, and in coves. Drainageways dissect some areas.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 44

inches thick. In sequence downward, it is 5 inches of a yellowish brown channery silt loam; 9 inches of reddish yellow channery silt loam mottled with strong brown and yellowish red; 10 inches of strong brown channery silty clay loam mottled with light brownish gray and yellowish red; and 20 inches of very firm and brittle, yellowish brown and strong brown very channery silt loam mottled with yellowish brown, light gray, yellowish red, and strong brown. The substratum is mottled, strong brown very channery loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Gilpin and Vandalia soils and moderately well drained Buchanan soils. Also included are poorly drained soils, soils with slopes of 25 to 35 percent, soils where stones cover 1 to 15 percent of the surface, and soils that do not have a very firm and brittle layer in the subsoil. Some areas have soils that are less acid in the subsoil and substratum than this Ernest soil. Included soils make up about 25 percent of this unit.

The available water capacity of this Ernest soil is moderate. Permeability is moderate above the brittle part of the subsoil and moderately slow or slow in the brittle part. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this soil is strongly acid or very strongly acid. A seasonal high water table at a depth of about 1 1/2 to 3 feet restricts the root zone of some types of plants. The depth to bedrock generally is more than 60 inches.

This soil has limited suitability for cultivated crops and is better suited to hay or pasture than to cultivated crops. The hazard of erosion is severe in unprotected areas and is a major management concern. In places, diversions are needed to intercept runoff from higher areas. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, maintaining sod in drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is reasonably firm are major pasture management needs.

The soil has high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment, and its use is further restricted during wet seasons because the soil is soft.

Slope, the seasonal high water table, and the moderately slow or slow permeability in the lower part of the subsoil are the main limitations of this soil for community development.

The capability subclass is IVe.

Fu—Fluvaquents and Udifluvents, frequently flooded. This unit consists of soils on flood plains mostly near the heads of streams in the eastern and southern parts of the survey area. Slopes range from 0 to 3 percent. Some areas consist mostly of somewhat poorly drained or poorly drained Fluvaquents, some mostly of well drained or moderately well drained Udifluvents, and some of both. The Fluvaquents and Udifluvents were mapped together because they have no major differences in use and management. The total acreage of the unit is about 40 percent Fluvaquents, 30 percent Udifluvents, and 30 percent other soils.

Fluvaquents and Udifluvents mostly consist of gray, brown, and yellow loamy material that is underlain in most places by gravel and cobblestones. The depth to bedrock is at least 20 inches. The loamy material in the Fluvaquents generally is mottled.

Included with this unit in mapping are well drained Pope soils, moderately well drained Buchanan and Ernest soils, moderately well drained Philo soils, and poorly drained Atkins soils. Also included are soils that are shallow to bedrock and soils with a very gravelly or very cobbly subsoil.

The available water capacity, permeability, and natural fertility of Fluvaquents and Udifluvents are variable. Where unlimed, the soils are strongly acid or very strongly acid.

A severe hazard of flooding and the variability of soil properties make these soils poorly suited to farming or most uses other than for pasture or wildlife habitat.

This unit is not assigned to a capability subclass.

GaB—Gilpin silt loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. Most areas are on broad ridgetops in the eastern and southern parts of the survey area.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is yellowish brown and strong brown silt loam about 19 inches thick. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 32 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb and Lily soils. Also included are soils that are more than 40 inches deep to bedrock, soils that have a subsoil or silty clay or a surface layer of channery silt loam, and soils that are mottled in the lower part of the subsoil and in the substratum. In some areas erosion has removed most of the original surface layer. Included soils make up about 25 percent of this unit.

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

This soil is suited to cultivated crops and to hay and pasture and has high potential productivity for trees. The hazard of erosion is moderate in unprotected areas and

is a management concern. Planting on the contour, using a crop sequence that includes hay, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

The depth to bedrock is the main limitation of this soil for community development.

The capability subclass is IIe.

GaC—Gilpin silt loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. Most areas are on rounded ridgetops in the eastern and southern parts of the survey area.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is yellowish brown and strong brown silt loam about 18 inches thick. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 32 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb and Lily soils. Also included are soils that are more than 40 inches deep to bedrock, soils that have a subsoil of silty clay or a surface layer of channery silt loam, and soils that are mottled in the lower part of the subsoil and in the substratum. In some areas erosion has removed most of the original surface layer. Included soils make up about 25 percent of this 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, this soil is strongly acid to extremely acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to hay and pasture and has high potential productivity for trees. The hazard of erosion is severe in unprotected areas and is a management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

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

The capability subclass is IIIe.

GaD—Gilpin silt loam, 15 to 25 percent slopes. This soil is moderately steep and well drained. Most areas are on ridgetops and side slopes in the eastern and southern parts of the survey area.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is yellowish brown and strong brown silt loam about 18 inches thick. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 32 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb, Lily, and Westmoreland soils and moderately well drained Buchanan and Ernest soils. Also included are soils that are more than 40 inches deep to bedrock, soils that have a subsoil of silty clay or a surface layer of channery silt loam, and soils that are mottled in the lower part of the subsoil and in the substratum. In some areas, erosion has removed most of the original surface layer. Included soils make up about 25 percent of this map 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, this soil is strongly acid to extremely acid. The root zone of some types of plants is 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 or pasture than to cultivated crops. The hazard of erosion is severe in unprotected areas and is a major management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, maintaining sod in drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

This soil has a moderately high or high potential productivity for trees. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

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

The capability subclass is IVe.

GbC—Gilpin channery silt loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. Most areas are on rounded ridgetops in the eastern and southern parts of the survey area.

Typically, the surface layer is brown channery silt loam about 6 inches thick. The subsoil is about 18 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 10 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 32 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb and Lily soils and moderately well drained Buchanan and Ernest soils. Also included are soils that are more than 40 inches deep to bedrock, soils that have a subsoil of silty clay, other moderately well drained soils, and soils that have fewer rock fragments in the surface layer than this Gilpin soil. In some areas erosion has removed most of the original surface layer, and in some others stones cover 1 to 3

percent of the surface. Included soils make up about 20 percent of this 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, this soil is strongly acid to extremely acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to hay and pasture and has high productivity potential for trees. The hazard of erosion is severe in unprotected areas and is a management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

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

The capability subclass is IIIe.

GbD—Gilpin channery silt loam, 15 to 25 percent slopes. This soil is moderately steep and well drained. Most areas are on ridgetops and side slopes in the eastern and southern parts of the survey area. Drainageways dissect some areas.

Typically, the surface layer is brown channery silt loam about 6 inches thick. The subsoil is about 18 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 10 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 32 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb soils and moderately well drained Buchanan and Ernest soils. Also included are areas where stones cover 1 to 3 percent of the surface, soils that have fewer rock fragments in the surface layer than this Gilpin soil, and areas where erosion has removed most of the original surface layer. Included soils make up about 25 percent of this 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, this soil is strongly acid to extremely acid. The root zone of some types of plants is 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 or pasture than to cultivated crops. The hazard of erosion is severe in unprotected areas and is a major management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, maintaining sod in drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

This soil has moderately high or high potential productivity for trees. Erosion on logging roads and skid trails is a major management concern. Placing roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

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

The capability subclass is IVe.

GbE—Gilpin channery silt loam, 25 to 35 percent slopes. This soil is steep and well drained. Most areas are on side slopes in the eastern and southern parts of the survey area.

Typically, the surface layer is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb soils and moderately well drained Buchanan and Ernest soils. Also included are soils that are more than 40 inches deep to bedrock, soils that have fewer rock fragments in the surface layer than this Gilpin soil, and soils with a subsoil of silty clay. In some areas erosion has removed most of the original surface layer, and in some others stones cover 1 to 3 percent of the surface. Included soils make up about 25 percent of this unit.

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

Slope makes this soil generally unsuited to cultivated crops or hay, but the soil is suited to pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

This soil has moderately high or high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

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

The capability subclass is VIe.

GbF—Gilpin channery silt loam, 35 to 65 percent slopes. This soil is very steep and well drained. Most

areas are on side slopes in the eastern and southern parts of the survey area.

Typically, the surface layer is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb soils and moderately well drained Buchanan and Ernest soils. Also included are areas where stones cover 1 to 3 percent of the surface, soils that have fewer rock fragments in the surface layer than this Gilpin soil, soils with a subsoil of silty clay, and areas where erosion has removed most of the original surface layer. Included soils make up about 25 percent of this unit.

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

Slope makes this soil generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soil has moderately high or high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

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

The capability subclass is VIIe.

GcC—Gilpin stony silt loam, 3 to 15 percent slopes. This soil is strongly sloping or gently sloping and is well drained. Most areas are on ridgetops in the southern part of the county. Stones cover 1 to 3 percent of the surface.

Typically, the surface layer is very dark grayish brown and dark brown channery silt loam about 5 inches thick. The subsoil is about 18 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 10 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 32 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb, Lily, and Upshur soils. Also included are soils that are more than 40 inches deep to bedrock, soils that have a subsoil of silty clay, and moderately well drained soils. Some areas do not have stones on the surface, and in some other areas erosion has removed much of the original surface layer. Included soils make up about 30 percent of this unit.

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

The stones on the surface restrict the use of farm machinery and make this soil generally unsuited to cultivated crops or hay. The soil is suited to pasture, and many areas are used for pasture. The hazard of erosion is moderate or severe in unprotected areas and is a management concern. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

This soil has high potential productivity for trees, and many areas are wooded.

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

The capability subclass is VIs.

GcE—Gilpin stony silt loam, 15 to 35 percent slopes. This soil is steep and moderately steep and is well drained. Most areas are on side slopes in the southern part of the county. Stones cover 1 to 3 percent of the surface.

Typically, the surface layer is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb, Lily, and Upshur soils and moderately well drained Buchanan and Ernest soils. Also included are soils that are more than 40 inches deep to bedrock and soils that have a subsoil of silty clay. In some areas erosion has removed most of the original surface layer. Some areas have boulders on the surface, and some do not have stones on the surface. Included soils make up about 30 percent of this unit.

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

Slope and the stones on the surface make this soil generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soil has moderately high or high potential productivity for trees, and many areas are wooded. Erosion on logging roads and skid trails is a major management concern, and placing the roads and skid trails on the contour helps to control this erosion. Slope restricts the use of equipment.

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

The capability subclass is VIIs.

GcF—Gilpin stony silt loam, 35 to 65 percent slopes. This soil is very steep and well drained. Most areas are on side slopes in the southern part of the county. Stones cover 1 to 3 percent of the surface.

Typically, the surface layer is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb, Lily, and Upshur soils and moderately well drained Buchanan and Ernest soils. Also included are soils that are more than 40 inches deep to bedrock, soils that have a subsoil of silty clay, and soils where stones cover 3 to 15 percent of the surface. In some areas erosion has removed most of the original surface layer. Some areas have boulders on the surface, and some do not have stones on the surface. Included soils make up about 30 percent of this unit.

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

Slope and the stones on the surface make this soil generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soil has moderately high or high potential productivity for trees, and many areas are wooded. Erosion on logging roads and skid trails is a major managment concern, and placing the roads and trails on the contour helps to control this erosion. Slope restricts the use of equipment.

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

The capability subclass is VIIs.

GdE—Gilpin-Dekalb complex, 15 to 35 percent slopes. This unit consists of steep or moderately steep, well drained soils mostly on side slopes. The Gilpin and Dekalb soils are so intermingled that it was not practical to map them separately. The unit is about 55 percent Gilpin channery silt loam, 25 percent Dekalb channery loam, and 20 percent other soils.

Typically, the surface layer of the Gilpin soils is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of 30 inches.

Typically, the surface layer of the Dekalb soils is very dark brown channery loam about 3 inches thick. The subsurface layer is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with these soils in mapping are a few small areas of moderately well drained Buchanan and Ernest soils. Also included are soils where stones cover up to 50 percent of the surface, soils that have slopes of less than 15 percent or more than 35 percent, and areas of rock outcrop.

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

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

Slopes makes these soils generally unsuited to cultivated crops or hay, but the soils are suited to pasture. The hazard of erosion is severe or very severe in unprotected areas and is a major management concern. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

These soils have moderately high or high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern on the Gilpin soil. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

Slope and the depth to bedrock are the main limitations of these soils for community development.

The capability subclass is VIe.

GdF—Gilpin-Dekalb complex, 35 to 70 percent slopes. This unit consists of very steep, well drained soils on side slopes. The Gilpin and Dekalb soils are so intermingled that it was not practical to map them separately. The unit is about 50 percent Gilpin channery silt loam, 30 percent Dekalb channery loam, and 20 percent other soils.

Typically, the surface layer of the Gilpin soils is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Typically, the surface layer of the Dekalb soils is very dark brown channery loam about 3 inches thick. The

subsurface layer is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with these soils in mapping are a few small areas of the moderately well drained Buchanan and Ernest soils. Also included are soils where stones cover up to 50 percent of the surface, soils with boulders on the surface, soils that have slopes of less than 35 percent, and areas of rock outcrop.

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

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

Slope makes these soils generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soils have moderately high or high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of some types of equipment.

Slope and the depth to bedrock are the main limitations of these soils for community development.

The capability subclass is VIIe.

GkC—Gilpin-Dekalb complex, stony, 3 to 15 percent slopes. This unit consists of strongly sloping to gently sloping, well drained soils on benches and ridgetops. Stones 1 to 2 feet in diameter cover 1 to 3 percent of the surface of the soils. The Gilpin and Dekalb soils are so intermingled that it was not practical to map them separately. This unit is about 60 percent Gilpin channery silt loam, 25 percent Dekalb channery loam, and 15 percent other soils.

Typically, the surface layer of the Gilpin soils is very dark grayish brown and dark brown channery silt loam about 5 inches thick. The subsoil is about 18 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 10 inches is strong brown silt loam and channery silt 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 Dekalb soils is very dark brown channery loam about 4 inches thick. The subsurface layer is dark brown channery loam about 3 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with these soils in mapping are a few small areas of well drained Lily soils and moderately well drained Buchanan and Ernest soils. Also included are soils that do not have stones on the surface, soils where stones cover 3 to 50 percent of the surface, and soils that have slopes of more than 15 percent.

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

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

The stones on the surface limit the use of farm machinery and make these soils generally unsuited to cultivated crops or hay, but the soils are suited to pasture. The hazard of erosion is moderate to severe in unprotected areas and is a management concern. The use of proper stocking rates and the use of rotational grazing are major pasture management needs.

These soils have moderately high potential productivity for trees, and most areas are wooded.

Slope and the depth to bedrock are the main limitations of these soils for community development.

The capability subclass is VIs.

GkE—Gilpin-Dekalb complex, stony, 15 to 35 percent slopes. This unit consists of steep or moderately steep, well drained soils mostly on side slopes. Stones 1 to 2 feet in diameter cover 1 to 3 percent of the surface of the soils. The Gilpin and Dekalb soils are so intermingled that it was not practical to map them separately. This unit is about 55 percent Gilpin channery silt loam, 25 percent Dekalb channery loam, and 20 percent other soils.

Typically, the surface layer of the Gilpin soils is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Typically, the surface layer of the Dekalb soils is very dark brown channery loam about 3 inches thick. The subsurface layer is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown very channery sandy loam about 23 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with these soils in mapping are a few small areas of Buchanan and Ernest soils. Also included are soils that do not have stones on the surface, soils where stones cover 3 to 50 percent of the surface, soils that have slopes of less than 15 percent or more than 35 percent, and areas of rock outcrop.

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

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

Slope and the stones on the surface make soils generally unsuited to cultivated crops or hay and difficult to manage for pasture. Most areas are wooded, and the soils have moderately high or high potential productivity for trees. Erosion on logging roads and skid trails is a major management concern, especially on the Gilpin soil. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

Slope and the depth to bedrock are the main limitations of these soils for community development.

The capability subclass is VIIs.

GkF—Gilpin-Dekalb complex, stony, 35 to 70 percent slopes. This unit consists of very steep, well drained soils on side slopes. Stones 1 to 2 feet in diameter cover 1 to 3 percent of the surface of the soils. The Gilpin and Dekalb soils are so intermingled that it was not practical to map them separately. This unit is about 60 percent Gilpin channery silt loam, 25 percent Dekalb channery loam, and 15 percent other soils.

Typically, the surface layer of the Gilpin soils is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Typically, the surface layer of the Dekalb soils is very dark brown channery loam about 3 inches thick. The subsurface layer is dark brown channery loam about 2 inches thick. The subsoil is yellowish brown very channery sandy loam about 21 inches thick. The substratum is yellowish brown very channery sandy loam that extends to bedrock at a depth of about 33 inches.

Included with these soils in mapping are a few small areas of moderately well drained Buchanan and Ernest soils. Also included are soils that do not have stones on the surface, soils where stones cover 3 to 50 percent of the surface, and soils that have slopes of 15 to 35 percent.

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

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

Slope and the stones on the surface make these soils generally unsuited to cultivated crops or hay and difficult to manage for pasture. Most areas are wooded, and the soils have moderately high or high potential productivity for trees. Erosion on logging roads and skid trails is a major management concern, especially on the Gilpin soil. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

Slope and the depth to bedrock are the main limitations of these soils for community development.

The capability subclass is VIIs.

GuC—Gilpin-Upshur silt loams, 8 to 15 percent slopes. The soils in this unit are strongly sloping and well drained. They are on ridgetops and benches in the northwestern and western parts of the survery area. The Gilpin and Upshur soils in this complex are so intermingled that it was not practical to map them separately. The unit is about 50 percent Gilpin soils, 30 percent Upshur soils, and 20 percent other soils.

Typically, the surface layer of the Gilpin soils is brown silt loam about 6 inches thick. The subsoil is yellowish brown and strong brown silt loam about 18 inches thick. 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 soils is dark reddish brown silt loam about 6 inches thick. The subsoil is reddish brown and is about 27 inches thick. The upper 22 inches is silty clay, and the lower 5 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of about 52 inches.

Included with these soils in mapping are a few small areas of well drained Lily, Westmoreland, and Vandalia soils and moderately well drained Ernest soils. Also included are soils where erosion has removed most of the original surface layer and soils where stones cover 1 to 3 percent of the surface. Some small areas consist of soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock or soils similar to this Upshur soil but that are less than 40 inches deep to bedrock.

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, this soil is strongly acid to extremely acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this soil is strongly acid to neutral. The subsoil has a high shrink-swell potential. The depth to bedrock is more than 40 inches.

The soils in this unit are suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. The Upshur soil is difficult to cultivate, and puddles form on the surface if the soil is tilled when it is too wet. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, maintaining sod in shallow drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm are the main pasture management needs.

These soils have moderately high or high potential productivity for trees, and some of the acreage is wooded. Erosion on logging roads and skid trails is a management concern on the Upshur soil. Placing the roads and trails on the contour helps to control this erosion. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope and the depth to bedrock of the Gilpin soil and the high shrink-swell potential, slow permeability, slope, low strength, and slip hazard of the Upshur soil are the main limitations of the unit for community development.

The capability subclass is IIIe.

GuD—Gilpin-Upshur silt loams, 15 to 25 percent slopes. The soils in this unit are moderately steep and well drained. They are on ridgetops, benches, and side slopes in the northwestern and western parts of the survey area. The benches commonly are dissected by drainageways, and land slips are in places. The Gilpin and Upshur soils are so intermingled that it was not practical to map them separately. The complex is about 50 percent Gilpin soils, 30 percent Upshur soils, and 20 percent other soils.

Typically, the surface layer of the Gilpin soils is very dark grayish brown and dark brown channery silt loam about 4 inches thick. The subsoil is about 17 inches thick. The upper 8 inches is yellowish brown silt loam, and the lower 9 inches is strong brown silt loam and channery silt loam. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Typically, the surface layer of the Upshur soils is dark reddish brown silt loam about 6 inches thick. The subsoil is reddish brown and is about 27 inches thick. The upper 22 inches is silty clay, and the lower 5 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of about 52 inches.

Included with these soils in mapping are a few small areas of well drained Vandalia and Westmoreland soils and moderately well drained Ernest soils. Also included are soils where erosion has removed most of the original surface layer, soils where stones cover 1 to 3 percent of the surface, and mottled soils that have a subsoil of silty clay. Some small areas consist of soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock and soils that are similar to this Upshur soil but that are less than 40 inches deep to bedrock.

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, this soil is strongly acid to extremely acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow. Runoff is rapid, and natrual fertility is moderate or high. Where unlimed, this soil is strongly acid to neutral. The subsoil has a high shrink-swell potential. The depth to bedrock is more than 40 inches.

The soils in this unit have limited suitability for cultivated crops and are better suited to hay and pasture than to cultivated crops. The hazard of erosion is severe in unprotected areas and is a major management concern. The Upshur soil is difficult to cultivate, and puddles form on the surface if the soil is tilled when it is too wet. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, maintaining sod in shallow drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the Upshur soil is reasonably firm are major pasture management needs.

The soils have moderate to high potential productivity for trees, and about half of the acreage is wooded. Erosion on logging roads and skid trails is the major management concern, and placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment, and its use is further limited on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope and the depth to bedrock of the Gilpin soil and the high shrink-swell potential, slow permeability, slope, low strength, and slip hazard of the Upshur soil are the main limitations of the unit for community development.

The capability subclass is IVe.

GuE—Gilpin-Upshur silt loams, 25 to 35 percent slopes. The soils in this unit are steep and well drained.

They are on side slopes and narrow ridgetops in the northwestern and western parts of the survey area. The side slopes commonly are dissected by drainageways, and landslips are in places. The Gilpin and Upshur soils are so intermingled that it was not practical to map them separately. The unit is about 50 percent Gilpin soils, 25 percent Upshur soils, and 25 percent other soils.

Typically, the surface layer of the Gilpin soils is very dark grayish brown and dark brown silt loam about 5 inches thick. The subsoil is brown and strong brown silt loam 17 inches thick. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Typically, the surface layer of the Upshur soil is dark brown and reddish brown silt loam about 5 inches thick. The subsoil is reddish brown and is 25 inches thick. The upper 19 inches is silty clay, and the lower 6 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of about 50 inches.

Included with these soils in mapping are small areas of well drained Vandalia and Westmoreland soils and moderately well drained Ernest soils. Also included are soils where erosion has removed most of the original surface layer, soils where stones cover 1 to 15 percent of the surface layer, and soils that have slopes of less than 15 percent or more than 35 percent. Some small areas consist of soils that are similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils that are similar to this Upshur soil but that are less than 40 inches deep to bedrock, and rock outcrop.

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

The available water capacity of this Upshur soil is moderate or high. Permeability is slow. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, this soil is strongly acid to neutral. The subsoil has a high shrink-swell potential. The depth to bedrock is more than 40 inches.

Slope makes these soils generally unsuited to cultivated crops or hay, but the soils are suited to pasture. The erosion hazard is very severe in unprotected areas and is a major management concern. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing in the spring until the Upshur soils are reasonably firm are major pasture management needs.

These soils have moderate to high potential productivity for trees, and about two-thirds of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment, and its use is further restricted on the Upshur soil during wet seasons because the soil is soft and slippery when wet.

Slope and the depth to bedrock of the Gilpin soil and the high shrink-swell potential, slope, low strength, and slip hazard of the Upshur soil are the main limitations of this unit for community development.

The capability subclass is VIe.

GuF—Gilpin-Upshur silt loams, 35 to 65 percent slopes. The soils in this unit are very steep and well drained. They are on side slopes and narrow ridgetops in the northwestern and western parts of the survey area. The side slopes commonly are dissected by drainageways, and landslips are in places. The Gilpin and Upshur soils are so intermingled that it was not practical to map them separately. The unit is about 50 percent Gilpin soils, 25 percent Upshur soils, and 25 percent other soils.

Typically, the surface layer of the Gilpin soils is very dark grayish brown and dark brown silt loam about 5 inches thick. The subsoil is brown and strong brown silt loam 17 inches thick. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Typically, the surface layer of the Upshur soil is dark brown and reddish brown silt loam about 5 inches thick. The subsoil is reddish brown and is 25 inches thick. The upper 19 inches is silty clay, and the lower 6 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of about 50 inches.

Included with these soils in mapping are a few small areas of well drained Vandalia and Westmoreland soils and moderately well drained Ernest soils. Also included are soils that are similar to this Gilpin soil but that are less than 20 inches deep to bedrock and soils that are similar to this Upshur soil but that are less than 40 inches deep to bedrock. Some small areas consist of soils where erosion has removed most of the original surface layer, soils with gullies, soils where stones cover 1 to 15 percent of the surface, and rock outcrop.

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

The available water capacity of this Upshur soil is moderate or high. Permeability is slow. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, this soil is strongly acid to neutral. The subsoil has a high shrink-swell potential. The depth to bedrock is more than 40 inches.

Slope makes these soils generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soils have moderate to high potential productivity for trees, and about three-fourths of the

acreage is wooded. Erosion on logging roads and skid trails is the major management concern, and placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment.

Slope and the depth to bedrock of the Gilpin soils and the high shrink-swell potential, slow permeability, slope, low strength, and slip hazard of the Upshur soils are the main limitations of this unit for community development.

The capability subclass is VIIe.

GwC3—Gilpin-Upshur complex, 8 to 15 percent slopes, severely eroded. The soils in this unit are strongly sloping and well drained. They are on ridgetops and benches in the northwestern and western parts of the survey area. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. The Gilpin and Upshur soils in this complex are so intermingled that it was not practical to map them separately. The unit is about 50 percent Gilpin silt loam, 30 percent Upshur silty clay loam, and 20 percent other soils.

Typically, the surface layer of the Gilpin soils is brown silt loam about 5 inches thick. The subsoil is yellowish brown and strong brown silt loam about 16 inches thick. The substratum is strong brown very channery silt loam that extends to bedrock at a depth of about 30 inches.

Typically, the surface layer of the Upshur soils is reddish brown silty clay loam about 5 inches thick. The subsoil is reddish brown and is about 26 inches thick. The upper 21 inches is silty clay, and the lower 5 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of about 50 inches.

Included with these soils in mapping are a few small areas of well drained Lily, Westmoreland, and Vandalia soils and moderately well drained Ernest soils. Also included are soils that are less eroded than these Gilpin and Upshur soils and areas where stones cover 1 to 3 percent of the surface layer. A few small areas consist of soils that are similar to this Gilpin soil but that are less than 20 inches deep to bedrock and soils that are similar to this Upshur soil but that are less than 40 inches deep to bedrock.

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, this soil is strongly acid to extremely acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this soil is strongly acid to neutral. The subsoil has a high shrink-swell potential. The depth to bedrock is more than 40 inches.

The soils in this unit have limited suitability for cultivated crops and are better suited to hay and pasture than to cultivated crops. The hazard of erosion is very severe in unprotected areas and is a management concern. These soils have poor tilth, and erosion of the original surface layer has removed most of the organic matter and many nutrients, causing poor germination. The Upshur soil is difficult to cultivate, and puddles form on the surface if the soil is tilled when it is too wet. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, maintaining sod in shallow drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, seeding of bare areas, and deferment of grazing until the Upshur soil is reasonably firm are major pasture management needs.

These soils have moderately high or high potential productivity for trees, and some areas are wooded. Erosion on logging roads and skid trails is a management concern on the Upshur soil. Placing the roads and skid trails on the contour helps to control this erosion. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope and the depth to bedrock of the Gilpin soil and the high shrink-swell potential, slow permeability, slope, low strength, and slip hazard of the Upshur soil are the main limitations of this unit for community development.

The capability subclass is IVe.

GwD3—Gilpin-Upshur complex, 15 to 25 percent slopes, severely eroded. The soils in this unit are moderately steep and well drained. They are on side slopes, ridgetops, and benches in the northwestern and western parts of the survey area. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. The benches commonly are dissected by drainageways, and landslips are common in places. The Gilpin and Upshur soils are so intermingled that it was not practical to map them separately. The unit is about 55 percent Gilpin silt loam, 30 percent Upshur silty clay loam, and 15 percent other soils.

Typically, the surface layer of the Gilpin soils is brown silt loam about 5 inches thick. The subsoil is yellowish brown and strong brown silt loam about 17 inches thick. The substratum is strong brown channery silt loam that extends to bedrock at a depth of about 30 inches.

Typically, the surface layer of the Upshur soils is reddish brown silt loam about 5 inches thick. The subsoil is reddish brown and is about 25 inches thick. The upper 20 inches is silty clay, and the lower 5 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of 50 inches.

Included with these soils in mapping are a few small areas of well drained Vandalia and Westmoreland soils and moderately well drained Ernest soils. Also included are areas where stones cover 1 to 3 percent of the

surface, gullied areas, and areas of rock outcrop. Some small areas consist of soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock and soils similar to this Upshur soil but that are less than 40 inches deep to bedrock.

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 root zone of some types of plants is 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. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this soil is strongly acid to neutral. The subsoil has a high shrink-swell potential. The depth to bedrock is more than 40 inches.

Slope and erosion make the soils in this unit generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soils have poor tilth, and erosion of the original surface layer has removed most of the organic matter and many plant nutrients, causing poor germination.

The soils have moderate to high potential productivity for trees, and half of the acreage is wooded. Erosion of the original surface layer has removed most of the organic matter and many nutrients, making the surface layer firm and dry and causing poor germination. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment, and its use is further limited on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope and the depth to bedrock of the Gilpin soil and the high shrink-swell potential, slow permeability, slope, low strength, and slip hazard of the Upshur soil are the main limitations of this unit for community development.

The capability subclass is VIIe.

GwE3—Gilpin-Upshur complex, 25 to 35 percent slopes, severely eroded. The soils in this unit are steep and well drained. They are on side slopes and narrow ridgetops in the northwestern and western parts of the survey area. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. The side slopes commonly are dissected by drainageways, and landslips are common in places. The Gilpin and Upshur soils are so intermingled that it was not practical to map them separately. The unit 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 soils is brown silt loam about 4 inches thick. The subsoil is yellowish brown and strong brown silt loam about 16 inches thick. The substratum is strong brown channery silt loam that extends to bedrock at a depth of about 28 inches.

Typically, the surface layer of the Upshur soils is reddish brown silty clay loam about 4 inches thick. The subsoil is reddish brown and is about 24 inches thick. The upper 18 inches is silty clay, and the lower 6 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of 48 inches.

Included with these soils in mapping are a few small areas of well drained Vandalia and Westmoreland soils and moderately well drained Ernest soils. Also included areas where stones cover 1 to 15 percent of the surface layer, soils that have slopes of less than 25 percent or more than 35 percent, gullied areas, and areas of rock outcrop. Some small areas consist of soils that are similar to this Gilpin soil but that are less than 20 inches deep to bedrock and soils that are similar to this Upshur soil but that are less than 40 inches deep to bedrock.

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

The available water capacity of this Upshur soil is moderate or high. Permeability is slow. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, this soil is strongly acid to neutral. The subsoil has a high shrink-swell potential. The depth to bedrock is more than 40 inches.

Slope and erosion make the soils in this unit generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soils have moderate to high potential productivity for trees, and about three-fourths of the acreage is wooded. Erosion of the original surface layer has removed most of the organic matter and many nutrients, making the surface layer firm and dry and causing poor germination. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment, and its use is further limited on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope and the depth to bedrock of the Gilpin soil and the high shrink-swell potential, slow permeability, slope, low strength, and slip hazard of the Upshur soil are the main limitations of this unit for community development.

The capability subclass is VIIe.

LyB—Lily loam, 3 to 8 percent slopes. This soil is gently sloping and well drained. Most areas are on broad ridgetops mainly in the eastern and southern parts of the survey area.

Typically, the surface layer is very dark grayish brown loam about 2 inches thick. The subsurface layer is yellowish brown loam about 3 inches thick. The subsoil is 29 inches thick. The upper 7 inches is yellowish brown loam, the middle 13 inches is strong brown clay loam

and loam, and the lower 9 inches is yellowish brown channery loam. The substratum is yellowish brown very channery loam that extends to bedrock at a depth of about 37 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb and Gilpin soils and moderately well drained Ernest soils. Also included are soils that are less than 20 inches deep to bedrock, soils that have more clay in the subsoil than this Lily soil, and soils where stones cover 1 to 3 percent of the surface. Included soils make up about 15 percent of the unit.

The available water capacity of this Lily soil is low to moderate. Permeability is moderately rapid. Runoff is medium, and natural fertility is low or moderate. Where unlimed, this soil is strongly acid to extremely acid. The root zone of some types of plants is restricted by bedrock at a depth of 20 to 40 inches.

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

The depth to bedrock is the main limitation of this soil for community development.

The capability subclass is IIe.

LyC—Lily loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. Most areas are on ridgetops mainly in the eastern and southern parts of the area.

Typically, the surface layer is very dark grayish brown loam about 2 inches thick. The subsurface layer is yellowish brown loam about 3 inches thick. The subsoil is 29 inches thick. The upper 7 inches is yellowish brown loam, the middle 13 inches is strong brown clay loam and loam, and the lower 9 inches is yellowish brown channery loam. The substratum is yellowish brown very channery loam that extends to bedrock at a depth to about 37 inches.

Included with this soil in mapping are a few small areas of well drained Dekalb and Gilpin soils and moderately well drained Ernest soils. Also included are soils that are less than 20 inches deep to bedrock, soils that have more clay in the subsoil than this Lily soil, and soils where stones cover 1 to 3 percent of the surface. Included soils make up about 15 percent of the unit.

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

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking and the use of rotational grazing are major pasture management needs.

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

The capability subclass is IIIe.

MoB—Monongahela silt loam, 3 to 8 percent slopes. This soil is gently sloping and moderately well drained. The areas are on high terraces mainly along the Buckhannon River.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 35 inches thick. The upper 17 inches is yellowish brown silt loam. The lower 18 inches is very firm and brittle, reddish yellow silt loam and loam mottled with light brownish gray and yellowish red. The substratum is strong brown, brownish yellow, and light gray gravelly clay loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chavies and Pope soils and moderately well drained Philo soils and a few areas of Udorthents, loamy. Also included are soils that are less than 60 inches deep to bedrock and somewhat poorly drained soils. Included soils make up about 15 percent of this unit.

The available water capacity of this Monongahela soil is moderate. Permeability is moderate above the brittle part of the subsoil and moderately slow or slow in the brittle part. Runoff is medium, and natural fertility is low. Where unlimed, this soil is strongly acid or very strongly acid. A seasonal high water table about 1 1/2 to 3 feet below the surface restricts the root zone of some types of plants. The depth to bedrock is generally more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Some small wet areas need drainage in order to be suitable for crops. Cultivating on the contour, using a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil sometimes is soft during wet seasons.

The seasonal high water table and the moderately slow or slow permeability in the firm part of the subsoil

are the main limitations of this soil for community development.

The capability subclass is IIe.

MoC—Monongahela silt loam, 8 to 15 percent slopes. This soil is strongly sloping and moderately well drained. The soil is mainly on the outer edges of high terraces along the Buckhannon River. Drainageways dissect some areas.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 34 inches thick. The upper 17 inches is yellowish brown silt loam. The lower 17 inches is very firm and brittle, reddish yellow silt loam and loam mottled with light brownish gray and yellowish red. The substratum is strong brown, brownish yellow, and light gray gravelly clay loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chavies soils and Udorthents, loamy. Also included are soils that are less than 60 inches deep to bedrock and somewhat poorly drained soils. Included soils make up about 15 percent of this unit.

The available water capacity of this Monongahela soil is moderate. Permeability is moderate above the brittle part of the subsoil and moderately slow or slow in the brittle part. Runoff is rapid, and natural fertility is low. Where unlimed, this soil is strongly acid to very strongly acid. A seasonal high water table about 1 1/2 to 3 feet below the surface restricts the root zone of some types of plants. The depth to bedrock is generally more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, delaying cultivation until the soil is reasonably dry, maintaining sod in drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a management concern. Placing the roads and trails on the contour helps to control this erosion. This soil sometimes is soft during wet seasons.

Slope, the seasonal high water table, and the moderately slow or slow permeability in the firm part of the subsoil are the main limitations of this soil for community development.

The capability subclass is IIIe.

Oh—Orrville-Holly silt loams. The soils in this unit are nearly level and are subject to occasional flooding. These soils are mostly along the major streams and their tributaries in the northern and western parts of the survey. Many areas are dissected by abandoned stream channels. The soils are so intermingled that it was not practical to map them separately. The unit is about 45 percent somewhat poorly drained Orrville soils, 25 percent poorly drained Holly soils, and 30 percent other soils. Slopes range from 0 to 3 percent.

Typically, the surface layer of the Orrville soils is dark grayish brown silt loam about 6 inches thick. The subsoil is about 25 inches thick. The upper 10 inches is brown silt loam mottled with yellowish brown and grayish brown. The lower 15 inches is grayish brown silt loam mottled with yellowish brown and strong brown. The substratum is mottled, dark grayish brown silt loam that extends to a depth of 60 inches or more.

Typically, the surface layer of the Holly soils is dark grayish brown silt loam about 6 inches thick. The subsoil is 28 inches thick. The upper 17 inches is dark grayish brown silt loam mottled with dark brown and strong brown. The lower 11 inches is dark gray loam mottled with strong brown and dark brown. The substratum is mottled and dark gray and extends to a depth of 60 inches or more. The upper part is loam, and the lower part is loam and thin layers of sandy loam.

Included with these soils in mapping are a few small areas of well drained Pope and Vandalia soils, moderately well drained Philo and Ernest soils, and poorly drained Atkins soils. Also included are soils with a reddish subsoil, soils with a subsoil of silty clay loam or silty clay, poorly drained soils that have a gravelly subsoil, and areas that have overwash from surface-mined areas.

The available water capacity is high in this Orrville soil. Permeability is moderate. Runoff is slow or medium, and natural fertility is high. Where unlimed, the Orrville soil is slightly acid to strongly acid. A seasonal high water table at a depth of 1 to 2 1/2 feet restricts the root zone of some types of plants. The depth to bedrock is generally more than 60 inches.

The available water capacity is high in this Holly soil. Permeability is moderate or moderately slow. Runoff is slow, and water is ponded on the surface of some areas. Natural fertility is moderate or high. Where unlimed, the Holly soil is slightly acid to strongly acid. A seasonal high water table at or near the surface restricts the root zone of many types of plants. The depth to bedrock is generally more than 60 inches.

These soils are suited to cultivated crops but are better suited to hay or pasture plants that tolerate wetness. The soils are used mostly for pasture. Both soils need artificial drainage for cultivated crops, and the Holly soils need drainage for hay and pasture; however, some areas lack suitable outlets. Conservation tillage, delaying tillage until the soils are reasonably dry, and using crop residue are practices in cultivated areas that help to increase fertility and tilth. The use of proper

Figure 3.—Flooding in an area of Philo-Atkins silt loams near the Buckhannon River.

stocking rates, the use of rotational grazing, and deferment of grazing until the soil is reasonably firm are major pasture management needs.

The soils in this unit have high potential productivity for trees that tolerate wetness, 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, the seasonal high water table, and the moderate or moderately slow permeability are the main limitations of these soils for community development.

The capability subclass is IIIw.

Pa—Philo-Atkins silt loams. This unit consists of nearly level soils on flood plains that are subject to common flooding (fig. 3). These soils are mostly along the major streams and their tributaries in the eastern and southern parts of the survey area. The soils are so intermingled that it was not practical to map them separately. The unit is about 45 percent moderately well drained Philo soils, 30 percent poorly drained Atkins soils, and 25 percent other soils. Slopes range from 0 to 3 percent.

Typically, the surface layer of the Philo soils is dark grayish brown silt loam about 5 inches thick. The subsoil is 17 inches thick. It is dark brown loam that is mottled in the lower 13 inches. The substratum extends to a depth of 60 inches or more. The upper part is brown, mottled sandy loam, and the lower part is gray loamy sand.

Typically, the surface layer of the Atkins soils is dark grayish brown silt loam about 8 inches thick. The subsoil is 25 inches thick, is light brownish gray, and is mottled with yellowish brown. The upper 11 inches is loam, and the lower 14 inches is silt loam. The substratum extends to a depth of 60 inches or more. The upper part is grayish brown, mottled silt loam, and the lower part is gray, mottled very gravelly sandy loam.

Included with these soils in mapping are a few small areas of well drained Pope soils. Also included are soils that are gravelly throughout and soils that are reddish and have less acidity than these Philo and Atkins soils.

In a few small areas, stones cover 1 to 3 percent of the surface, and in a few others, boulders are on the surface.

The available water capacity is moderate or high in this Philo soil. Permeability is moderate. Runoff is slow or medium, and natural fertility is moderate. Where unlimed, the Philo soil is strongly acid or very strongly acid. A seasonal high water table about 1 1/2 to 3 feet below the surface restricts the root zone of some types of plants. The depth to bedrock is more than 40 inches.

The available water capacity is high in this Atkins soil. Permeability is slow or moderately slow. Runoff is slow or medium, and water is ponded on the surface of some areas. Natural fertility is moderate. Where unlimed, the Atkins soil is strongly acid or very strongly acid. A seasonal high water table at or near the surface restricts the root zone of some types of plants. The depth to bedrock is more than 60 inches.

These soils are suited to cultivated crops but are better suited to hay and pasture plants that tolerate wetness. The soils are used mainly for pasture. Providing drainage for cultivated crops, hay, or pasture on the Atkins soil is a major management concern. Some areas lack suitable drainage outlets, and in places diversions are needed to intercept runoff from higher areas. Conservation tillage, using a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and using crop residue are practices in cultivated areas that help to maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is reasonably firm are major pasture management needs.

These soils have a very high potential productivity for trees that tolerate wetness, 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, the seasonal high water table, and the moderately slow or slow permeability in the Atkins soil are the main limitations of this unit for community development.

The capability subclass is IIIw.

Po—Pope sandy loam. This soil is nearly level and well drained. Most areas are on flood plains along the major streams in the eastern and southern parts of the survey area. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark brown sandy loam about 8 inches thick. The subsoil is strong brown sandy loam about 26 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is dark yellowish brown sandy loam, and the lower part is dark brown stratified sand and gravel.

Included with this soil in mapping are a few small areas of moderately well drained Philo soils and poorly drained Atkins soils. Also included are soils that are loamy sand or sand in the surface layer and subsoil. Included soils make up 20 percent of this unit.

The available water capacity of this Pope soil is moderate or high. Permeability is moderate or moderately rapid in the subsoil. Runoff is slow, and natural fertility is moderate. Where unlimed, the Pope soil is strongly acid to extremely acid. The depth to bedrock in this soil is generally more than 60 inches.

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 and crops in some areas are subject to damage from flooding. Working residue from the cover crop into the soil helps to maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is firm are major pasture management needs.

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

The hazard of flooding limits this soil for community development.

The capability subclass is IIw.

Tg—Tygart silt loam. This soil is nearly level and somewhat poorly drained. Most areas are on terraces adjacent to the flood plains of rivers and streams. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is about 38 inches thick. The upper 8 inches is light olive brown silt loam mottled with gray and yellowish brown. The lower 30 inches is light yellowish brown and light brownish gray silty clay loam mottled with yellowish brown and light brownish gray. The substratum is light brownish gray, mottled silty clay loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of poorly drained Atkins and Holly soils, moderately well drained Philo soils, and well drained soils. Included soils make up about 20 percent of this unit.

The available water capacity of this Tygart soil is moderate or high. Permeability is slow in the subsoil. Runoff is slow, and water is ponded on the surface of some areas. Natural fertility is low. A seasonal high water table about 1/2 foot to 1 1/2 feet below the surface restricts the root zone of some types of plants. Where unlimed, the soil is strongly acid or very strongly acid. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops, but it is better suited to and mainly used for water-tolerant hay and pasture plants. Drainage is needed for cultivated crops, but the soil commonly lacks outlets in the Brushy Fork area. Conservation tillage, using a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and using crop residue are practices in cultivated areas that help to maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and

deferment of grazing until the soil is reasonably firm are the major pasture management needs.

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

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

The capability subclass is IIIw.

Ua—Udorthents, loamy. This unit is nearly level and consists of material dredged from the Buckhannon River. It is mostly on flood plains of the Buckhannon River. Flooding is rare and usually occurs after very heavy rains. Slopes range from 0 to 3 percent.

Most areas of this unit consist of shades of brown, gray, and yellow loamy material that generally is mottled.

Included with this unit in mapping are small areas of poorly drained Holly soils, moderately well drained Orrville soils, somewhat poorly drained Tygart soils, and moderately well drained Monongahela soils. Also included are a few small areas with coal fragments and shale with a high carbon content and a few areas with bedrock less than 60 inches below the surface. Included soils make up about 20 percent of this unit.

The available water capacity, permeability, and natural fertility of this unit are variable. Runoff is slow or medium. Where unlimed, the soils are very strongly acid to slightly acid. The depth to bedrock is generally more than 60 inches.

Most areas of this unit are used for hay. A compacted surface layer makes the soils generally unsuitable for cultivated crops. Use of a permanent plant cover helps the development of tilth in these soils. The soils are suited to pasture, woodland, and wildlife habitat, but onsite investigation is needed to determine the limitations of the unit for any use, especially for community development.

This unit is not assigned to a capability subclass.

Ub—Udorthents, mudstone and limestone, high base. This unit is on hillsides in the Charity Fork part of the survey area. The unit consists of areas which have been surface-mined for coal. Most areas have a highwall, a bench, and an outslope. The benches are gently sloping or strongly sloping, and the outslopes are moderately steep to very steep. The highwalls are nearly vertical.

Commonly, the surface layer of these soils is dark grayish brown channery silt loam with yellowish brown mottles, and it is about 5 inches thick. The next 35 inches is dark gray very channery silt loam with yellowish brown mottles.

Included with this unit in mapping are areas of Udorthents, mudstone and sandstone, high base, and Udorthents, sandstone and mudstone, low base. Also included are areas of well drained Gilpin and Upshur soils. Included soils make up 25 percent of this unit.

The available water capacity, permeability, and natural fertility of this unit are variable. Runoff is medium to very rapid. Where unlimed, the soils are medium acid to mildly alkaline.

Most areas of this unit are used for wildlife habitat. Slope and an uneven surface make this unit generally unsuitable for cultivated crops. The benches have limited suitability for hay but are better suited to permanent pasture, woodland, or wildlife habitat. Most of the acreage has a cover of grasses and legumes and some woody species at the base of the outslopes. Onsite investigation is needed to determine the limitations of this unit for most uses, especially for community development.

This unit is not assigned to a capability subclass.

Uc—Udorthents, mudstone and sandstone, high base. This unit is on ridgetops and side slopes mostly in the northwestern part of the survey area. The unit consists of areas that have been surface-mined for coal. Most areas have a highwall, a bench, and an outslope, but some of this unit has been graded to conform to a rounded hill or backfilled to the approximate original contour. The soils are gently sloping or strongly sloping on ridgetops and benches and are moderately steep to very steep on outslopes. The highwalls are nearly vertical.

Commonly, the surface layer of these soils is dark brown channery silty clay loam mottled with reddish brown and yellow, and it is about 2 inches thick. The next 38 inches is dark brown very channery silty clay loam mottled with dark red and black.

Included with this unit in mapping are a few small areas of Udorthents, sandstone and mudstone, low base; Udorthents, mudstone and limestone, high base; and areas of coal fragments and shale with a high content of carbon. Also included are a few small areas of well drained Gilpin and Upshur soils. Included soils make up 20 percent of this unit.

The available water capacity, permeability and natural fertility of this unit are variable. Runoff is medium to very rapid. Where unlimed, the soils are medium acid to mildly alkaline.

Most areas of this unit are covered with grasses and legumes and a few woody species (fig. 4). Some of the benches have been used for pasture. Slope and an uneven surface make the unit generally unsuitable for cultivated crops. The benches have limited suitability for hay but are better suited to permanent pasture, woodland, or wildlife habitat. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing until the soil is firm are the main pasture management needs. Determination of the suitability of the unit for most other uses requires onsite investigation.

This unit is not assigned to a capability subclass.

Figure 4.—This area of Udorthents, mudstone and sandstone, high base, is a reclaimed strip mine.

Ud—Udorthents, sandstone and mudstone, low base. This soil is on hillsides and ridgetops mostly in the eastern and southern parts of the survey area. The unit consists of areas that have been surface-mined for coal. Most areas have a highwall, a bench, and an outslope. Where the mountaintop has been removed, only an outslope exists. The benches are gently sloping to strongly sloping, and the outslopes are moderately steep to very steep. The highwalls are nearly vertical.

Commonly, the surface layer of these soils is dark yellowish brown very channery sandy loam about 3 inches thick. The next 12 inches is yellowish brown very channery sandy loam mottled with dark grayish brown and reddish yellow. The next 25 inches is brownish yellow, very dark gray, and strong brown very channery loam.

Included with this unit in mapping are a few small areas of Udorthents, mudstone and sandstone, high base, and Udorthents, sandstone and mudstone, very low base. Included soils make up about 25 percent of this unit.

The available water capacity, permeability, and natural fertility of this unit are variable. Runoff is medium to very rapid. Where unlimed, the soils are strongly acid to very strongly acid.

Most areas of this unit are covered with grasses and legumes and a few woody species. A few of the benches have been used for pasture. Slope, an uneven surface, and sandstone rock fragments in the soil make the unit generally unsuitable for cultivated crops and hay; most areas are better suited to woodland or wildlife habitat. Determination of the suitability of the unit for most uses requires onsite investigation.

This unit is not assigned to a capability subclass.

Ue—Udorthents, sandstone and mudstone, very low base. This unit is mostly on hillsides in the northeastern and eastern parts of the survey area. The unit consists of areas that have been surface-mined for coal. Most areas have a highwall, a bench, and an outslope. The benches are gently sloping to moderately steep, and the outslopes are moderately steep to very steep. The highwalls are nearly vertical.

Commonly, the surface layer of these soils is dark yellowish brown very channery sandy loam about 3 inches thick. The next 12 inches is yellowish brown very channery sandy loam mottled with dark grayish brown and reddish yellow. The next 25 inches is brownish yellow very dark gray and strong brown very channery loam.

Included with this unit in mapping are a few areas of Udorthents, sandstone and mudstone, low base. Included soils make up about 15 percent of this unit.

The available water capacity, permeability, and natural fertility of this unit are variable. Runoff is medium to very rapid. Where unlimed, the soils are extremely acid.

Slope, an uneven surface, sandstone rock fragments in the soil, and high acidity make this unit generally unsuitable for farming. Most areas are better suited to and are used for wildlife habitat. Determination of the suitability of the unit for most other uses requires onsite investigation.

This unit is not assigned to a capability subclass.

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

This unit commonly consists of gray, brown, and yellow soils that generally are mottled. Most areas are loamy, but some are clayey.

Some areas of this unit have limited suitability for pasture, but most are better suited to woodland or wildlife habitat. Determination of the suitability of the unit for most other uses requires onsite investigation.

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. Most areas of this soil are on foot slopes and alluvial fans in the northwestern and western parts of the survey area.

Typically, the surface layer is reddish brown silt loam about 9 inches thick. The subsoil is reddish brown and is about 35 inches thick. The upper 21 inches is silty clay loam, and the lower 14 inches is channery silty clay. The substratum is mottled, reddish brown very channery silty clay that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Gilpin and Upshur soils and moderately well drained Ernest soils. Also included are poorly drained soils, soils that have a subsoil of silt loam, soils that are 20 to 40 inches deep to bedrock, and soils that have slopes of less than 8 percent. Stones cover 1 to 3 percent of the surface of some small areas, and erosion has removed most of the original surface layer in a few other small areas. Included soils make up about 20 percent of this 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, this soil is medium acid to very strongly acid. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a management concern, and placing roads and trails on the contour will help to control this erosion. The use of equipment is restricted during wet seasons because the soil is soft.

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

The capability subclass is IIIe.

VaD—Vandalia silt loam, 15 to 25 percent slopes. This soil is moderately steep and well drained. Most areas of this soil are on foot slopes in the northwestern and western parts of the survey area.

Typically, the surface layer is reddish brown silt loam about 9 inches thick. The subsoil is reddish brown and is about 35 inches thick. The upper 21 inches is silty clay loam, and the lower 14 inches is channery silty clay. The substratum is mottled, reddish brown very channery silty clay that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Gilpin and Upshur soils and moderately well drained Ernest soils. Also included are soils that have a subsoil of silt loam, soils that are 20 to 40 inches deep to bedrock, soils that have slopes of less than 15 percent or more than 25 percent, and poorly drained soils. Stones cover 1 to 3 percent of the surface of a few small areas, and erosion has removed most of the original surface layer in a few other small areas. Included soils make up about 20 percent of this 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, this soil is medium acid to very strongly acid. The depth to bedrock is more than 60 inches.

This soil has limited suitability for cultivated crops and is better suited to hay or pasture than to cultivated crops. The hazard of erosion is severe in unprotected areas and is a major management concern. Conservation tillage, planting crops in contour strips, using a crop sequence that includes hay, maintaining sod in shallow drainageways, and using crop residue are practices in cultivated areas that help to control erosion and maintain fertility and tilth. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high or high potential productivity for trees. About a third of the acreage is wooded. Erosion on logging roads and skid trails and slope are the main limitations. Placing the roads and trails on the contour will help to control erosion. Slope limits the use of equipment, and its use is further restricted during wet seasons because the soil is soft.

Low strength, slope, slow permeability, a high shrink-swell potential, and a hazard of slipping are the main limitations of the soil for community development.

The capability unit is IVe.

WuE—Westmoreland-Upshur silt loams, 25 to 35 percent slopes. These soils are strongly sloping and well drained. Most areas are on benches in the northwestern part of the county. Landslips are in places. The Westmoreland and Upshur soils are so intermingled that it was not practical to map them separately. The unit is about 50 percent Westmoreland soils, 25 percent Upshur soils, and 25 percent other soils.

Typically, the surface layer of the Westmoreland soils is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is dark brown silt loam about 3 inches thick. The subsoil is about 33 inches thick. The upper 4 inches is brown silt loam, and the next 22 inches is strong brown channery silty clay loam. The lower 7 inches is strong brown channery silt loam. The substratum is brown very channery silt loam that extends to bedrock at a depth of about 50 inches.

Typically, the surface layer of the Upshur soils is dark brown silt loam about 2 inches thick. The subsurface layer is reddish brown silt loam about 3 inches thick. The subsoil is reddish brown and is about 23 inches thick. The upper 17 inches is silty clay, and the lower 6 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of about 48 inches.

Included with these soils in mapping are a few small areas of well drained Gilpin soils. Also included are moderately well drained soils, soils that have slopes of less than 25 percent, and soils where stones cover 1 to 3 percent of the surface.

The available water capacity of these Westmoreland soils is moderate or high. Permeability is moderate. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, the soils are strongly acid or medium acid. The depth to bedrock is 40 inches or more.

The available water capacity of these Upshur soils is moderate or high. Permeability is slow. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, the Upshur soils are strongly acid to neutral. The subsoil has a high shrink-swell potential. The depth to bedrock is more than 40 inches.

Slope makes the soils in this unit generally unsuited to cultivated crops or hay, but the soils are suited to pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. The use of proper stocking rates, the use of rotational grazing, and deferment of grazing in the spring until the Upshur soil is reasonably firm are the major pasture management needs.

The soils have moderate to high potential productivity for trees, and about half the acreage is wooded. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helps to control this erosion. Slope limits the use of equipment, and its use is further restricted on the Upshur soil during wet seasons because the soil is soft and slippery.

Slope and a slip hazard on the Westmoreland soils and the high shrink-swell potential, slope, low strength, slow permeability, and slip hazard of the Upshur soils are the main limitations of this unit for community development.

The capability subclass is VIe.

WuF—Westmoreland-Upshur silt loams, 35 to 65 percent slopes. These soils are very steep and well drained. Most areas are in narrow bands along side slopes in the northwestern part of the county. Landslips are in places. The Westmoreland and Upshur soils are so intermingled that it was not practical to map them separately. The unit is about 50 percent Westmoreland soils, 25 percent Upshur soils, and 25 percent other soils.

Typically, the surface layer of the Westmoreland soils is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is dark brown silt loam about 3 inches thick. The subsoil is about 33 inches thick. The upper 4 inches is brown silt loam, and the next 22 inches is strong brown channery silty clay loam. The lower 7 inches is strong brown channery silt loam. The substratum is brown very channery silt loam that extends to bedrock at a depth of about 50 inches.

Typically, the surface layer of the Upshur soil is dark brown silt loam about 2 inches thick. The subsurface layer is reddish brown silt loam about 3 inches thick. The subsoil is reddish brown and is about 23 inches thick.

The upper 17 inches is silty clay, and the lower 6 inches is channery silty clay loam. The substratum is reddish brown very channery silty clay loam that extends to bedrock at a depth of about 48 inches.

Included with these soils in mapping are a few small areas of well drained Gilpin soils. Also included are soils that are similar to these Westmoreland soils but that are less than 40 inches deep to bedrock, soils that have slopes of less than 35 percent, and areas of rock outcrop.

The available water capacity of these Westmoreland soils is moderate or high. Permeability is moderate. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, the soils are strongly acid or medium acid. The depth to bedrock is 40 inches or more.

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

Slope makes the soils in this unit generally unsuited to cultivated crops or hay and difficult to manage for pasture. The soils have moderate to high potential productivity for trees, and most of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern. Placing the roads and trails on the contour helped to control this erosion. Slope limits the use of equipment, and its use is further restricted on the Upshur soils during wet seasons because the soil is soft and slippery.

Slope and a slip hazard on the Westmoreland soil and the high shrink-swell potential, slope, low strength, slow permeability, and slip hazard of the Upshur soils are the main limitations of the unit for community development.

The capability subclass is VIIe.

Prime Farmland

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

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

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

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has favorable temperature and growing season and acceptable acidity or alkalinity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

About 8,300 acres, or 3.7 percent of Upshur County, meets the soil requirements for prime farmland. The areas are throughout the county, and most are adjacent to the major drainageways.

A recent trend in land use in some parts of the county has resulted in the loss of some prime farmlands to industrial and urban uses (fig. 5). The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and difficult to cultivate and usually are less productive.

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

Soils that have a seasonal high water table may qualify for prime farmland if the water table is overcome by drainage. In table 5 the need for drainage is shown in parentheses after the map unit name. Onsite evaluation is necessary to see if the limitation has been overcome by corrective measures.

Figure 5.—Community development near an area of Orrville-Holly silt loams.

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

Dixie Shreve, resource conservationist, Soil Conservation Service, assisted with the preparation of this section.

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

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

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

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

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

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

The Atkins and Holly soils in this survey area need artificial drainage to make them suitable for cultivated crops and hay and pasture. Soils with a fragipan in the subsoil, such as Ernest and Monongahela soils, are difficult to drain with tile. Such soils generally respond better to random tile drainage or diversions, or both.

Runoff and erosion occur mainly while a cultivated crop is growing or soon after it has been harvested. All of the gently sloping and steeper soils that are cultivated are subject to erosion and thus require a suitable cropping system for erosion control. The main management needs of such a system include proper rotation of crops, conservation tillage, using crop residue, growing cover crops and green-manure crops, and using lime and fertilizer. Other major erosion-control practices are contour cultivation, contour stripcropping, 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 ground cover to prevent erosion. Grazing is controlled by rotating the livestock from one pasture to another and providing idle periods for the pasture to allow for regrowth of the plants. Some soils need pasture mixtures that require the least renovation to maintain good ground cover and forage for grazing.

Yields per Acre

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The 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.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic

numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

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

Woodland Management and Productivity

Lewis Rowan, forester, Soil Conservation Service, and James Mitchell, forester, West Virginia Department of Natural Resources, assisted with the preparation of this section.

Woodland in Upshur County amounts to nearly 154,000 acres, or 68 percent of the total area. The size of the woodland tracts ranges from small farm woodlots to large corporate-owned areas of several thousand acres. The largest woodland tracts are in the southern and eastern parts of the survey area.

The common forest types, or natural associations of tree species, and their percent of the wooded area are: oak-hickory, 55 percent; maple-beech-birch, 28 percent; other hardwoods, 15 percent; and pine, 2 percent (*7*).

The southern part of the county is the best area for trees, mainly because of a favorable climate and high or very high potential productivity of the soils. The maple-beech-birch type is in this area; the cherry and yellow poplar species associated with this type make up a high percentage of the marketable timber.

The aspect of some soils, generally those that have slopes of more than 15 percent, is shown in table 8. North aspects are those that face in any compass direction from 315 degrees to 135 degrees. South aspects are those that face in any compass direction from 135 degrees to 315 degrees. Aspect affects potential productivity of sloping soils. The soils on north aspects generally are more moist than those on south aspects and commonly are rated as having higher productivity. Aspect also affects the occurrence of a tree species and the degree of management concerns.

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

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

In table 8, *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 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production 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 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 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

The soils of the survey area are rated in table 10 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 10, 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 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

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

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

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

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

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

Wildlife Habitat

Gary A. Gwinn, biologist, Soil Conservation Service, assisted with the preparation of this section.

Upshur County supports a large and varied population of fish and wildlife. County landforms and land-use patterns provide the base for a variety of habitat types. Black bear, wild turkeys, and bobcats generally are confined to the mountainous areas in the southeastern part of the county. White-tailed deer, ruffed grouse, raccoons, squirrels, foxes, and rabbits are throughout the county. Local populations of bobwhite quail also exist, but these are restricted greatly by a lack of suitable habitat.

The streams, lakes, and farm ponds in the area support a variety of warm-water and cold-water fish. The common game fish in the county are smallmouth bass, muskellunge, rainbow trout, and brook trout. The streams also provide nesting habitat for wood ducks and nesting and feeding areas for migratory waterfowl.

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

In table 11, 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, fir, 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, slope, and surface stoniness. Examples of wetland plants are smartweed, rushes, sedges, and reeds.

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

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

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

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

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

Engineering

James L. Dove, conservation engineer, Soil Conservation Service, assisted with the preparation of 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 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

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

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large

stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

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

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

Sanitary Facilities

Table 13 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 13 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 13 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 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

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

Construction Materials

Table 14 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 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

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

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

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

of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

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

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

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

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

Water Management

Table 15 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. 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. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

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

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

Engineering Index Properties

Table 16 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 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 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 17 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 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

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

Some soils in table 18 are assigned to two hydrologic soil groups because the soils have a seasonal high water table but can be drained. In this instance the first letter applies to the drained condition of the soil and the second letter to the undrained condition.

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 18 gives the frequency of flooding. Frequency is expressed as none, rare, and 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 18 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 18.

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 (*6*). 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 19 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 Entisol.

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 Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

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 Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

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

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

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

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*5*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*6*). 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."

Atkins Series

The Atkins series consists of deep, poorly drained soils formed in alluvial material washed mainly from acid soils on uplands. The Atkins soils are on flood plains along the major streams in the southern and eastern parts of the county. Slopes range from 0 to 3 percent.

Atkins soils are on the landscape with well drained Pope soils and moderately well drained Philo soils. The Atkins soils are grayer in the B horizon than the Pope or Philo soils.

Typical pedon of Atkins silt loam, in a hayfield, about 300 yards west of Tennerton grade school, about 10 yards east of Stony Run:

Ap—0 to 8 inches, dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; many roots; slightly acid; abrupt wavy boundary.
B21g—8 to 19 inches, light brownish gray (2.5Y 6/2) loam; few fine yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; common roots; strongly acid; clear wavy boundary.
B22g—19 to 33 inches, light brownish gray (2.5Y 6/2) silt loam; common medium yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm; few roots; very strongly acid; clear wavy boundary.
Cg—33 to 46 inches, grayish brown (10YR 5/2) silt loam; common medium strong brown (7.5YR 5/8) mottles; massive; firm; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
IICg—46 to 60 inches, gray (10YR 5/1) very gravelly sandy loam; common medium strong brown (7.5YR 5/8) and yellowish red (5YR 4/6) mottles; massive; friable; 80 percent coarse fragments; very strongly acid.

The solum thickness ranges from 30 to 45 inches, and the depth to bedrock is 60 inches or more. In unlimed areas the soils are strongly acid to very strongly acid.

The A horizon has hue of 10YR, value of 4 through 6, and chroma of 1 or 2.

The B horizon has hue of 10YR through 5Y, value of 5 through 7, and chroma of 1 or 2. It is loam, silt loam, or silty clay loam.

The C horizon has hue of 10YR, value of 4 through 6, and chroma of 1 through 6. It is silt loam, sandy loam, loam, fine sandy loam, or silty clay loam or their gravelly or very gravelly analogs.

Buchanan Series

The Buchanan series consists of deep, moderately well drained soils that formed in acid colluvial material that moved downslope from soils on uplands. The Buchanan soils are on foot slopes, along drainageways, on benches, and in coves mainly in the southern and eastern parts of the survey area. Slopes range from 3 to 25 percent.

Buchanan soils are on the landscape with well drained Dekalb and Lily soils, moderately well drained Ernest soils, and Fluvaquents and Udifluvents. The Buchanan soils are deeper than the Dekalb or Lily soils and have a fragipan which is not typical in those soils. The Buchanan soils have more sand in the upper part of the B horizon than the Ernest soils and are not subject to flooding as are the Fluvaquents and Udifluvents.

Typical pedon of Buchanan channery silt loam, in a wooded area of Buchanan and Ernest very stony silt loams, 15 to 25 percent slopes, along Route 46/1, about 0.6 mile north of the confluence of Panther Run and the Little Kanawha River:

O1—1 inch to 1/2 inch, hardwood leaf litter.
O2—1/2 inch to 0, decomposed leaf litter.
A1—0 to 3 inches, very dark grayish brown (10YR 3/2) channery silt loam; weak fine granular structure; very friable; many roots; 20 percent coarse fragments; very strongly acid; clear wavy boundary.
A2—3 to 9 inches, dark yellowish brown (10YR 4/4) channery silt loam; weak fine and medium granular structure; very friable; many roots; 20 percent coarse fragments; very strongly acid; clear wavy boundary.
B1—9 to 17 inches, yellowish brown (10YR 5/6) channery loam; weak medium subangular blocky structure; friable; 25 percent coarse fragments; common roots; very strongly acid; clear wavy boundary.
B2t—17 to 30 inches, yellowish brown (10YR 5/6) channery loam; common medium light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; 30 percent coarse fragments; few roots; common discontinuous clay films on faces of peds; extremely acid; clear wavy boundary.
Bx1—30 to 40 inches, yellowish brown (10YR 5/6) very channery loam; many medium gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; very firm and brittle; 45 percent coarse fragments; extremely acid; clear wavy boundary.
Bx2—40 to 52 inches, yellowish brown (10YR 5/6) very channery loam; many medium gray (10YR 6/1), strong brown (7.5YR 5/8), and black (N 2/0) mottles; weak very coarse prismatic structure; very firm and brittle; 50 percent coarse fragments; extremely acid; clear wavy boundary.
C—52 to 60 inches, yellowish brown (10YR 5/6) very channery loam; many fine black (N 2/0) mottles and few fine gray (10YR 6/1) mottles; massive; very firm; 55 percent coarse fragments; extremely acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 60 inches. The content of coarse fragments of sandstone, siltstone, or shale ranges from 5 to 30 percent above the fragipan, 10 to 50 percent in the fragipan, and 40 to 60 percent in the C horizon. In unlimed areas the soils are strongly acid through extremely acid.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 1 through 4.

The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 6. It is loam, sandy clay

loam, or clay loam or their channery or very channery analogs.

The C horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 1 through 6. It is very channery analogs of loam, sandy clay loam, sandy loam, or clay loam.

Chavies Series

The Chavies series consists of deep, well drained soils that formed in alluvial material washed mainly from acid soils on uplands. The Chavies soils are on high flood plains mainly along the Middle Fork and Buckhannon Rivers. Slopes range from 0 to 3 percent.

Chavies soils are on the landscape with well drained Pope soils, moderately well drained Philo and Monongahela soils, and somewhat poorly drained Tygart soils. The Chavies soils are flooded less frequently than the Pope or Philo soils and more frequently than the Monongahela or Tygart soils. The Chavies soils do not have the fragipan typical of the Monongahela soils.

Typical pedon of Chavies loam, in a pasture about 300 yards north of Yoakum, about 17 yards west of the road along the Middle Fork River:

Ap—0 to 9 inches, dark brown (10YR 4/3) loam; weak fine granular structure; friable; many roots; strongly acid; abrupt wavy boundary.
B1—9 to 20 inches, yellowish brown (10YR 5/6) fine sandy loam; weak fine subangular blocky structure; friable; many roots; medium acid; clear wavy boundary.
B2t—20 to 40 inches, yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; common discontinuous clay films on faces of peds; few roots; few charcoal fragments; strongly acid; clear wavy boundary.
B3—40 to 48 inches, yellowish brown (10YR 5/6) loam; few dark brown (10YR 3/3) mottles and common fine black (10YR 2/1) mottles; weak medium and fine subangular blocky structure; friable; few roots; strongly acid; clear wavy boundary.
C—48 to 60 inches, yellowish brown (10YR 5/6) loam; common fine black (10YR 2/1), strong brown (7.5YR 5/8), and light brownish gray (2.5Y 6/2) mottles; massive; friable; strongly acid.

The solum thickness ranges from 30 to 50 inches, and the depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 15 percent in the solum and 0 to 30 percent in the C horizon. In unlimed areas the soils are medium acid to very strongly acid.

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

The B horizon has hue of 10YR through 5YR, value of 4 or 5, and chroma of 4 through 6. It is loam or fine sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6. It is loam, sandy loam, or loamy sand or their gravelly analogs and in some pedons is stratified.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils that formed in acid material weathered from sandstone and some interbedded siltstone and shale. The Dekalb soils are on ridgetops, benches, and side slopes. Slopes range from 8 to 70 percent.

Dekalb soils are on the landscape with well drained Gilpin and Lily soils and moderately well drained Buchanan and Ernest soils. The Dekalb soils have more coarse fragments in the A and B horizons than the Gilpin or Lily soils. The Dekalb soils are shallower than the Buchanan or Engs soils and do not have the fragipan typical of those soils.

Typical pedon of Dekalb channery loam, in a wooded area of Gilpin-Dekalb complex, stony, 15 to 35 percent slopes, about 0.3 mile east of the intersection of Routes 22/2 and 92, about 75 yards north of Route 22/2:

O1—1 1/2 inches to 1/2 inch, hardwood leaf litter.
O2—1/2 inch to 0, decomposed leaf litter.
A1—0 to 3 inches, very dark brown (10YR 2/2) channery loam; weak fine granular structure; very friable; 15 percent coarse fragments; many roots; strongly acid; abrupt wavy boundary.
A2—3 to 5 inches, dark brown (10YR 4/3) channery loam; weak fine granular structure; friable; 20 percent coarse fragments; many roots; very strongly acid; clear wavy boundary.
B1—5 to 12 inches, yellowish brown (10YR 5/4) very channery sandy loam; weak fine subangular blocky structure; friable; 40 percent coarse fragments; many roots; very strongly acid; clear wavy boundary.
B2—12 to 22 inches, yellowish brown (10YR 5/6) very channery sandy loam; weak fine subangular blocky structure; friable; 45 percent coarse fragments; common roots; very strongly acid; clear wavy boundary.
B3—22 to 28 inches, yellowish brown (10YR 5/6) very channery sandy loam; weak medium subangular blocky structure; friable; 60 percent coarse fragments; few roots; very strongly acid; clear wavy boundary.
C—28 to 33 inches, yellowish brown (10YR 5/6) very channery sandy loam; massive; friable; 85 percent coarse fragments; few roots; very strongly acid; clear irregular boundary.
R—33 inches, fractured sandstone.

The solum thickness and depth to bedrock range from 20 to 40 inches. Coarse fragments dominantly of sandstone with some siltstone and shale make up 15 to

60 percent of individual horizons of the solum and 50 to 90 percent of the C horizon. In unlimed areas the soils are strongly acid or very strongly acid.

The A horizon has hue of 10YR, value of 2 through 6, and chroma of 1 through 4.

The B horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is channery or very channery analogs of loam, fine sandy loam, or sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 6.

Ernest Series

The Ernest series consists of deep, moderately well drained soils. The soils formed in acid colluvial material that moved downslope from soils on uplands. The Ernest soils are in the eastern and southern parts of the survey area. They are on foot slopes, on colluvial fans, in coves, and along drainageways. Slopes range from 3 to 25 percent.

Ernest soils are on the landscape with well drained Dekalb, Gilpin, and Lily soils; moderately well drained Buchanan soils; somewhat poorly drained and poorly drained Fluvaquents; and well drained and moderately well drained Udifluvents. The Ernest soils are deeper than the Dekalb, Gilpin, or Lily soils, and they have a fragipan that is not characteristic of those soils. The Ernest soils have less sand in the upper part of the B horizon than the Buchanan soils and are not subject to flooding as are the Fluvaquents and Udifluvents.

Typical pedon of Ernest channery silt loam, in a wooded area of Buchanan and Ernest very stony silt loam, 15 to 25 percent slopes, about 0.4 mile south of Burnt Bridge, adjacent to Route 28:

O1—2 inches to 1 inch, hardwood leaf litter.

O2—1 inch to 0, partially decomposed leaf litter.

A1—0 to 5 inches, very dark grayish brown (10YR 3/2) channery silt loam; moderate fine granular structure; very friable; many roots; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B1—5 to 12 inches, yellowish brown (10YR 5/6) channery silt loam; moderate fine subangular blocky structure; very friable; many roots; 15 percent coarse fragments; strongly acid; clear wavy boundary.

B21t—12 to 20 inches, reddish yellow (7.5YR 6/6) channery silt loam; few fine strong brown (7.5YR 5/8) and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; many roots; 25 percent coarse fragments; few discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

B22t—20 to 29 inches, strong brown (7.5YR 5/8) channery silty clay loam; few medium light brownish gray (10YR 6/2) and yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; common roots; 25 percent coarse fragments; common discontinuous clay films on faces of peds; very strongly acid; clear wavy boundary.

Bx1—29 to 35 inches, yellowish brown (10YR 5/6) very channery silt loam; common medium light gray (N 7/0) and yellowish red (5YR 5/8) mottles and few fine strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; firm and brittle; few roots; 40 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bx2—35 to 49 inches, strong brown (7.5YR 5/6) very channery silt loam; common medium light gray (N 7/0) and yellowish brown (10YR 5/6) mottles; weak very coarse prismatic structure; very firm and brittle; 40 percent coarse fragments; very strongly acid; gradual irregular boundary.

C—49 to 60 inches, strong brown (7.5YR 5/6) very channery loam; common medium light gray (N 7/0) and yellowish red (5YR 5/8) mottles; massive; very firm; 50 percent coarse fragments; very strongly acid.

The solum thickness ranges from 40 to 55 inches, and the depth to bedrock is more than 60 inches. Coarse fragments of shale, siltstone, and sandstone make up 5 to 25 percent of the profile above the fragipan, 10 to 40 percent of the fragipan, and 10 to 50 percent of the C horizon. In unlimed areas the soils are strongly acid or very strongly 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 10YR or 7.5YR, value of 5 or 6, and chroma of 3 through 8. The B1 and B2 horizons are silt loam or silty clay loam or their channery or shaly analogs. The Bx horizon is loam, silt loam, or silty clay loam or their channery, shaly, very channery, or very shaly analogs.

The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 through 6. It is loam, silt loam, or silty clay loam or their channery, shaly, very channery, or very shaly analogs.

Fluvaquents

Fluvaquents consist of moderately deep and deep, somewhat poorly drained and poorly drained soils. They formed in acid alluvial material washed from soils on uplands. The soils are on flood plains along the major tributaries and rivers in the southern and eastern parts of the survey area. Slopes range from 0 to 3 percent.

Fluvaquents are on the landscape with Pope, Philo, Buchanan, and Ernest soils. Fluvaquents are more poorly drained than any of those soils, and they are subject to frequent flooding.

Because of the variability of Fluvaquents, a typical pedon is not given. The depth to bedrock is 20 inches or more. The content of coarse fragments ranges from 0 to 10 percent in the surface layer and 0 to 60 percent in the underlying layers. In unlimed areas the soils are strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR, 7.5YR, or 2.5YR; value of 2 through 6; and chroma of 1 through 6. It is silt loam, loam, or fine sandy loam.

The underlying horizons have hue of 10YR, 7.5YR, or 2.5Y; value of 3 through 7; and chroma of 1 through 4 and are mottled. They mainly are silt loam, loam, fine sandy loam, sandy clay loam, clay loam, or silty clay loam. Some pedons have strata of loamy sand. Structure ranges from weak, medium, and coarse subangular blocky to massive. Consistence is friable or very friable.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils that formed in acid material weathered from interbedded shale, siltstone, and sandstone. The Gilpin soils are on ridgetops, benches, and side slopes. Slopes range from 3 to 70 percent.

Gilpin soils are on the landscape with well drained Dekalb, Lily, Upshur, Vandalia, and Westmoreland soils and moderately well drained Ernest soils. The Gilpin soils have less sand in the B horizon than the Lily soils and fewer coarse fragments in the A and B horizons than the Dekalb soils. The Gilpin soils have less clay in the B and C horizons and are shallower than the Upshur and Vandalia soils, and do not have the reddish brown color typical of those soils. The Gilpin soils are shallower than the Westmoreland or Ernest soils and do not have the fragipan typical of the Ernest soils.

Typical pedon of Gilpin silt loam, 3 to 8 percent slopes, in a field about 150 yards south of Jaw Bone Run and 3/4 mile west of Buckhannon City Park:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak fine granular structure; friable; many roots; 5 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21t—6 to 15 inches, yellowish brown (10YR 5/6) silt loam; weak and moderate medium subangular blocky structure; friable; few discontinuous clay films on faces of peds; common roots; 10 percent coarse fragments; extremely acid; clear wavy boundary.

B22t—15 to 25 inches, strong brown (7.5YR 5/8) silt loam; moderate medium subangular blocky structure; firm; common discontinuous clay films on faces of peds; common roots; 5 percent coarse fragments; extremely acid; clear wavy boundary.

C—25 to 32 inches, strong brown (7.5YR 5/6) very channery silt loam; massive; friable; few clay films on coarse fragments; few roots; 60 percent coarse fragments; extremely acid; clear irregular boundary.

R—32 inches, fractured siltstone and shale.

The solum thickness ranges from 20 to 36 inches, and the depth to bedrock ranges from 20 to 40 inches. Coarse fragments of shale, siltstone, and sandstone make up 5 to 40 percent of individual horizons of the solum and 40 to 90 percent of 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 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is silt loam, silty clay loam, or loam or their shaly, very shaly, channery, or very channery analogs.

The C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. It is very shaly or very channery analogs of silt loam, loam, or silty clay loam.

Holly Series

The Holly series consist of deep, poorly drained soils that formed in alluvial material washed from acid and lime-influenced soils on uplands. The Holly soils are on flood plains along the major streams in the northwestern and western parts of the survey area. Slopes range from 0 to 3 percent.

Holly soils are on the landscape and are mapped with somewhat poorly drained Orrville soils.

Typical pedon of Holly silt loam, in an area of Orrville-Holly silt loams, in a pasture, about 1/2 mile south of Buckhannon-Upshur High School, about 0.7 mile east of the junction of Routes 20 and 20/7, about 50 yards west of Cutright Run:

Ap—0 to 6 inches, dark grayish brown (10YR 4/2) silt loam; moderate fine and medium granular structure; friable; many roots; slightly acid; clear wavy boundary.

B1g—6 to 11 inches, dark grayish brown (10YR 4/2) silt loam; few fine dark brown (7.5YR 4/4) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; common roots; medium acid; clear wavy boundary.

B21g—11 to 23 inches, dark grayish brown (10YR 4/2) silt loam; many coarse strong brown (7.5YR 5/8) mottles and few medium dark brown (7.5YR 4/4) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few roots; medium acid, clear wavy boundary.

B22g—23 to 34 inches, dark gray (10YR 4/1) loam; many common strong brown (7.5YR 5/8) mottles and common medium dark brown (7.5YR 4/4) mottles; weak very coarse prismatic structure parting to weak coarse subangular blocky; friable; medium acid; clear wavy boundary.

C1g—34 to 45 inches, dark gray (N 4/0) loam; many coarse strong brown (7.5YR 5/8) mottles; massive; friable; medium acid; clear wavy boundary.

C2g—45 to 60 inches, dark gray (N 4/0) loam; thin layers of sandy loam; many fine dark brown (7.5YR 4/4) mottles; massive; friable; medium acid.

The solum thickness ranges from 20 to 40 inches, and the depth to bedrock is generally more than 60 inches. Coarse fragments of gravel make up 0 to 10 percent of individual horizons of the solum. In unlimed areas the soils are slightly acid or medium acid.

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

The B horizon is neutral or has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is silt loam or loam or in a few places sandy loam.

The C horizon is neutral or has hue of 10YR, value of 3 or 4, and chroma of 0 or 1. It is loam, silt loam, or sandy loam. Some pedons are stratified below a depth of 40 inches.

Lily Series

The Lily series consists of moderately deep, well drained soils that formed in acid material weathered from sandstone and some interbedded siltstone and shale. The Lily soils are on ridgetops and benches mostly in the eastern and southern parts of the survey area. Slopes range from 3 to 15 percent.

Lily soils are on the landscape with well drained Dekalb and Gilpin soils and moderately well drained Buchanan and Ernest soils. The Lily soils contain fewer coarse fragments in the A and B horizons than the Dekalb soils and more sand in the B horizon than the Gilpin soils. The Lily soils are shallower than and do not have the fragipan typical of the Buchanan and Ernest soils.

Typical pedon of Lily loam, 3 to 15 percent slopes, in a wooded area on Hemlock Ridge, about 1.3 miles south of Upper Queens:

O1—3/4 inch to 1/4 inch, leaf litter.
O2—1/4 inch to 0, decomposed leaf litter.
A1—0 to 2 inches, very dark grayish brown (10YR 3/2) loam; weak and moderate fine granular structure; very friable; many roots; 10 percent coarse fragments; strongly acid; clear wavy boundary.
A2—2 to 5 inches, yellowish brown (10YR 5/4) loam; weak fine and medium granular structure; friable; many roots; 5 percent coarse fragments; strongly acid; clear wavy boundary.
B1—5 to 12 inches, yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common roots; 10 percent coarse fragments; strongly acid; gradual wavy boundary.
B21t—12 to 19 inches, strong brown (7.5YR 5/6) clay loam; pockets of loam; moderate medium subangular blocky structure; firm; few discontinuous clay films on faces of peds and in pores; 5 percent coarse fragments; very strongly acid; clear wavy boundary.
B22t—19 to 25 inches, strong brown (7.5YR 5/6) loam; weak and moderate medium subangular blocky structure; firm; few discontinuous clay films on faces of peds and in pores; 10 percent coarse fragments; very strongly acid; clear wavy boundary.
B3—25 to 34 inches, yellowish brown (10YR 5/4) channery loam; weak coarse subangular blocky structure; firm; 20 percent coarse fragments; extremely acid; clear wavy boundary.
C—34 to 37 inches, yellowish brown (10YR 5/4) very channery loam; massive; firm; 35 percent coarse fragments; extremely acid; clear wavy boundary.
R—37 inches, sandstone.

The solum thickness and depth to bedrock range from 20 to 40 inches. Coarse fragments, dominantly of sandstone with some siltstone and shale, make up from 0 to 10 percent of the upper part of the solum and up to 35 percent of the lower part of the solum and the substratum. In unlimed areas the soils are strongly acid to extremely acid.

The A horizon has hue of 10YR, value of 2 through 6, and chroma of 2 through 4.

The B horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. It is loam, clay loam, or sandy clay loam or their channery analogs.

The C horizon has hue of 10YR through 5YR, value of 5 or 6, and chroma of 4 through 6. It is loam or sandy loam or their channery or very channery analogs.

Monongahela Series

The Monongahela series consists of deep, moderately well drained soils that formed in old alluvial material washed mainly from acid soils on uplands. The Monongahela soils are on high terraces mainly along the Buckhannon River. Slopes range from 3 to 15 percent.

Monongahela soils are on the landscape with well drained Chavies soils and somewhat poorly drained Tygart soils. Monongahela soils have a fragipan that is not typical of those soils, and they are not subject to rare flooding as are the Chavies soils.

Typical pedon of Monongahela silt loam, 3 to 8 percent slopes, in a hayfield about 1/2 mile north of the intersection of Routes 9/1 and 9, about 150 yards north of golf course:

Ap—0 to 9 inches, dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many roots; 5 percent coarse fragments; neutral; abrupt smooth boundary.
B2t—9 to 26 inches, yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; many discontinuous clay films and silt

coatings on faces of peds; common roots; medium acid; clear wavy boundary.

Bx1—26 to 33 inches, reddish yellow (7.5YR 6/6) silt loam; many fine light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; firm and brittle; 5 percent coarse fragments; few roots; very strongly acid; clear wavy boundary.

Bx2—33 to 44 inches, reddish yellow (7.5YR 6/8) loam; many medium light brownish gray (10YR 6/2) and yellowish red (5YR 5/8) mottles and few medium black (10YR 2/1) mottles; weak very coarse prismatic structure; very firm and brittle; 10 percent coarse fragments; very strongly acid; clear wavy boundary.

C—44 to 60 inches, mixed strong brown (7.5YR 5/8), brownish yellow (10YR 6/6), and light gray (10YR 7/2) gravelly clay loam; massive; firm; 20 percent coarse fragments; very strongly acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 60 inches. Rounded coarse fragments of sandstone and shale make up 0 to 15 percent of the profile above the fragipan, 0 to 25 percent of the fragipan, and 10 to 40 percent of the C horizon. In unlimed areas the soils are strongly acid or very strongly acid.

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

The B2t horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. It is silt loam, loam, silty clay loam, clay loam, or sandy clay loam. The Bx horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 2 through 8. It is loam, silt loam, sandy clay loam, or clay loam or their gravelly or cobbly analogs.

The C horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 2 through 8. It is sandy loam, loam, or clay loam or their gravelly, very gravelly, cobbly, or very cobbly analogs.

Orrville Series

The Orrville series consist of deep, somewhat poorly drained soils that formed in alluvial material washed from acid and lime- influenced soil on uplands. The Orrville soils are on flood plains along the major streams in the northwestern and western parts of the survey area. Slopes range from 0 to 3 percent.

Orrville soils are on the landscape with poorly drained Holly soils.

Typical pedon of Orrville silt loam, in an area of Orrville-Holly silt loams in a hayfield adjacent to Pecks Run, about 150 yards south of Route 2, about 175 yards west of the junction of Routes 2 and 20:

Ap—0 to 6 inches, dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; very friable; many roots; slightly acid; abrupt smooth boundary.

B21—6 to 16 inches, brown (10YR 4/3) silt loam; few fine yellowish brown (10YR 5/8) mottles and common fine grayish brown (10YR 5/2) mottles; weak medium and fine subangular blocky structure; friable; common roots; grayish brown (10YR 5/2) silt coatings on faces of peds; few fine black concretions; medium acid; clear wavy boundary.

B22g—16 to 22 inches, grayish brown (10YR 5/2) silt loam; common fine and medium strong brown (7.5YR 5/8) and yellowish brown (10YR 5/8) mottles; weak coarse and medium subangular blocky structure; friable; few roots; few light brownish gray (10YR 6/2) silt coatings on faces of peds; few fine very dark brown (10YR 2/2) concretions; medium acid; clear wavy boundary.

B3g—22 to 31 inches, grayish brown (10YR 5/2) silt loam; many medium yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few roots; common fine very dark brown (10YR 2/2) concretions; medium acid; gradual wavy boundary.

Cg—31 to 60 inches, dark grayish brown (10YR 4/2) silt loam; many medium and fine strong brown (7.5YR 5/6) and yellowish brown (10YR 5/8) mottles; massive; firm; few fine pores with gray silt coatings; common fine and medium very dark gray (10YR 3/1) concretions; medium acid.

The solum thickness ranges from 25 to 40 inches, and the depth to bedrock is more than 60 inches. The content of gravel ranges from 0 to 5 percent in A horizon, 0 to 10 percent in the B horizon, and 0 to 20 percent in the C horizon. In unlimed areas the soils are medium acid or strongly acid.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2.

The B horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 0 through 4. It is silt loam or silty clay loam.

The C horizon is neutral or has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 0 through 2. It is silt loam, loam, or sandy loam, and in some pedons it is stratified.

Philo Series

The Philo series consists of deep, moderately well drained soils that formed in alluvial material washed mainly from acid soils on uplands. The Philo soils are on flood plains mainly along the major streams and their tributaries. Slopes range from 0 to 3 percent.

Philo soils are on the landscape with well drained Chavies and Pope soils, poorly drained Atkins soils, and

Fluvaquents and Udifluvents. The Philo soils are flooded more frequently than Chavies soils and less frequently than the Fluvaquents and Udifluvents, and they have more brown in the B horizon than the Atkins soils.

Typical pedon of Philo silt loam, in an area of Philo-Atkins silt loams, in a hayfield, about 20 feet southwest of Sand Run, about 1/2 mile east of the junction of Routes 16 and 16/9:

Ap—0 to 5 inches, dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; very friable; many roots; medium acid; clear wavy boundary.
B1—5 to 9 inches, dark brown (10YR 4/3) loam; weak medium subangular blocky structure; friable; many roots; medium acid; clear wavy boundary.
B2—9 to 22 inches, dark brown (10YR 4/3) loam; common fine strong brown (7.5YR 5/8), dark brown (7.5YR 4/4), and grayish brown (10YR 5/2) mottles in the lower part; weak medium and fine subangular blocky structure; friable; common roots; strongly acid; clear wavy boundary.
C1—22 to 35 inches, brown (10YR 5/3) sandy loam; many medium yellowish brown (10YR 5/8) and grayish brown (10YR 5/2) mottles and common fine strong brown (7.5YR 5/8) mottles; massive; friable; few roots; strongly acid; clear wavy boundary.
IIC2—35 to 60 inches, gray (10YR 5/1) loamy sand; massive; very friable; strongly acid.

The solum thickness ranges from 20 to 45 inches, and the depth to bedrock is more than 40 inches. The gravel content ranges from 0 to 20 percent in the solum and 0 to 40 percent in the C horizon. In unlimed areas the soils are strongly acid or very strongly acid.

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

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is loam, fine sandy loam, or silt loam or their gravelly analogs.

The C horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 1 through 4. It is silt loam, loam, or sandy loam or their gravelly or very gravelly analogs. The IIC horizon mainly is loamy sand or sand. In some pedons stratified sand and gravel are at a depth of 40 inches.

Pope Series

The Pope series consists of deep, well drained soils that formed in alluvial material washed mainly from acid soils on uplands. The Pope soils are on flood plains mainly along the major streams in the eastern and southern parts of the survey area. Slopes range from 0 to 3 percent.

Pope soils are on the landscape with well drained Chavies soils, moderately well drained Philo soils, poorly drained Atkins soils, and Fluvaquents and Udifluvents. The Pope soils are flooded more frequently than the Chavies soils and less frequently than the Fluvaquents and Udifluvents, and are better drained than the Philo or Atkins soils.

Typical pedon of Pope sandy loam, in a idle field about 50 feet north of the Little Kanawha River and south of Route 46, about 0.8 mile east of the Lewis County line:

Ap—0 to 8 inches, dark brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many roots; strongly acid; abrupt smooth boundary.
B21—8 to 17 inches, strong brown (7.5YR 5/6) sandy loam; weak and moderate medium subangular blocky structure; very friable; many roots; medium acid; clear wavy boundary.
B22—17 to 34 inches, strong brown (7.5YR 5/6) sandy loam; weak fine and medium subangular blocky structure; friable; few roots; strongly acid; clear wavy boundary.
C1—34 to 48 inches, dark brown (7.5YR 4/4) sandy loam; massive; very friable; few roots; very strongly acid; clear wavy boundary.
IIC2—48 to 60 inches, dark brown (7.5YR 4/4) stratified sand and gravel; single grain; loose; very strongly acid.

The solum thickness ranges from 30 to 45 inches, and the depth to bedrock is more than 60 inches. The gravel content ranges from 0 to 30 percent in the solum and 0 to 40 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 or 4, and chroma of 2 through 4.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. It is fine sandy loam, sandy loam, or loam or their gravelly analogs.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is loam, sandy loam, loamy sand, or sand or their gravelly or very gravelly analogs.

Tygart Series

The Tygart series consists of deep, somewhat poorly drained soils that formed in slackwater-deposited alluvial material that washed from acid and lime-influenced soils on uplands. The Tygart soils are on terraces along the major streams in the northern and western parts of the survey area. Slopes range from 0 to 3 percent.

Tygart soils are on the landscape with well drained Chavies soils and moderately well drained Monongahela soils. The Tygart soils are not subject to rare flooding as are the Chavies soils, and they do not have the fragipan typical of the Monongahela soils.

Typical pedon of Tygart silt loam, in a meadow about 0.4 mile northwest of Route 119/3, about 2 miles east of the junction of U.S. Route 119 and Route 119/3:

Ap—0 to 10 inches, dark grayish brown (2.5Y 4/2) silt loam; weak fine granular structure; friable; many roots; medium acid; abrupt smooth boundary.
B1—10 to 18 inches, light olive brown (2.5Y 5/4) silt loam; few fine gray (N 5/0) and yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; firm; common roots; strongly acid; clear wavy boundary.
B21t—18 to 24 inches, light yellowish brown (2.5Y 6/4) silty clay loam; common fine yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2) mottles; coatings of light brownish gray (2.5Y 6/2) on faces of peds; moderate medium subangular blocky structure; firm; slightly plastic; slightly sticky; few roots; common discontinuous clay films on faces of peds; continuous clay films in pores; strongly acid; clear wavy boundary.
B22tg—24 to 36 inches, light brownish gray (2.5Y 6/2) silty clay loam; many medium yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; firm; slightly plastic, slightly sticky; few roots; continuous clay films on faces of peds and in pores; very strongly acid; clear wavy boundary.
B3g—36 to 48 inches, light brownish gray (2.5Y 6/2) silty clay loam; moderate medium and coarse yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few roots; few very dark brown (10YR 2/2) concretions; very strongly acid; gradual wavy boundary.
Cg—48 to 60 inches, light brownish gray (10YR 6/2) silty clay loam; common medium and coarse yellowish brown (10YR 5/8) mottles; massive; firm; common very dark brown (10YR 2/2) concretions; very strongly acid.

The solum thickness ranges from 35 to 55 inches, and the depth to bedrock is more than 60 inches. In unlimed areas the soils are strongly acid or very strongly acid.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3.

The upper part of the B horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 through 4. The lower part of the B horizon is neutral or has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 0 or 2. The B horizon is silt loam or silty clay loam.

The C horizon is neutral or has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 0 or 2.

Tygart soils in this survey area are a taxadjunct to the Tygart series because they are slightly less than 35 percent clay in the upper 20 inches of the argillic horizon. This difference does not significantly affect the use and management of the soils.

Udifluvents

Udifluvents consist of deep, well drained and moderately well drained soils. They formed in acid alluvial material washed from soils on uplands. The soils are on flood plains along the major tributaries of rivers in the southern and eastern parts of the survey area. Slopes range from 0 to 3 percent.

Udifluvents are on the landscape with Pope, Philo, Buchanan, and Ernest soils. The Udifluvents contain more cobbles than any of those soils, do not have the fragipan typical of the Buchanan and Ernest soils, and are flooded more frequently than the Pope or Philo soils.

Because of the variability of Udifluvents, a typical pedon is not given. The depth to bedrock is 48 inches or more. The content of coarse fragments ranges from 0 to 40 percent in the surface layer and 30 to 90 percent in underlying horizons. In unlimed areas the soils are very strongly acid to neutral throughout.

The A horizon has hue of 10YR through 5YR, value of 2 through 4, and chroma of 2 through 8. It is silt loam, loam, fine sandy loam, or loamy sand or their cobbly analogs.

The underlying horizons have hue of 10YR through 5YR, value of 3 through 6, and chroma of 2 through 8. They mainly are silt loam, loam, fine sandy loam, sandy loam, sandy clay loam, or clay loam or their cobbly or very cobbly analogs. Some pedons have strata of loamy sand or sand or their cobbly or very cobbly analogs. Structure is weak, medium or coarse subangular blocky, or the horizons are massive or single grain. Consistence is friable to loose.

Udorthents

Udorthents consist of a mixture of soil and rock fragments that has resulted from drastic land disturbance by man. The Udorthents in Upshur County are areas covered by dredged materials from the Buckhannon River, areas surface-mined for coal, and areas along highways and other construction sites that have been excavated or filled.

Udorthents, loamy, are mostly adjacent to the Buckhannon River in areas that have been covered with soil material dredged from the river.

Udorthents, mudstone and limestone; Udorthents, mudstone and sandstone; and Udorthents, sandstone and mudstone, are soils in areas used for surface mining or deep mining of coal.

Udorthents, smooth, are areas along highways and other construction sites that have been excavated or filled.

Because of the variability of Udorthents, loamy, a typical pedon is not given. The depth to bedrock is more than 60 inches. The coarse fragments have a wide range in kind, size, and amount. The soils have hue of 7.5YR to 2.5Y, value of 2 through 5, and chroma of 2 through 6. They are sandy loam, loam, silt loam, clay loam, or silty clay loam or their gravelly or very gravelly analogs.

Because of the variability of Udorthents, smoothed, a typical pedon is not given. The depth to bedrock is

generally more than 40 inches. The coarse fragments have a wide range in kind, size, and amount. The soils have hue of 10YR to 10R, 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, or clay or their gravelly or very gravelly or channery or very channery counterparts.

The areas of Udorthents that have resulted from the surface mining of coal have at least three of the following properties (*4*):

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 longest diameter of less than 3/4 inch or more than 10 inches and should be based on numbers of coarse fragments rather than 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 contain a higher percentage of fines than any other horizon in the profile to the bottom of the control section. This horizon generally ranges from 1 to 4 inches thick in most minesoils, but it may be thicker in minesoils that have been "topsoiled."
6. The profile has local pockets of materials, excluding single coarse fragments, that range from 3 to 40 inches in horizontal diameter. These pockets have no lateral continuity and are the result of the original placement of materials and not post-depositional processes. They may differ from surrounding material in color (1 or more Munsell color chips), soil textural or particle-size class, or dominant rock type constituting the coarse fragments.
7. Artifacts are present (paper, wire, logs, cans, glass, etc.).
8. Carbolithic coarse fragments occur in noncarbolithic minesoils.
9. Oxidizable carbon is irregularly distributed with depth and not associated with stratification (laboratory determination).

The soils mapped as Udorthents, mudstone and limestone, high base, contain a mixture of rock types, but the mudstone and limestone are predominant.

Udorthents, mudstone and limestone, high base, mapped in this survey area include many different kinds of pedons, none of which is considered typical. A pedon used as a reference for this soil is on a surface-mine bench about 300 yards north of Charity Fork, about 1.2 miles northwest of the junction of Routes 20/1 and West Virginia 20:

A1—0 to 5 inches, dark grayish brown (10YR 4/2) channery silt loam; few medium yellowish brown (10YR 5/6) lithochromic mottles; weak fine and medium granular structure; very friable; many roots; 30 percent coarse fragments (65 percent mudstone, 30 percent limestone, 5 percent sandstone); neutral; gradual irregular boundary.

C1—5 to 22 inches, dark gray (10YR 4/1) very channery silt loam; many medium and coarse dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/8) lithochromic mottles; massive; friable; common roots; 80 percent coarse fragments (55 percent mudstone, 25 percent limestone, 20 percent sandstone); neutral, gradual irregular boundary.

C2—22 to 40 inches, dark gray (10YR 4/1) very channery silt loam; pockets of silty clay loam; many medium and coarse yellowish brown (10YR 5/6) lithochromic mottles; massive; few roots; friable to firm; 85 percent coarse fragments (55 percent mudstone, 25 percent limestone, 20 percent sandstone); neutral.

The depth to bedrock is generally more than 40 inches but ranges from outcrops on highwalls to a depth of more than 30 feet on some benches and outslopes. The content of coarse fragments ranges from 30 to 85 percent in individual layers. The soils are medium acid to mildly alkaline.

The layers have hue of 10YR, value of 3 through 5, and chroma of 1 or 2. They are channery or very channery analogs of silt loam, loam, and silty clay loam.

Udorthents, mudstone and sandstone, high base, mapped in this survey consist of many different kinds of pedons, none of which is considered typical. A pedon used as a reference is about 3/4 mile south of Lorentz:

A1—0 to 2 inches, dark brown (7.5YR 4/4) channery silty clay loam; pockets of silt loam; many medium and coarse reddish brown (2.5YR 4/4) and yellow (2.5Y 7/8) lithochromic mottles; weak very fine and fine granular structure; very friable; many roots; 30 percent coarse fragments (60 percent mudstone, 25 percent sandstone, 15 percent shale and coal material); neutral; abrupt smooth boundary.

C1—2 to 21 inches, dark brown (7.5YR 4/4) very channery silty clay loam; pockets of silt loam and silty clay; common coarse dark red (2.5YR 3/6) lithochromic mottles; massive; friable to firm; common roots; 50 percent coarse fragments (55

percent mudstone, 30 percent sandstone, 15 percent shale and coal material); mildly alkaline; gradual irregular boundary.

C2—21 to 40 inches, dark brown (7.5YR 4/4) very channery silty clay loam; pockets of silt loam; common coarse dark red (2.5YR 3/6) and black (N 2/0) lithochromic mottles; massive; firm to friable; few roots; 70 percent coarse fragments (65 percent mudstone, 25 percent sandstone, 10 percent shale and coal material); neutral.

The depth to bedrock is generally more than 40 inches but ranges from outcrops on highwalls to a depth of more than 30 feet on some benches and outslopes. The content of coarse fragments ranges from 30 to 80 percent in individual layers. In unlimed areas the soils are medium acid to mildly alkaline.

The layers have hue of 7.5YR or 5YR, value of 3 through 5, and chroma of 2 through 6. They are channery or very channery counterparts of silt loam or silty clay loam.

The soils mapped as Udorthents, sandstone and mudstone, very low base (pH less than 4.0), and Udorthents, sandstone and mudstone, low base (pH 4.0 to 5.5), contain a mixture of rock types, but sandstone and mudstone are predominant.

Udorthents, sandstone and mudstone, low base, mapped in this survey area consist of many different kinds of pedons, none of which is considered typical. A pedon used as a reference is about 2 miles northwest of Ellamore:

A—0 to 3 inches, dark yellowish brown (10YR 4/4) very channery sandy loam; weak very fine granular structure; very friable; many roots; 65 percent coarse fragments (65 percent sandstone, 30 percent shale, 5 percent coal material); very strongly acid; clear wavy boundary.

C1—3 to 15 inches, yellowish brown (10YR 5/6) very channery sandy loam; many medium very dark grayish brown (10YR 3/2) and reddish yellow (7.5YR 6/8) lithochromic mottles and common medium yellowish brown (10YR 5/8) lithochromic mottles; massive; very friable; many roots; 75 percent coarse fragments (45 percent sandstone, 40 percent mudstone, 15 percent shale and coal material); few discontinuous silt coatings on coarse fragments; very strongly acid; gradual irregular boundary.

C2—15 to 22 inches, mixed brownish yellow (10YR 6/8) and very dark gray (10YR 3/1) very channery loam; pockets of silt loam; common medium strong brown (7.5YR 5/8) lithochromic mottles; massive; friable; few roots; 60 percent coarse fragments (60 percent sandstone, 30 percent mudstone, 10 percent shale and coal material); few discontinuous silt coatings on fragments; very strongly acid; gradual irregular boundary.

C3—22 to 40 inches, mixed brownish yellow (10YR 6/6) and strong brown (7.5YR 5/8) very channery loam; pockets of sandy loam and silt loam; massive; friable; 70 percent coarse fragments (70 percent sandstone, 20 percent mudstone, 10 percent shale and coal material); very strongly acid.

The depth to bedrock is generally more than 40 inches but ranges from outcrops on highwalls to a depth of more than 30 feet on some benches and outslopes. The content of coarse fragments ranges from 35 to 80 percent in individual layers. In unlimed areas the low base soils are very strongly acid or strongly acid and the very low base soils are extremely acid.

The layers have hue of 10YR or 7.5YR, value of 3 through 6, and chroma of 1 through 8. They are very channery counterparts of silt loam, loam, or sandy loam.

Upshur Series

The Upshur series consists of deep, well drained soils formed in lime-influenced material weathered mainly from soft shale. The Upshur soils are on ridgetops, benches, and side slopes in the northwestern part of the survey area. Slopes range from 8 to 65 percent.

Upshur soils are on the landscape with well drained Gilpin, Vandalia, and Westmoreland soils. The Upshur soils have more clay in the B and C horizons and are deeper to bedrock than the Gilpin soils and do not have the yellowish brown or strong brown typical of the Gilpin soils. The Upshur soils have more clay in the upper part of the subsoil than the Vandalia soils, have more clay in the B horizon than the Westmoreland soils, and do not have the strong brown typical of the Westmoreland soils.

Typical pedon of Upshur silty clay loam, in an area of Gilpin-Upshur complex, 25 to 35 percent slopes, severely eroded, in a pasture, 300 yards west of Sauls Run, about 1.2 miles southwest of Lorentz:

Ap—0 to 4 inches, reddish brown (5YR 4/4) silty clay loam; moderate medium and fine granular structure; friable; common roots; 10 percent coarse fragments; slightly acid; abrupt wavy boundary.

B21t—4 to 14 inches, reddish brown (2.5YR 4/4) silty clay; strong medium subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; 5 percent coarse fragments; many discontinuous clay films on faces of peds; medium acid; clear wavy boundary.

B22t—14 to 20 inches, reddish brown (2.5YR 4/4) silty clay; moderate medium and coarse subangular blocky structure; firm, sticky and plastic; common roots; less than 5 percent coarse fragments; many discontinuous clay films on faces of peds; medium acid; clear wavy boundary.

B3t—20 to 28 inches, reddish brown (2.5YR 4/4) channery silty clay loam; few black (10YR 2/1)

coatings; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; 25 percent coarse fragments; common discontinuous clay films on faces of peds; medium acid; clear wavy boundary.
C1—28 to 48 inches, reddish brown (2.5YR 4/4) very channery silty clay loam; 70 percent coarse fragments; firm; few roots; strongly acid; gradual wavy boundary.
Cr—48 inches, red and olive weathered shale and siltstone.

The solum thickness ranges from 26 to 40 inches, and the depth to bedrock is 40 inches or more. Coarse fragments of shale and siltstone and some sandstone make up 0 to 10 percent of the upper part of the solum, 0 to 25 percent of the lower part of the solum, and 25 to 75 percent in the C horizon. In unlimed areas the soils are strongly acid to slightly acid in the A horizon, strongly acid or medium acid in the B horizon, and strongly acid to neutral in the C horizon.

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

The B horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 or 6. It is silty clay in the upper part and silty clay loam or silty clay or their channery analogs in the B3 horizon.

The C horizon has hue of 2.5YR or 10R, value of 3 or 4, and chroma of 4 or 6. It is silty clay loam or silty clay or their channery or very channery analogs.

Vandalia Series

The Vandalia series consists of deep, well drained soils that formed in lime-influenced and acid colluvial material that moved down slope from Gilpin and Upshur soils on uplands. The Vandalia soils are on foot slopes and around the heads of drainageways. Slopes range from 8 to 25 percent.

Vandalia soils are on the landscape with well drained Gilpin and Upshur soils. The Vandalia soils are deeper to bedrock and have more clay in the B and C horizon than the Gilpin soils and do not have the yellowish brown or strong brown typical of the Gilpin soils. The Vandalia soils have less clay in the upper part of the subsoil than the Upshur soils.

Typical pedon of Vandalia silt loam, 15 to 25 percent slopes, in a hayfield about 50 yards north of U.S. Routes 33 and 119, at Lorentz:

Ap—0 to 9 inches, reddish brown (5YR 4/3) silt loam; moderate fine granular structure; friable; many roots; 5 percent coarse fragments; neutral; abrupt wavy boundary.
B21t—9 to 16 inches, reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common roots; 10 percent coarse fragments; common discontinuous clay films on faces of peds; neutral; clear wavy boundary.
B22t—16 to 30 inches, reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; 10 percent coarse fragments; many discontinuous clay films on faces of peds; medium acid; clear wavy boundary.
B3t—30 to 44 inches, reddish brown (5YR 4/4) channery silty clay; weak coarse subangular blocky structure; firm, few roots; 15 percent coarse fragments; many discontinuous clay films on faces of peds; few black (10YR 2/1) coatings; sticky and plastic; medium acid; gradual wavy boundary.
IIC—44 to 60 inches, reddish brown (2.5YR 4/4) very channery silty clay; few fine yellowish red (5YR 4/6) mottles; massive; firm, slightly sticky; 40 percent coarse fragments; many medium black (10YR 2/1) coatings; slightly acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 60 inches. Coarse fragments of shale and sandstone make up 5 to 20 percent of the solum and 10 to 50 percent of the C horizon. In unlimed areas the soils are medium acid or strongly acid in the A and B2t horizons and strongly acid to slightly acid in the B3 and C horizons.

The A horizon has hue of 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 4 or 6. It is silty clay loam or silty clay or their channery analogs.

The C horizon or IIC horizon has hue of 5YR or 2.5YR, value of 4 through 6, and chroma of 3 through 6. It is channery or very channery analogs of silty clay, silty clay loam, or clay loam.

Westmoreland Series

The Westmoreland series consist of deep, well drained soils that formed in acid and lime-influenced material weathered from interbedded shale, siltstone, sandstone, and some limestone. Westmoreland soils are mainly on side slopes and benches in the northwestern part of the survey area. Slopes range from 25 to 65 percent.

Westmoreland soils are on the landscape with well drained Gilpin and Upshur soils. The Westmoreland soils are deeper than the Gilpin soils, have less clay in the B horizon than the Upshur soils, and do not have the reddish brown typical of the Upshur soils.

Typical pedon of Westmoreland silt loam, in a wooded area of Westmoreland-Upshur silt loams, 35 to 65 percent slopes, about 1/2 mile south of Charity Fork and 0.2 mile west of West Virginia Route 20:

O1—1 1/2 inches to 1/2 inch, hardwood leaf litter.
O2—1/2 inch to 0, decomposed leaf litter.

A1—0 to 2 inches, very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; very friable; many roots; 5 percent coarse fragments; strongly acid; clear wavy boundary.
A2—2 to 5 inches, dark brown (10YR 4/3) silt loam; weak fine and medium granular structure; very friable; many roots; 5 percent coarse fragments; strongly acid; abrupt wavy boundary.
B1—5 to 9 inches, brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; many roots; 10 percent coarse fragments; strongly acid; clear wavy boundary.
B21t—9 to 20 inches, strong brown (7.5YR 5/6) channery silty clay loam; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on faces of peds; 15 percent coarse fragments; medium acid; gradual wavy boundary.
B22t—20 to 31 inches, strong brown (7.5YR 5/6) channery silty clay loam; moderate medium subangular blocky structure; friable; common roots; common discontinuous clay films on faces of peds; 15 percent coarse fragments; medium acid; clear wavy boundary.
B3—31 to 38 inches, strong brown (7.5YR 4/6) channery silt loam; weak medium and coarse subangular blocky structure; friable; common roots; few discontinuous clay films on faces of peds; 20 percent coarse fragments; strongly acid; clear wavy boundary.
C—38 to 50 inches, brown (7.5YR 4/4) very channery silt loam; massive; firm; few roots; 70 percent coarse fragments; strongly acid; clear wavy boundary.
R—50 inches, fractured siltstone.

The solum thickness ranges from 20 to 40 inches. The depth to bedrock is 40 inches or more. Coarse fragments of shale, siltstone, and some limestone make up from 5 to 30 percent of individual horizons of the solum and 45 to 80 percent of the C horizon. In unlimed areas the soils are strongly acid to medium 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 4 or 5, and chroma of 4 through 8. It is silt loam or silty clay loam or their channery analogs.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 6. It is very channery analogs of silt loam and loam.

Formation of the Soils

The origin and development of the soils in Upshur County are described in this section. The five factors of soil formation are listed, and their influence on the soils is described. Also described are the morphology of 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 Upshur County have resulted from the interaction of five major factors of soil formation: parent material, time, climate, living organisms, and topography. Each factor modifies the effectiveness of the others. Parent material, topography, and time have produced the major differences among the soils in the survey area. Climate and living organisms generally show their influence throughout broad areas, and their effects are relatively uniform throughout the area.

Parent Material, Time, and Climate

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

Most of the soils formed in residual material weathered from interbedded shale, siltstone, sandstone, and some limestone. For example, Gilpin soils formed in material weathered from interbedded shale, siltstone, and fine-grain sandstone; Dekalb soils in material weathered from sandstone; and Upshur soils in material weathered from calcareous shales. The residual material is the oldest parent material in the survey area. However, most of the soils are not as well developed as some of the soils formed in younger material, mainly because the soil-forming processes have been slowed in some areas by clayey material, resistant rock, slope, and soil erosion.

Colluvial material is along foot slopes and near the heads of drainageways. This material moved downslope from the acid and lime-influenced residual soils. The Vandalia soils formed in colluvium below the Upshur soils, the Buchanan soils in colluvium below the Dekalb soils, and the Ernest soils in colluvium below the Gilpin soils.

The alluvial 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 Tygart and Monongahela soils, are strongly leached and moderately well developed. The alluvial deposits on the flood plains are the youngest parent materials in the survey area. Most soils on flood plains are poorly developed because the soil-forming processes have had little time to act. Pope, Philo, and Atkins are examples of soils of flood plains.

Climate generally is uniform throughout the survey area. Slight climatic differences exist between the northern and southern parts of the county, but the differences are not significant enough to affect soil formation. Therefore, climate is not responsible for major differences in the soil. Rainfall and temperature, however, have a general influence on the development of layers in the soil profile. A detailed description of climate is given in the section "General Nature of the Survey Area."

Living Organisms

All living organisms—plants, animals, bacteria, fungi, and man—affect soil formation. The kind and amount of vegetation are generally responsible for the amount of organic matter, the color of the surface layer, and, in part, the amount of nutrients. Earthworms and burrowing animals help keep the soil open and porous, and they mix organic matter and mineral matter by moving the soil to the surface. Bacteria and fungi decompose organic matter, thus releasing nutrients for plant food. Man influences the characteristics of the surface layer by clearing the forest, plowing, and mining and other land disturbances. He has added fertilizers, mixed some of the soil horizons, and moved soil from place to place.

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 move through them. This condition favors the formation of deep, moderately developed to well developed soils. On the steep and very steep hillsides, less water moves through the soil and the amount and rate of runoff are greater. In

addition, the soil material may be washed away almost as rapidly as it forms. Thus, it is likely that the soils on the steeper hillsides will be shallower to bedrock than the soils on the more gentle slopes.

In this survey area, topography is favorable for formation of soils on flood plains and terraces, and formation is progressing at a rather rapid rate. Soils on flood plains are weakly developed, however, mainly because too little time has elapsed since the material was deposited.

Morphology of Soils

The results of the soil-forming processes can be observed in the different layers, or soil horizons, in the soil profile. The profile extends from the soil surface downward to materials that are little changed by the soil-forming processes. Most soils contain three major horizons, called the A, B, and C horizons. These horizons can be subdivided further by the use of numbers and letters to indicate changes within the major horizon.

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

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

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

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

Most of the well drained and moderately well drained soils on uplands in the survey area have a yellowish brown, strong brown, or reddish brown B horizon. These colors are caused mainly by the presence of iron oxides. The B horizon of these soils has blocky structure and commonly contains translocated clay minerals.

A fragipan has formed in the B horizon of most of the moderately well drained soils on foot slopes and terraces. This layer is dense and brittle, is mottled, and has slow or very slow permeability to water and air. The grayish colors in a fragipan are the result of reduction of iron during soil formation.

Geology

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

All the surface rocks of Upshur County are sedimentary in origin and consist of sandstone, siltstone, shale, thin limestones, and coal of Pennsylvanian age. Little local folding has taken place, but there is a regional dip ranging from 50 to 200 feet per mile to the northwest.

The regional dip creates broad outcrop zones trending from the southwest to northeast which allow the county to be divided into three large areas with somewhat different geologic and topographic features (*3, 10*).

The southeastern half of the county, bordering Randolph and Barbour Counties, is an area of rugged hills drained by the upper Buckhannon and Middle Fork Rivers. Rocks of the Conemaugh group, Allegheny Formation, and Pottsville group outcrop here. Massive sandstones in the Allegheny and Pottsville groups have a strong influence on the topography. A number of coals, most notably the Upper Freeport and Lower Kittanning, have been extensively mined. Gilpin, Buchanan, and Lily soils are dominant in the northern half of this area; Gilpin, Dekalb, and Buchanan soils are dominant in the southern half.

An area about 5 miles wide and 22 miles long follows the outcrop of the Conemaugh group. It crosses the county from Rock Cave through Buckhannon to Teter. This is an area of rolling hills underlain primarily by siltstone and shale but also containing significant amounts of sandstone, thick limestones, and coal. Gilpin, Lily, Buchanan, and Ernest soils are dominant. The area in and near the city of Buckhannon consists primarily of Monongahela, Tygart, and Orrville soils that formed in alluvial deposits along the Buckhannon River and Finks Run.

The youngest rocks are in the northwestern corner of Upshur County, at the headwaters of Finks Run, Turkey Run, and Hackers Creek. Some ridgetops are capped with sandstones of the Dunkard group, but most ridges and side slopes are primarily of the Monongahela group. Some side slopes are influenced by the Conemaugh group. Cyclic deposits of sandstone, siltstone, shale, coal, and limestone are typical of this area. Gilpin, Upshur, Vandalia, and Ernest soils are dominant.

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Glossary

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

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

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

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

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

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	>5.2

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

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

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.

Coaly. Covered with coal, or containing or resembling coal.

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.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

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

Conservation tillage. A form of noninversion tillage that retains protective amounts of residue mulch on the surface throughout the year. It includes no-tillage, strip tillage, stubble mulching, and other types of noninversion tillage.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.
Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

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

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

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.

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.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

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.

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.
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.

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.

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.

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.

Lime-influenced. A soil having a base saturation of more than 35 percent, but not containing enough calcium carbonate (or magnesium carbonate) to effervesce visibly when treated with cold dilute hydrochloric acid.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lithochromic mottles. Mottles that have inherited their color from the parent rocks.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low 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.

Minesoil. A young soil in recently deposited earthy materials resulting from deep mining or surface mining of coal.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

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).

Mudstone. An indurated mud having the texture and composition of shale but lacking the fine lamination of fissility; a blocky or massive, fine-grained sedimentary rock in which the proportions of clay and silt are approximately the same.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

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.

Parent material. The unconsolidated organic and mineral material in which soil forms.

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.

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.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

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. A sedimentary rock formed by induration of a clay or silty clay deposit and having the tendency to split into thin layers (i.e., fissility).

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils,

slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are:

	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).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace (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.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-73 at Buckhannon, W. Va.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	41.1	20.0	30.8	69	-15	31	3.84	2.41	5.13	9	14.4
February---	45.6	24.0	34.8	71	-7	46	3.70	2.27	4.98	9	14.0
March------	55.5	28.7	41.0	78	8	106	4.09	2.40	5.59	10	8.2
April------	64.4	38.2	51.3	84	18	349	4.31	2.73	5.72	11	1.9
May--------	73.8	46.2	60.0	88	27	620	4.04	2.59	5.43	9	.0
June-------	81.5	54.8	68.1	92	36	843	4.47	2.61	6.12	8	.0
July-------	83.7	58.9	71.3	94	42	970	5.06	3.20	6.74	9	.0
August-----	82.5	57.3	70.0	92	40	930	4.12	2.45	5.61	7	.0
September--	77.8	50.6	64.2	94	30	726	3.73	2.18	5.10	7	.0
October----	68.7	40.0	54.3	85	20	443	2.70	.82	4.23	6	.0
November---	54.3	31.2	42.8	78	7	126	3.33	2.13	4.41	8	4.5
December---	44.0	24.1	34.0	74	-6	96	3.64	1.94	5.12	9	11.4
Year-----	64.2	39.5	51.9	96	-15	5,286	47.03	40.97	52.98	102	54.4

[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

[Recorded in the period 1951-73 at Buckhannon, 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--	May 3	May 8	June 1
2 years in 10 later than--	April 27	May 4	May 25
5 years in 10 later than--	April 17	April 26	May 13
First freezing temperature in fall:			
1 year in 10 earlier than--	October 12	September 27	September 17
2 years in 10 earlier than--	October 17	October 1	September 22
5 years in 10 earlier than--	October 26	October 11	October 1

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-73 at Buckhannon, 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	173	150	115
8 years in 10	180	156	124
5 years in 10	192	167	140
2 years in 10	204	179	157
1 year in 10	210	185	165

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
At	Atkins silt loam	630	0.3
BeC	Buchanan and Ernest very stony silt loams, 3 to 15 percent slopes	8,330	3.7
BeD	Buchanan and Ernest very stony silt loams, 15 to 25 percent slopes	24,670	11.0
Ch	Chavies loam	750	0.3
DaC	Dekalb channery loam, 8 to 15 percent slopes	1,310	0.6
DaD	Dekalb channery loam, 15 to 25 percent slopes	1,320	0.6
DaE	Dekalb channery loam, 25 to 35 percent slopes	930	0.4
DaF	Dekalb channery loam, 35 to 70 percent slopes	540	0.2
DmC	Dekalb extremely stony loam, 3 to 15 percent slopes	440	0.2
DmE	Dekalb extremely stony loam, 15 to 35 percent slopes	870	0.4
DmF	Dekalb extremely stony loam, 35 to 70 percent slopes	500	0.2
EnB	Ernest silt loam, 3 to 8 percent slopes	320	0.1
EnC	Ernest silt loam, 8 to 15 percent slopes	5,120	2.3
EnD	Ernest silt loam, 15 to 25 percent slopes	2,590	1.1
Fu	Fluvaquents and Udifluvents, frequently flooded	810	0.4
GaB	Gilpin silt loam, 3 to 8 percent slopes	930	0.4
GaC	Gilpin silt loam, 8 to 15 percent slopes	8,430	3.7
GaD	Gilpin silt loam, 15 to 25 percent slopes	4,030	1.8
GbC	Gilpin channery silt loam, 8 to 15 percent slopes	5,230	2.3
GbD	Gilpin channery silt loam, 15 to 25 percent slopes	6,750	3.0
GbE	Gilpin channery silt loam, 25 to 35 percent slopes	13,280	5.9
GbF	Gilpin channery silt loam, 35 to 65 percent slopes	2,850	1.3
GcC	Gilpin stony silt loam, 3 to 15 percent slopes	1,780	0.8
GcE	Gilpin stony silt loam, 15 to 35 percent slopes	8,140	3.6
GcF	Gilpin stony silt loam, 35 to 65 percent slopes	1,820	0.8
GdE	Gilpin-Dekalb complex, 15 to 35 percent slopes	3,020	1.3
GdF	Gilpin-Dekalb complex, 35 to 70 percent slopes	870	0.4
GkC	Gilpin-Dekalb complex, stony, 3 to 15 percent slopes	3,570	1.6
GkE	Gilpin-Dekalb complex, stony, 15 to 35 percent slopes	31,970	14.2
GkF	Gilpin-Dekalb complex, stony, 35 to 70 percent slopes	23,550	10.5
GuC	Gilpin-Upshur silt loams, 8 to 15 percent slopes	1,040	0.5
GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes	2,640	1.2
GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes	9,410	4.2
GuF	Gilpin-Upshur silt loams, 35 to 65 percent slopes	11,920	5.3
GwC3	Gilpin-Upshur complex, 8 to 15 percent slopes, severely eroded	650	0.3
GwD3	Gilpin-Upshur complex, 15 to 25 percent slopes, severely eroded	2,720	1.2
GwE3	Gilpin-Upshur complex, 25 to 35 percent slopes, severely eroded	6,870	3.0
LyB	Lily loam, 3 to 8 percent slopes	1,220	0.5
LyC	Lily loam, 8 to 15 percent slopes	4,630	2.1
MoB	Monongahela silt loam, 3 to 8 percent slopes	540	0.2
MoC	Monongahela silt loam, 8 to 15 percent slopes	270	0.1
Oh	Orrville-Holly silt loams	2,460	1.1
Pa	Philo-Atkins silt loams	960	0.4
Po	Pope sandy loam	830	0.4
Tg	Tygart silt loam	520	0.2
Ua	Udorthents, loamy	410	0.2
Ub	Udorthents, mudstone and limestone, high base	380	0.2
Uc	Udorthents, mudstone and sandstone, high base	3,600	1.6
Ud	Udorthents, sandstone and mudstone, low base	930	0.4
Ue	Udorthents, sandstone and mudstone, very low base	140	0.1
Uf	Udorthents, smoothed	560	0.2
VaC	Vandalia silt loam, 8 to 15 percent slopes	1,540	0.7
VaD	Vandalia silt loam, 15 to 25 percent slopes	2,330	1.0
WuE	Westmoreland-Upshur silt loams, 25 to 35 percent slopes	680	0.3
WuF	Westmoreland-Upshur silt loams, 35 to 65 percent slopes	2,000	0.9
	Water	680	0.3
	Total	225,280	100.0

TABLE 5.--PRIME FARMLAND

[Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name]

Map symbol	Soil name
At	Atkins silt loam (where drained)
Ch	Chavies loam
GaB	Gilpin silt loam, 3 to 8 percent slopes
LyB	Lily loam, 3 to 8 percent slopes
Oh	Orrville-Holly silt loams (where drained)
Pa	Philo-Atkins silt loams (where drained)
Po	Pope sandy loam
Tg	Tygart silt loam (where drained)

TABLE 6.--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
	Bu	Bu	Bu	Ton	Ton	AUM*
At---------- Atkins	100	60	30	3.0	---	4.5
BeC---------- Buchanan and Ernest	---	---	---	---	---	---
BeD---------- Buchanan and Ernest	---	---	---	---	---	---
Ch---------- Chavies	120	80	45	3.5	5.0	5.0
DaC---------- Dekalb	75	55	35	2.5	3.0	4.0
DaD---------- Dekalb	70	50	30	2.0	3.0	3.0
DaE---------- Dekalb	---	---	---	---	---	2.5
DaF, DmC, DmE, DmF-------- Dekalb	---	---	---	---	---	---
EnB---------- Ernest	100	65	40	3.0	3.5	4.5
EnC---------- Ernest	95	60	35	3.0	3.5	4.0
EnD---------- Ernest	90	55	35	2.5	3.0	3.5
Fu---------- Fluvaquents and Udifluvents	---	---	---	---	---	---
GaB---------- Gilpin	90	65	40	3.0	3.5	4.5
GaC---------- Gilpin	85	60	35	3.0	3.5	4.5
GaD---------- Gilpin	80	55	30	2.5	3.0	4.0
GbC---------- Gilpin	85	60	35	3.0	3.5	4.5
GbD---------- Gilpin	80	55	30	2.5	3.0	4.0
GbE, GcC---------- Gilpin	---	---	---	---	---	3.0
GbF, GcE, GcF---------- Gilpin	---	---	---	---	---	---
GdE---------- Gilpin-Dekalb	---	---	---	---	---	2.5
GdF, GkC, GkE, GkF-------- Gilpin-Dekalb	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky bluegrass
	Bu	Bu	Bu	Ton	Ton	AUM*
GuC---- Gilpin-Upshur	90	60	35	3.0	3.5	4.5
GuD---- Gilpin-Upshur	85	55	30	2.5	3.0	4.0
GuE---- Gilpin-Upshur	---	---	---	---	---	3.5
GuF---- Gilpin-Upshur	---	---	---	---	---	---
GwC3---- Gilpin-Upshur	85	55	30	2.5	3.0	4.0
GwD3---- Gilpin-Upshur	---	---	---	---	---	3.5
GwE3---- Gilpin-Upshur	---	---	---	---	---	---
LyB---- Lily	95	---	40	3.5	---	---
LyC---- Lily	85	---	35	3.0	---	---
MoB---- Monongahela	110	65	40	3.0	3.5	4.5
MoC---- Monongahela	90	60	35	3.0	3.0	4.5
Oh---- Orrville-Holly	105	75	---	4.0	---	5.0
Pa---- Philo-Atkins	115	70	40	3.5	---	5.0
Po---- Pope	130	80	45	4.0	---	4.5
Tg---- Tygart	95	60	---	3.0	3.0	4.5
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents						
VaC---- Vandalia	100	60	35	3.0	4.5	4.5
VaD---- Vandalia	90	55	30	2.5	4.0	4.0
WuE---- Westmoreland-Upshur	---	---	---	---	---	3.5
WuF---- Westmoreland-Upshur	---	---	---	---	---	---

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	---	---	---	---
II	4,590	3,010	830	750
III	32,140	27,570	4,570	---
IV	20,310	20,310	---	---
V	---	---	---	---
VI	35,390	30,040	---	5,350
VII	125,340	25,050	---	100,290
VIII	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
At---------- Atkins	1w	Slight	Severe	Severe	Severe	Red maple----------	---	Eastern white pine, Norway spruce.
						American sycamore---	---	
						Blackgum----------	---	
						Black birch---------	---	
BeC*:								
Buchanan----------	2x	Slight	Moderate	Slight	Severe	Northern red oak----	80	Northern red oak, yellow-poplar, sugar maple, eastern white pine, Japanese larch.
						Yellow-poplar-------	90	
Ernest----------	2x	Moderate	Severe	Slight	Severe	Northern red oak----	80	Eastern white pine, Norway spruce, Japanese larch, yellow poplar.
						Yellow-poplar-------	89	
						White ash----------	80	
						Black walnut--------	---	
						Sugar maple---------	80	
						Black cherry--------	80	
BeD*:								
Buchanan----------	2x	Moderate	Moderate	Slight	Severe	Northern red oak----	80	Northern red oak, yellow-poplar, sugar maple, eastern white pine, Japanese larch.
						Yellow-poplar-------	90	
Ernest----------	2x	Severe	Severe	Slight	Severe	Northern red oak----	80	Eastern white pine, Norway spruce, Japanese larch, yellow poplar.
						Yellow-poplar-------	89	
						White ash----------	80	
						Black walnut--------	---	
						Sugar maple---------	80	
						Black cherry--------	80	
Ch---------- Chavies	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Eastern white pine, yellow-poplar, black walnut, Norway spruce.
						Yellow-poplar-------	90	
						Black walnut--------	---	
						Sugar maple---------	---	
DaC**---------- Dekalb	3o	Slight	Slight	Slight	Moderate	Northern red oak----	70	Norway spruce, yellow-poplar, red pine.
						Black cherry--------	88	
						White ash----------	80	
DaD**---------- Dekalb (North aspect)	2r	Slight	Moderate	Slight	Severe	Northern red oak----	76	Norway spruce, yellow-poplar, red pine.
						Black cherry--------	95	
						Yellow-poplar-------	93	
DaD**---------- Dekalb (South aspect)	3r	Slight	Moderate	Slight	Moderate	Northern red oak----	---	Eastern white pine, red pine.
						Black cherry--------	82	
						Yellow-poplar-------	75	
DaE**---------- Dekalb (North aspect)	2r	Slight	Moderate	Slight	Severe	Northern red oak----	76	Norway spruce, yellow-poplar, red pine.
						Black cherry--------	95	
						Yellow-poplar-------	93	
DaE**---------- Dekalb (South aspect)	3r	Slight	Moderate	Slight	Moderate	Northern red oak----	66	Eastern white pine, red pine.
						Black cherry--------	82	
						Yellow-poplar-------	75	
DaF**---------- Dekalb (North aspect)	2r	Moderate	Severe	Slight	Severe	Northern red oak----	76	Norway spruce, yellow-poplar, red pine.
						Black cherry--------	95	
						Yellow-poplar-------	93	

See footnotes at end of table.

TABLE 8.--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	
DaF** Dekalb (South aspect)	3r	Moderate	Severe	Slight	Moderate	Northern red oak Black cherry Yellow-poplar	66 82 75	Eastern white pine, red pine.
DmC** Dekalb	3x	Slight	Moderate	Slight	Moderate	Northern red oak Black cherry White ash	70 88 80	Norway spruce, yellow-poplar, red pine.
DmE** Dekalb (North aspect)	2x	Slight	Severe	Slight	Severe	Northern red oak Black cherry Yellow-poplar	76 95 93	Norway spruce, yellow-poplar, red pine.
DmE** Dekalb (South aspect)	3x	Slight	Severe	Slight	Moderate	Northern red oak Black cherry Yellow-poplar	66 82 75	Eastern white pine, red pine.
DmF** Dekalb (North aspect)	2x	Moderate	Severe	Slight	Severe	Northern red oak Black cherry Yellow-poplar	76 95 93	Norway spruce, yellow-poplar, red pine.
DmF** Dekalb (South aspect)	3x	Moderate	Severe	Slight	Moderate	Northern red oak Black cherry Yellow-poplar	66 82 75	Eastern white pine, red pine.
EnB Ernest	2w	Slight	Moderate	Slight	Severe	Northern red oak Yellow-poplar White ash Black walnut Sugar maple Black cherry	80 89 80 --- 80 80	Eastern white pine, Norway spruce, Japanese larch, yellow-poplar.
EnC Ernest	2w	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar White ash Black walnut Sugar maple Black cherry	80 89 80 --- 80 80	Eastern white pine, Norway spruce, Japanese larch, yellow-poplar.
EnD Ernest	2w	Severe	Moderate	Slight	Severe	Northern red oak Yellow-poplar White ash Black walnut Sugar maple Black cherry	80 89 80 --- 80 80	Eastern white pine, Norway spruce, Japanese larch, yellow-poplar.
GaB, GaC Gilpin	2o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Red maple White oak	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GaD Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Red maple White oak	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GaD Gilpin (South asepct)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar Red maple White oak	70 90 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GbC** Gilpin	2o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Red maple White oak	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GbD** Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Red maple White ash	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.

See footnotes at end of table.

TABLE 8.--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	
GbD** Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	70 90 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GbE** Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GbE** Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	70 90 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GbF** Gilpin (North aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GbF** Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	70 90 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GcC Gilpin	2o	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GcE Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GcE Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	70 90 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GcF Gilpin (North aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GcF Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	70 90 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.
GdE* **: Gilpin---------- (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak---- Yellow-poplar------- Red maple---------- White oak----------	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar, red pine.

See footnotes at end of table.

TABLE 8.--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	
GdE* **:								
Dekalb (North aspect)	2r	Slight	Moderate	Slight	Severe	Northern red oak	76	Norway spruce, yellow-poplar, red pine.
						Black cherry	95	
						Yellow-poplar	93	
						Red maple	---	
						White oak	---	
GdE* **:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak	70	Japanese larch, eastern white pine, yellow-poplar, red pine.
						Yellow-poplar	90	
						Red maple	---	
						White oak	---	
Dekalb (South aspect)	3r	Slight	Moderate	Slight	Moderate	Northern red oak	66	Eastern white pine, red pine.
						Black cherry	82	
						Yellow-poplar	75	
						Red maple	---	
						White oak	---	
GdF* **:								
Gilpin (North aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak	80	Japanese larch, eastern white pine, yellow-poplar, red pine.
						Yellow-poplar	95	
						Red maple	---	
						White oak	---	
Dekalb (North aspect)	2r	Moderate	Severe	Slight	Severe	Northern red oak	76	Norway spruce, yellow-poplar, red pine.
						Black cherry	95	
						Yellow-poplar	93	
						Red maple	---	
						White oak	---	
GdF* **:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak	70	Japanese larch, eastern white pine, yellow-poplar, red pine.
						Yellow-poplar	90	
						Red maple	---	
						White oak	---	
Dekalb (South aspect)	3r	Moderate	Severe	Slight	Moderate	Northern red oak	66	Eastern white pine, red pine.
						Black cherry	82	
						Yellow-poplar	75	
						Red maple	---	
						White oak	---	
GkC* **:								
Gilpin	2o	Slight	Slight	Slight	Moderate	Northern red oak	80	Japanese larch, eastern white pine, yellow-poplar, red pine.
						Yellow-poplar	95	
						Red maple	---	
						White oak	---	
Dekalb	3o	Slight	Slight	Slight	Moderate	Northern red oak	70	Norway spruce, yellow-poplar, red pine.
						Black cherry	88	
						White ash	80	
						Red maple	---	
						White oak	---	
GkE* **:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak	80	Japanese larch, eastern white pine, yellow-poplar, red pine.
						Yellow-poplar	95	
						Red maple	---	
						White oak	---	
Dekalb (North aspect)	2r	Slight	Moderate	Slight	Severe	Northern red oak	76	Norway spruce, yellow-poplar, red pine.
						Black cherry	95	
						Yellow-poplar	93	
						Red maple	---	
						White oak	---	

See footnotes at end of table.

TABLE 8.--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	
GkE* **:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak	70	Japanese larch, eastern white pine, yellow-poplar, red pine.
						Yellow-poplar	90	
						Red maple	---	
						White oak	---	
Dekalb (South aspect)	3r	Slight	Moderate	Slight	Moderate	Northern red oak	66	Eastern white pine, red pine.
						Black cherry	82	
						Yellow-poplar	75	
						Red maple	---	
						White oak	---	
GkF* **:								
Gilpin (North aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak	80	Japanese larch, eastern white pine, yellow-poplar, red pine.
						Yellow-poplar	95	
						Red maple	---	
						White oak	---	
Dekalb (North aspect)	2r	Moderate	Severe	Slight	Severe	Northern red oak	76	Norway spruce, yellow-poplar, red pine.
						Black cherry	95	
						Yellow-poplar	93	
						Red maple	---	
						White oak	---	
GkF* **:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak	70	Japanese larch, eastern white pine, yellow-poplar, red pine.
						Yellow-poplar	90	
						Red maple	---	
						White oak	---	
Dekalb (South aspect)	3r	Moderate	Severe	Slight	Moderate	Northern red oak	66	Eastern white pine, red pine.
						Black cherry	82	
						Yellow-poplar	75	
						Red maple	---	
						White oak	---	
GuC*:								
Gilpin	2o	Slight	Slight	Slight	Moderate	Northern red oak	80	Japanese larch, eastern white pine, yellow-poplar.
						Yellow-poplar	95	
						Black oak	---	
						White oak	---	
Upshur	3c	Severe	Severe	Slight	Severe	Northern red oak	65	Eastern white pine, yellow-poplar.
						Yellow-poplar	80	
						Black oak	---	
						White oak	---	
GuD*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak	80	Japanese larch, eastern white pine, yellow-poplar.
						Yellow-poplar	95	
						Black oak	---	
						White oak	---	
						Red maple	---	
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak	70	Eastern white pine, yellow-poplar.
						Yellow-poplar	90	
						Red maple	---	
GuD*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak	70	Japanese larch, eastern white pine, yellow-poplar.
						Yellow-poplar	90	
						Black oak	---	
						White oak	---	
						Red maple	---	
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak	65	Eastern white pine, eastern redcedar.
						White oak	---	
						Chestnut oak	---	

See footnotes at end of table.

TABLE 8.--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	
GuE*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Black oak White oak Red maple	80 95 --- --- ---	Japanese larch, eastern white pine, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Red maple	70 90 ---	Eastern white pine, yellow-poplar.
GuE*:								
Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar Black oak White oak Red maple	70 90 --- --- ---	Japanese larch, eastern white pine, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak White oak Chestnut oak	65 --- ---	Eastern white pine, eastern redcedar.
GuF*:								
Gilpin (North aspect)	2r	Severe	Severe	Slight	Moderate	Northern red oak Yellow-poplar Black oak White oak Red maple	80 95 --- --- ---	Japanese larch, eastern white pine, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Red maple	70 90 ---	Eastern white pine, yellow-poplar.
GuF*:								
Gilpin (South aspect)	3r	Severe	Severe	Moderate	Moderate	Northern red oak Yellow-poplar Black oak White oak Red maple	70 90 --- --- ---	Japanese larch, eastern white pine, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak White oak Chestnut oak	65 --- ---	Eastern white pine, eastern redcedar.
GwC3*:								
Gilpin	2o	Slight	Slight	Slight	Moderate	Northern red oak Yellow-poplar Black oak White oak	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar.
Upshur	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Red maple	65 80 ---	Eastern white pine, yellow-poplar.
GwD3*:								
Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Black oak White oak	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar.

See footnotes at end of table.

TABLE 8.--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	
GwD3*: Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Red maple	70 90 ---	Eastern white pine, yellow poplar.
GwD3*: Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar Black oak White oak	70 90 --- ---	Japanese larch, eastern white pine, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak White oak Chestnut oak	65 --- ---	Eastern white pine, eastern redcedar.
GwE3*: Gilpin (North aspect)	2r	Moderate	Moderate	Slight	Moderate	Northern red oak Yellow-poplar Black oak White oak	80 95 --- ---	Japanese larch, eastern white pine, yellow-poplar.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Red maple	70 90 ---	Eastern white pine, yellow-poplar.
GwE3*: Gilpin (South aspect)	3r	Moderate	Moderate	Moderate	Moderate	Northern red oak Yellow-poplar Black oak White oak	70 90 --- ---	Japanese larch, eastern white pine, yellow-poplar.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak White oak Chestnut oak	65 --- ---	Eastern white pine, eastern redcedar.
LyB, LyC Lily	4o	Slight	Slight	Slight	Moderate	Northern red oak Yellow poplar White pine	--- --- ---	White pine, Norway spruce, white oak, red oak.
MoB Monongahela	3o	Slight	Slight	Slight	Severe	Northern red oak Yellow-poplar White ash Black walnut	70 85 --- ---	Eastern white pine, Norway spruce, yellow-poplar, black walnut.
MoC Monongahela	3r	Moderate	Slight	Slight	Severe	Northern red oak Yellow-poplar White ash Black walnut	70 85 --- ---	Eastern white pine, Norway spruce, yellow-poplar, black walnut.

See footnotes at end of table.

TABLE 8.--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	
Oh*:								
Orrville	2o	Slight	Slight	Slight	Moderate	Northern red oak	80	Eastern white pine, yellow-poplar, black walnut, red pine.
						Yellow-poplar	90	
						Sugar maple	80	
						White oak	---	
						Black walnut	---	
						White ash	---	
Holly	2w	Slight	Severe	Severe	Severe	Red maple	---	Sweetgum, American sycamore, Norway spruce.
Pa*:								
Philo	1w	Slight	Moderate	Slight	Severe	Northern red oak	86	Eastern white pine, yellow-poplar, Norway spruce.
						Yellow-poplar	102	
						Black oak	85	
						White oak	85	
						White ash	85	
						Red maple	---	
Atkins	1w	Slight	Severe	Severe	Severe	Black gum	---	Eastern white pine, white spruce, Norway spruce.
						Sweetgum	95	
						Black birch	---	
						Red maple	---	
						American sycamore	---	
Po Pope	2o	Slight	Slight	Slight	Severe	Northern red oak	80	Eastern white pine, yellow-poplar, black walnut, Norway spruce, European larch.
						Yellow-poplar	102	
						Red maple	---	
Tg Tygart	2w	Slight	Severe	Severe	Severe	Northern red oak	80	Eastern white pine, Norway spruce.
						Yellow-poplar	90	
						Red maple	---	
						White ash	80	
						Black oak	80	
VaC Vandalia	3c	Moderate	Moderate	Slight	Severe	Northern red oak	73	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	75	
						White oak	---	
						Red maple	---	
VaD Vandalia (North aspect)	2c	Severe	Severe	Slight	Severe	Northern red oak	77	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	90	
						White oak	---	
						Red maple	---	
VaD Vandalia (South aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak	68	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	75	
						White oak	---	
						Red maple	---	
WuE*:								
Westmoreland (North aspect)	2r	Moderate	Moderate	Slight	Severe	Northern red oak	81	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar	90	
						White ash	---	
						Red maple	---	

See footnotes at end of table.

TABLE 8.--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	
WuE*: Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar White ash Red maple	70 90 --- ---	Eastern white pine, yellow-poplar.
WuE*: Westmoreland (South aspect)	3r	Moderate	Moderate	Slight	Severe	Northern red oak Yellow-poplar White oak Chestnut oak	70 80 --- ---	Eastern white pine, European larch.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak Eastern white pine White oak Chestnut oak	65 75 --- ---	Eastern white pine, eastern redcedar.
WuF*: Westmoreland (North aspect)	2r	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Red maple	81 90 ---	Black walnut, yellow-poplar, eastern white pine.
Upshur (North aspect)	3c	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar Red maple	70 90 ---	Eastern white pine, yellow-poplar.
WuF*: Westmoreland (South aspect)	3r	Severe	Severe	Slight	Severe	Northern red oak Yellow-poplar White oak Chestnut oak	70 80 --- ---	Eastern white pine, European larch.
Upshur (South aspect)	4c	Severe	Severe	Slight	Moderate	Northern red oak White oak Chestnut oak	65 --- ---	Eastern white pine, eastern redcedar.

* See description of the map unit for composition and behavior characteristics of the map unit.
** The level of productivity in the ordination symbol is one number less in some of these soils in the southern part of the survey area. For example, some of the units rated with the symbol 3r have an actual rating of 2r.

TABLE 9.--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
At---------- Atkins	Redosier dogwood, bayberry.	Silky dogwood, white spruce, blue spruce, common ninebark, American plum, amur privet.	Northern white-cedar.	Eastern white pine, Austrian pine.	Red maple, sweetgum.
BeC*, BeD*: Buchanan.					
Ernest-----------	Redosier dogwood, bayberry.	Silky dogwood, redosier dogwood, forsythia, nannyberry viburnum.	Northern white-cedar, European alder, eastern redcedar.	Norway spruce-----	Eastern white pine.
Ch---------- Chavies	Regal privet------	Eastern redcedar	Eastern hemlock, northern white-cedar.	Norway spruce-----	Sweetgum, sourwood.
DaC, DaD, DaE, DaF, DmC, DmE, DmF---------- Dekalb	Regal privet, Canada yew.	Forsythia, winged euonymus, nannyberry viburnum.	Scotch pine-------	Norway spruce, Austrian pine.	Eastern white pine, red pine.
EnB, EnC, EnD----- Ernest	Redosier dogwood, bayberry.	Silky dogwood, redosier dogwood, forsythia, nannyberry viburnum.	Northern white-cedar, European alder, eastern redcedar.	Norway spruce-----	Eastern white pine.
Fu*: Fluvaquents.					
Udifluvents.					
GaB, GaC, GaD, GbC, GbD, GbE, GbF, GcC, GcE, GcF---------- Gilpin	Canada yew, regal privet.	European burningbush, blackhaw, late lilac, shadblow serviceberry, American cranberrybush.	Eastern hemlock, northern white-cedar.	Austrian pine, sawtooth oak.	Honeylocust, eastern white pine, Norway spruce.

See footnote at end of table.

TABLE 9.--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
GdE*, GdF*, GkC*, GkE*, GkF*: Gilpin	Canada yew, regal privet.	European burningbush, blackhaw, late lilac, shadblow serviceberry, American cranberrybush.	Eastern hemlock, northern white-cedar.	Austrian pine, sawtooth oak.	Honeylocust, eastern white pine, Norway spruce.
Dekalb	Canada yew, regal privet.	Forsythia, winged euonymus, nannyberry viburnum.	Scotch pine	Norway spruce, Austrian pine.	Red pine, Eastern white pine.
GuC*, GuD*, GuE*, GuF*, GwC3*, GwD3*, GwE3*: Gilpin	Canada yew, regal privet.	European burningbush, blackhaw, late lilac, shadblow serviceberry, American cranberrybush.	Eastern hemlock, northern white-cedar.	Austrian pine, sawtooth oak.	Honeylocust, eastern white pine, Norway spruce.
Upshur	Redosier dogwood, northern white-cedar.	Eastern redcedar, Washington hawthorn, amur privet, arrowwood, American cranberrybush.	Austrian pine	Eastern white pine, pin oak.	Norway spruce, Austrian pine.
LyB, LyC Lily	Silky dogwood	American plum.	Amur maple, eastern redcedar.	American sycamore, eastern cottonwood, Austrian pine, European alder, eastern white pine, silver maple.	Pin oak, sourwood.
MoB, MoC 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.

See footnote at end of table.

TABLE 9.--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
Oh*:					
Orrville	Redosier dogwood, bayberry.	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Holly	Redosier dogwood, bayberry.	Amur privet, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Pa*:					
Philo	Canada yew, bayberry.	Silky dogwood, redosier dogwood, forsythia, nannyberry viburnum.	Northern white-cedar, European alder, eastern redcedar.	Norway spruce	Eastern white pine.
Atkins	Redosier dogwood, bayberry.	Silky dogwood, white spruce, blue spruce, common ninebark, American plum, amur privet.	Northern white-cedar.	Eastern white pine, Austrian pine.	Red maple, sweetgum.
Po Pope	Canada yew, bayberry.	Silky dogwood, redosier dogwood, forsythia, nannyberry viburnum.	Northern white-cedar, European alder, eastern redcedar.	Norway spruce	Eastern white pine.
Tg Tygart	Redosier dogwood, bayberry.	Silky dogwood, white spruce, common ninebark, blue spruce, American plum, amur privet.	Eastern white pine, northern white-cedar.	---	Red maple, sweetgum.
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents					
VaC, VaD Vandalia	Silky dogwood, redosier dogwood.	Forsythia, nannyberry viburnum, winged euonymus.	Norway spruce, Scotch pine, red pine.	Eastern white pine, Austrian pine.	---
WuE*, WuF*:					
Westmoreland	Redosier dogwood, northern white-cedar.	Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
Upshur	Redosier dogwood, northern white-cedar.	Eastern redcedar, Washington hawthorn, amur privet, arrowwood, American cranberrybush.	Austrian pine	Eastern white pine, pin oak.	Norway spruce. Austrian pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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
At Atkins	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
BeC*: Buchanan	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Moderate: wetness.	Severe: small stones.
Ernest	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Moderate: wetness.	Moderate: small stones, large stones, slope.
BeD*: Buchanan	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: wetness, slope.	Severe: slope, small stones.
Ernest	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: wetness, slope.	Severe: slope.
Ch Chavies	Severe: flooding.	Slight	Slight	Slight	Slight.
DaC Dekalb	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	
DaD Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.	Severe: slope, small stones.
DaE, DaF Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
DmC Dekalb	Severe: slope, large stones, small stones.	Severe: small stones, large stones.	Severe: slope, small stones, large stones.	Moderate: large stones.	Severe: small stones.
DmE, DmF Dekalb	Severe: slope, small stones.	Severe: slope, large stones, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, small stones.
EnB Ernest	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: large stones, small stones.
EnC Ernest	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: large stones, small stones, slope.
EnD Ernest	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Fu*: Fluvaquents. Udifluvents.					
GaB---------- Gilpin	Slight----------	Slight----------	Moderate: small stones, slope.	Slight----------	Moderate: thin layer.
GaC---------- Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
GaD---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GbC---------- Gilpin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Moderate: large stones.	Moderate: slope, small stones.
GbD---------- Gilpin	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope, large stones.	Severe: slope.
GbE, GbF---------- Gilpin	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope.
GcC---------- Gilpin	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: slope, small stones, large stones.	Moderate: large stones.	Moderate: slope, thin layer, small stones.
GcE, GcF---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
GdE*, GdF*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope.
Dekalb----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
GkC*: Gilpin----------	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: slope, small stones, large stones.	Moderate: large stones.	Moderate: slope, thin layer, small stones.
Dekalb----------	Severe: small stones.	Severe: small stones.	Severe: slope, small stones, large stones.	Moderate: large stones.	Severe: small stones.
GkE*, GkF*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
Dekalb----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, small stones.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
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.
GuD*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GuE*, 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.
GwC3*:					
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.
GwD3*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GwE3*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
LyB Lily	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: thin layer.
LyC Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
MoB Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
MoC Monongahela	Moderate: wetness, slope.	Moderate: slope, wetness.	Slope	Severe: erodes easily.	Moderate: slope.
Oh*:					
Orrville	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Oh*: Holly	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Pa*: Philo	Severe: flooding.	Moderate: wetness.	Moderate: flooding, wetness.	Slight	Moderate: flooding.
Atkins	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Po Pope	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Tg Tygart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents					
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.
WuE*, WuF*: Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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
At---------- Atkins	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
BeC*, BeD*: Buchanan----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ernest----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Ch---------- Chavies	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
DaC---------- Dekalb	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
DaD---------- Dekalb	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
DaE---------- Dekalb	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
DaF---------- Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DmC---------- Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DmE, DmF---------- Dekalb	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
EnB---------- Ernest	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EnC---------- Ernest	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
EnD---------- Ernest	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Fu*: Fluvaquents. Udifluvents.										
GaB---------- Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
GaC---------- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GaD---------- Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GbC---------- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GbD---------- Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GbE---------- Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 11.--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
GbF, GcC, GcE, GcF-Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GdE*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Dekalb	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GdF*, GkC*, GkE*, GkF*:										
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GuC*:										
Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Upshur	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuD*:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuE*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GuF*:										
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.
GwC3*:										
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.
GwD3*:										
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.
GwE3*:										
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.

See footnote at end of table.

TABLE 11.--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
LyB---Lily	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LyC---Lily	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MoB---Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MoC---Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Oh*:										
Orrville	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Holly	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Pa*:										
Philo	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Atkins	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Po---Pope	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Tg---Tygart	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents										
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.
WuE*:										
Westmoreland	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Upshur	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
WuF*:										
Westmoreland	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Upshur	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
At Atkins	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.
BeC*: Buchanan	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope.	Severe: small stones.
Ernest	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: small stones, large stones, slope.
BeD*: Buchanan	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Ernest	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Ch Chavies	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
DaC Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
DaD, DaE, DaF Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
DmC Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
DmE, DmF Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
EnB Ernest	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Moderate: large stones, small stones.
EnC Ernest	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: large stones, small stones, slope.
EnD Ernest	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Fu*: Fluvaquents.						
Udifluvents.						

See footnote at end of table.

TABLE 12.--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
GaB---------- Gilpin	Moderate: depth to rock.	Slight----------	Moderate: depth to rock.	Moderate: slope.	Slight----------	Moderate: thin layer.
GaC---------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer.
GaD---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GbC---------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, small stones.
GbD, GbE, GbF----- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GcC---------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer, small stones.
GcE, GcF---------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GdE*, GdF*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dekalb----------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
GkC*: Gilpin----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, thin layer, small stones.
Dekalb----------	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
GkE*, GkF*: Gilpin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dekalb----------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
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.
GuD*, GuE*, 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.

See footnote at end of table.

TABLE 12.--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
GwC3*:						
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.
GwD3*, GwE3*:						
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.
LyB Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: thin layer.
LyC 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.
MoB Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.
MoC Monongahela	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: slope, low strength, wetness.	Moderate: slope.
Oh*:						
Orrville	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.
Holly	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Pa*:						
Philo	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Atkins	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.
Po Pope	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Tg Tygart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents						

See footnote at end of table.

TABLE 12.--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
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---------- 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.
WuE*, WuF*: Westmoreland-----	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	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.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--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. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
At Atkins	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Poor: wetness.
BeC*: Buchanan	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Poor: small stones.
Ernest	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Poor: small stones.
BeD*: Buchanan	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Ernest	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Ch Chavies	Moderate: flooding.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Good.
DaC Dekalb	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
DaD, DaE, DaF Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
DmC Dekalb	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
DmE, DmF Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
EnB Ernest	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Poor: small stones.
EnC Ernest	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Poor: small stones.
EnD Ernest	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope, small stones.

See footnote at end of table.

TABLE 13.--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
Fu*: Fluvaquents. Udifluvents.					
GaB---------- Gilpin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GaC---------- Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GaD---------- 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.
GbC---------- Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GbD, GbE, GbF------- 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.
GcC---------- Gilpin	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, large stones, area reclaim.
GcE, GcF---------- 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.
GdE*, GdF*: 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.
Dekalb----------	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
GkC*: Gilpin----------	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, large stones, area reclaim.
Dekalb----------	Severe: depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
GkE*, GkF*: Gilpin----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, large stones.

See footnote at end of table.

TABLE 13.--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
GkE*, GkF*: Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
GuC*: 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*, GuE*, GuF*: Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
GwC3*: 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.
GwD3*, GwE3*: Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
LyB---- Lily	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
LyC---- Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
MoB---- Monongahela	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
MoC---- Monongahela	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Fair: small stones, wetness, slope.

See footnote at end of table.

TABLE 13.--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
Oh*: Orrville	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
Holly	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, seepage.
Pa*: Philo	Severe: flooding, wetness, poor filter.	Severe: flooding, wetness, seepage.	Severe: flooding, depth to rock, seepage.	Severe: flooding, wetness.	Fair: area reclaim, wetness, thin layer.
Atkins	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Poor: wetness.
Po Pope	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
Tg Tygart	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents					
VaC Vandalia	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
VaD Vandalia	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, slippage.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
WuE*, WuF*: Westmoreland	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--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. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
At Atkins	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
BeC*: Buchanan	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Ernest	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BeD*: Buchanan	Fair: slope, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Ernest	Fair: low strength, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Ch Chavies	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
DaC Dekalb	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
DaD Dekalb	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
DaE, DaF Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
DmC Dekalb	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, large stones.
DmE, DmF Dekalb	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, large stones.
EnB, EnC Ernest	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
EnD Ernest	Fair: low strength, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Fu*: Fluvaquents. Udifluvents.				
GaB, GaC Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GaD---------- Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GbC---------- Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GbD---------- Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GbE, GbF---------- Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GcC---------- Gilpin	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, small stones.
GcE, GcF---------- Gilpin	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, large stones, small stones.
GdE*, GdF*:				
Gilpin----------	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Dekalb----------	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GkC*:				
Gilpin----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, small stones.
Dekalb----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, large stones.
GkE*, GkF*:				
Gilpin----------	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, large stones, small stones.
Dekalb----------	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, large stones.
GuC*:				
Gilpin----------	Poor: thin layer.	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*:				
Gilpin----------	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GuE*, GuF*:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
GwC3*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GwD3*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
GwE3*:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
LyB, LyC Lily	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
MoB Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MoC Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
Oh*:				
Orrville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Holly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Pa*:				
Philo	Fair: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Atkins	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Po Pope	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Tg---------- Tygart	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents				
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.
WuE*, WuF*: Westmoreland----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Upshur----------	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
At---------- Atkins	Severe: seepage.	Severe: piping, wetness.	Flooding, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
BeC*, BeD*: Buchanan---------	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.
Ernest----------	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, large stones, wetness.	Large stones, slope, rooting depth.
Ch---------- Chavies	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
DaC, DaD, DaE, DaF---------- Dekalb	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water----	Slope, large stones, depth to rock.	Slope, large stones, droughty.
DmC, DmE, DmF----- Dekalb	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water----	Slope, depth to rock, large stones.	Slope, large stones, droughty.
EnB---------- Ernest	Moderate: slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, rooting depth, percs slowly.	Erodes easily, rooting depth.
EnC, EnD---------- Ernest	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, rooting depth.	Rooting depth, slope, erodes easily.
Fu*: Fluvaquents. Udifluvents.					
GaB---------- Gilpin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water----	Depth to rock, large stones.	Depth to rock, large stones.
GaC, GaD, GbC, GbD, GbE, GbF---- Gilpin	Severe: slope.	Severe: thin layer.	Deep to water-----	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
GcC, GcE, GcF----- Gilpin	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
GdE*, GdF*: Gilpin----------	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Dekalb----------	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water----	Slope, large stones, depth to rock.	Slope, large stones, droughty.

See footnote at end of table.

TABLE 15.--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
GkC*, GkE*, GkF*: Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Dekalb	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, large stones, droughty.
GuC*, GuD*, GuE*, GuF*, GwC3*, GwD3*, GwE3*: 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.
LyB---- Lily	Severe: seepage.	Severe: piping.	Deep to water	Depth to rock	Depth to rock.
LyC---- Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
MoB---- Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
MoC---- Monongahela	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Oh*: Orrville	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
Holly	Severe: seepage.	Severe: piping, wetness, seepage.	Flooding, cutbanks cave.	Wetness, too sandy.	Wetness.
Pa*: Philo	Severe: seepage.	Severe: piping.	Flooding	Wetness	Favorable.
Atkins	Severe: seepage.	Severe: piping, wetness.	Flooding, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Po---- Pope	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Favorable.
Tg---- Tygart	Slight	Severe: hard to pack, wetness.	Percs slowly	Erodes easily, percs slowly, wetness.	Percs slowly, wetness, erodes easily.
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents					
VaC, VaD---- Vandalia	Severe: slope, slippage.	Moderate: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily, percs slowly.

See footnote at end of table.

TABLE 15.--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
WuE*, WuF*: Westmoreland-----	Severe: slope.	Severe: piping.	Deep to water----	Slope----------	Slope.
Upshur----------	Severe: slope, slippage.	Severe: hard to pack.	Deep to water----	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--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	
At---------- Atkins	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	60-95	20-40	3-20
	8-46	Silty clay loam, silt loam, sandy loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	65-100	45-85	20-40	3-20
	46-60	Stratified silty clay loam to gravelly sandy loam.	SM, CL, GM, ML	A-2, A-4, A-6	0-15	60-100	60-100	50-95	30-85	20-40	1-15
BeC*, BeD*: Buchanan--------	0-9	Very stony silt loam.	GM, ML, CL, CL-ML	A-2, A-4	5-20	50-85	45-70	40-70	30-60	20-35	2-11
	9-30	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	30-60	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
Ernest----------	0-5	Very stony silt loam.	ML, CL, CL-ML	A-4, A-6	10-25	65-80	60-80	55-75	55-70	20-40	4-15
	5-29	Silty clay loam, silt loam, channery silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-15	75-95	70-95	65-90	55-90	25-50	6-22
	29-49	Channery silt loam, channery loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	55-95	55-90	45-90	20-45	4-18
	49-60	Channery silt loam, silt loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	45-95	45-90	40-90	25-50	6-22
Ch---------- Chavies	0-9	Loam----------	SM, ML, CL-ML, SM-SC	A-4	0	85-100	75-100	40-90	40-75	<25	NP-5
	9-48	Fine sandy loam, silt loam, loam.	SM, ML	A-4	0	85-100	75-100	65-100	45-85	<35	NP-8
	48-60	Fine sandy loam, gravelly fine sandy loam, loam.	SM, ML, CL-ML, SM-SC	A-4, A-2, A-1	0-5	70-100	60-95	40-85	20-75	<25	NP-5
DaC, DaD, DaE, DaF---------- Dekalb	0-5	Channery loam----	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	15-32	NP-9
	5-28	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	28-33	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--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	
DmC, DmE, DmF---- Dekalb	0-5	Extremely stony loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	15-30	50-90	45-80	40-75	20-55	15-32	NP-9
	5-28	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	28-33	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
EnB, EnC---------- Ernest	0-5	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-10	85-100	80-100	70-95	60-95	20-40	4-15
	5-29	Silty clay loam, silt loam, channery silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-15	75-95	70-95	65-90	55-90	25-50	6-22
	29-49	Channery silt loam, channery loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	55-95	55-90	45-90	20-45	4-18
	49-60	Channery silt loam, silt loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	45-95	45-90	40-90	25-50	6-22
EnD---------- Ernest	0-5	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-10	85-100	80-100	70-95	60-95	20-40	4-15
	5-29	Silty clay loam, silt loam, channery silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-15	75-95	70-95	65-90	55-90	25-50	6-22
	29-49	Channery silt loam, channery loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	55-95	55-90	45-90	20-45	4-18
	49-60	Channery silt loam, silt loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	45-95	45-90	40-90	25-50	6-22
Fu*: Fluvaquents.											
Udifluvents.											
GaB, GaC, GaD---- Gilpin	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-25	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
	25-32	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
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--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	
GbC, GbD, GbE, GbF---------- Gilpin	0-6	Channery silt loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-90	45-85	35-75	30-70	20-40	4-15
	6-25	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
	25-32	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
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GcC, GcE, GcF---- Gilpin	0-6	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
	6-25	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
	25-32	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
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GdE*, GdF*: Gilpin----------	0-6	Channery silt loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-90	45-85	35-75	30-70	20-40	4-15
	6-25	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
	25-32	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
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dekalb----------	0-5	Channery loam----	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	15-32	NP-9
	5-28	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	28-33	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GkC*, GkE*, GkF*: Gilpin----------	0-6	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
	6-25	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
	25-32	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
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--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	
GkC*, GkE*, GkF*:											
Dekalb	0-5	Stony loam	SM, GM, ML, CL-ML	A-2, A-4, A-1	10-30	50-90	45-80	40-75	20-55	15-32	NP-9
	5-28	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	28-33	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GuC*, GuD*, GuE*, GuF*:											
Gilpin	0-6	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-25	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
	25-32	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
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur	0-4	Silt loam	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	4-28	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	28-48	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
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---
GwC3*, GwD3*, GwE3*:											
Gilpin	0-6	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-25	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
	25-32	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
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur	0-4	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	4-28	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	28-48	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
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---
LyB, LyC	0-5	Loam	ML	A-4	0-5	90-100	85-100	70-95	55-75	<35	NP-7
Lily	5-34	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
	34-37	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
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MoB, MoC---------- 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
	9-26	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
	26-44	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
	44-60	Silt loam, clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
Oh*:											
Orrville--------	0-6	Silt loam--------	ML, CL-ML, CL	A-4	0	100	90-100	85-100	60-80	22-35	4-10
	6-31	Silt loam, loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0-2	95-100	75-100	70-95	45-90	20-40	2-16
	31-60	Stratified gravelly loamy sand to silt loam.	ML, CL, SM, SC	A-4, A-2	0-2	95-100	65-100	40-85	15-75	15-35	NP-10
Holly-----------	0-6	Silt loam--------	ML	A-4	0	90-100	85-100	80-100	70-90	25-35	3-10
	6-34	Silt loam, loam, sandy loam.	ML, SM	A-4, A-6	0	85-100	75-100	70-95	45-85	20-40	NP-14
	34-60	Stratified silt loam to gravelly sand.	ML, SM, SP-SM	A-4, A-2,	0-5	70-100	65-100	40-90	10-70	20-40	NP-10
Pa*:											
Philo-----------	0-5	Silt loam--------	ML, SM, CL-ML	A-4	0-5	95-100	80-100	85-90	60-80	20-35	1-10
	5-35	Silt loam, loam, sandy loam.	ML, SM, CL-ML	A-4	0-5	95-100	75-100	70-90	45-80	20-35	1-10
	35-60	Stratified sand to silt loam.	GM, SM, ML, CL-ML	A-2, A-4	0-5	60-95	50-90	40-85	30-80	15-30	1-10
Atkins----------	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	60-95	20-40	3-20
	8-46	Silty clay loam, silt loam, sandy loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	65-100	45-85	20-40	3-20
	46-60	Stratified silty clay loam to gravelly sandy loam.	SM, CL, GM, ML	A-2, A-4, A-6	0-15	60-100	60-100	50-95	30-85	20-40	1-15
Po--------------- Pope	0-8	Sandy loam-------	SM, ML, CL-ML, SM-SC	A-2, A-4	0	85-100	75-100	51-85	25-55	<20	NP-5
	8-48	Fine sandy loam, sandy loam, loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	<30	NP-7
	48-60	Sandy loam, loamy sand.	SM, SM-SC, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	<30	NP-7
Tg--------------- Tygart	0-10	Silt loam--------	ML, CL	A-4, A-6	0	95-100	95-100	85-100	60-90	25-40	2-15
	10-48	Silty clay loam, silty clay, clay loam.	CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	65-95	30-65	11-30
	48-60	Silty clay loam, silty clay, clay.	CL, CH, MH	A-6, A-7	0	95-100	95-100	85-100	70-95	30-65	11-30
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents											

See footnote at end of table.

TABLE 16.--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	
VaC, VaD---------- Vandalia	0-9	Silt loam---------	ML, CL	A-4, A-6, A-7	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	9-44	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
	44-60	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
WuE*, WuF*: Westmoreland----	0-5	Silt loam---------	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	---	---
	5-38	Silty clay loam, channery loam, shaly silt loam.	CL, ML, GM, GC	A-4, A-6, A-7	0-15	65-100	55-95	50-90	45-85	22-45	2-20
	38-50	Very channery loam, very channery silt loam, shaly silty clay loam.	GM, GC, SM, SC	A-2, A-1, A-4, A-6	0-20	25-95	20-95	15-90	15-80	20-40	2-20
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-4	Silt loam---------	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	4-28	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	28-48	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
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
At----------	0-8	0.6-2.0	0.14-0.22	4.5-5.5	Low----------	0.32	5
Atkins	8-46	0.06-2.0	0.14-0.18	4.5-5.5	Low----------	0.32	
	46-60	0.2-6.0	0.08-0.18	4.5-5.5	Low----------	0.28	
BeC*, BeD*:							
Buchanan---------	0-9	0.6-2.0	0.11-0.16	3.6-5.5	Low----------	0.24	3
	9-30	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	30-60	0.06-0.2	0.06-0.10	3.6-5.5	Low----------	0.17	
Ernest----------	0-5	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.32	3
	5-29	0.6-2.0	0.12-0.16	4.5-5.5	Moderate-------	0.32	
	29-49	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.32	
	49-60	0.06-0.6	0.08-0.12	4.5-5.5	Moderate-------	0.32	
Ch----------	0-9	2.0-6.0	0.11-0.18	4.5-7.3	Low----------	0.24	4
Chavies	9-48	2.0-6.0	0.11-0.20	4.5-7.3	Low----------	0.24	
	48-60	2.0-6.0	0.08-0.18	4.5-6.0	Low----------	0.24	
DaC, DaD, DaE, DaF, DmC, DmE, DmF----------	0-5	2.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	2
Dekalb	5-28	2.0-20	0.06-0.12	3.6-5.5	Low----------	0.17	
	28-33	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17	
	33	---	---	---	----------	----	
EnB, EnC----------	0-5	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.43	3
Ernest	5-29	0.6-2.0	0.12-0.16	4.5-5.5	Moderate-------	0.32	
	29-49	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.32	
	49-60	0.06-0.6	0.08-0.12	4.5-5.5	Moderate-------	0.32	
EnD----------	0-5	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.43	3
Ernest	5-29	0.6-2.0	0.12-0.16	4.5-5.5	Moderate-------	0.32	
	29-49	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.32	
	49-60	0.06-0.6	0.08-0.12	4.5-5.5	Moderate-------	0.32	
Fu*:							
Fluvaquents.							
Udifluvents.							
GaB, GaC, GaD----	0-6	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
Gilpin	6-25	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	25-32	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	32	---	---	---	----------	----	
GbC, GbD, GbE, GbF----------	0-6	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	3
Gilpin	6-25	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	25-32	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	32	---	---	---	----------	----	
GcC, GcE, GcF----	0-6	0.6-2.0	0.08-0.14	3.6-5.5	Low----------	0.24	3
Gilpin	6-25	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	25-32	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	32	---	---	---	----------	----	
GdE*, GdF*:							
Gilpin----------	0-6	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	3
	6-25	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	25-32	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	32	---	---	---	----------	----	

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
GdE*, GdF*:							
Dekalb----------	0-5	2.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	2
	5-28	2.0-20	0.06-0.12	3.6-5.5	Low----------	0.17	
	28-33	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17	
	33	---	---	---	----------	----	
GkC*, GkE*, GkF*:							
Gilpin----------	0-6	0.6-2.0	0.08-0.14	3.6-5.5	Low----------	0.24	3
	6-25	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	25-32	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	32	---	---	---	----------	----	
Dekalb----------	0-5	2.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	2
	5-28	2.0-20	0.06-0.12	3.6-5.5	Low----------	0.17	
	28-33	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17	
	33	---	---	---	----------	----	
GuC*, GuD*, GuE*, GuF*:							
Gilpin----------	0-6	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
	6-25	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	25-32	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	32	---	---	---	----------	----	
Upshur----------	0-4	0.6-2.0	0.12-0.16	4.5-6.5	Moderate-------	0.43	3
	4-28	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32	
	28-48	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-------	0.32	
	48	---	---	---	----------	----	
GwC3*, GwD3*, GwE3*:							
Gilpin----------	0-6	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3
	6-25	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	
	25-32	0.6-2.0	0.06-0.10	3.6-5.5	Low----------	0.24	
	32	---	---	---	----------	----	
Upshur----------	0-4	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-------	0.37	3
	4-28	0.06-0.2	0.10-0.14	4.5-8.4	High----------	0.32	
	28-48	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-------	0.32	
	48	---	---	---	----------	----	
LyB, LyC----------	0-5	0.6-6.0	0.13-0.18	3.6-5.5	Low----------	0.28	3
Lily	5-34	2.0-6.0	0.12-0.18	3.6-5.5	Low----------	0.28	
	34-37	2.0-6.0	0.08-0.17	3.6-5.5	Low----------	0.17	
	37	---	---	---	----------	----	
MoB, MoC----------	0-9	0.6-2.0	0.18-0.24	4.5-5.5	Low----------	0.43	3
Monongahela	9-26	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.43	
	26-44	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43	
	44-60	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37	
Oh*:							
Orrville---------	0-6	0.6-2.0	0.18-0.22	5.1-7.3	Low----------	0.37	5
	6-31	0.6-2.0	0.15-0.19	5.1-6.5	Low----------	0.37	
	31-60	0.6-6.0	0.08-0.15	5.1-7.3	Low----------	0.37	
Holly----------	0-6	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.28	5
	6-34	0.2-2.0	0.17-0.21	5.1-7.3	Low----------	0.28	
	34-60	0.6-6.0	0.07-0.18	5.6-7.8	Low----------	0.28	
Pa*:							
Philo----------	0-5	0.6-2.0	0.14-0.20	4.5-6.0	Low----------	0.37	5
	5-35	0.6-2.0	0.10-0.20	4.5-6.0	Low----------	0.32	
	35-60	2.0-6.0	0.06-0.10	4.5-6.0	Low----------	0.24	
Atkins----------	0-8	0.6-2.0	0.14-0.22	4.5-5.5	Low----------	0.32	5
	8-46	0.06-2.0	0.14-0.18	4.5-5.5	Low----------	0.32	
	46-60	0.2-6.0	0.08-0.18	4.5-5.5	Low----------	0.28	

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
Po	0-8	2.0-6.0	0.10-0.16	3.6-5.5	Low	0.28	5
Pope	8-48	0.6-6.0	0.10-0.18	3.6-5.5	Low	0.28	
	48-60	0.6-6.0	0.10-0.18	3.6-5.5	Low	0.28	
Tg	0-10	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.43	3
Tygart	10-48	0.06-0.2	0.10-0.14	3.6-5.5	Moderate	0.32	
	48-60	0.06-0.2	0.10-0.14	3.6-5.5	Moderate	0.32	
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents							
VaC, VaD	0-9	0.2-2.0	0.12-0.18	4.5-6.0	Moderate	0.37	4
Vandalia	9-44	0.06-0.6	0.12-0.15	4.5-6.0	High	0.32	
	44-60	0.06-0.6	0.08-0.12	5.1-7.3	High	0.32	
WuE*, WuF*:							
Westmoreland	0-5	0.6-2.0	0.16-0.20	4.5-6.0	Low	0.37	3
	5-38	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.28	
	38-50	0.6-2.0	0.06-0.10	5.1-6.0	Low	0.17	
	50	---	---	---	---	---	
Upshur	0-4	0.6-2.0	0.12-0.16	4.5-6.5	Moderate	0.43	3
	4-28	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32	
	28-48	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32	
	48	---	---	---	---	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
			Ft			In			
At---------- Atkins	D	Occasional----	0-1.0	Apparent	Nov-Jun	>60	---	High-----	Moderate.
BeC*, BeD*: Buchanan---------	C	None----------	1.5-3.0	Perched	Nov-Mar	>60	---	High-----	High.
Ernest----------	C	None----------	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	Moderate.
Ch---------- Chavies	B	Rare----------	>6.0	---	---	>60	---	Low------	Moderate.
DaC, DaD, DaE, DaF, DmC, DmE, DmF---------- Dekalb	C	None----------	>6.0	---	---	20-40	Hard	Low------	High.
EnB, EnC, EnD----- Ernest	C	None----------	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	Moderate.
Fu*: Fluvaquents.									
Udifluvents.									
GaB, GaC, GaD, GbC, GbD, GbE, GbF, GcC, GcE, GcF---------- Gilpin	C	None----------	>6.0	---	---	20-40	Soft	Low------	High.
GdE*, GdF*, GkC*, GkE*, GkF*: Gilpin----------	C	None----------	>6.0	---	---	20-40	Soft	Low------	High.
Dekalb----------	C	None----------	>6.0	---	---	20-40	Hard	Low------	High.
GuC*, GuD*, GuE*, GuF*, GwC3*, GwD3*, GwE3*: Gilpin----------	C	None----------	>6.0	---	---	20-40	Soft	Low------	High.
Upshur----------	D	None----------	>6.0	---	---	>40	Soft	High-----	Moderate.
LyB, LyC---------- Lily	B	None----------	>6.0	---	---	20-40	Hard	Moderate	High.
MoB, MoC---------- Monongahela	C	None----------	1.5-3.0	Perched	Dec-Apr	>60	---	High-----	High.
Oh*: Orrville---------	C	Occasional----	1.0-2.5	Apparent	Nov-Jun	>60	---	High-----	Moderate.
Holly----------	B/D	Occasional----	0-1.0	Apparent	Dec-May	>60	---	High-----	Moderate.
Pa*: Philo----------	B	Occasional----	1.5-3.0	Apparent	Dec-Apr	>40	Hard	Low------	High.
Atkins----------	D	Occasional----	0-1.0	Apparent	Nov-Jun	>60	---	High-----	Moderate.
Po---------- Pope	B	Occasional----	>6.0	---	---	>60	---	Low------	High.
Tg---------- Tygart	D	None----------	0.5-1.5	Apparent	Dec-May	>60	---	High-----	High.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
			Ft			In			
Ua, Ub, Uc, Ud, Ue, Uf. Udorthents									
VaC, VaD---------- Vandalia	D	None----------	4.0-6.0	Perched	Feb-Apr	>60	---	High-----	Moderate.
WuE*, WuF*: Westmoreland-----	B	None----------	>6.0	---	---	>40	Hard	Low------	High.
Upshur----------	D	None----------	>6.0	---	---	>40	Soft	High-----	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Atkins	Fine-loamy, mixed, acid, mesic Typic Fluvaquents
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Chavies	Coarse-loamy, mixed, mesic Ultic Hapludalfs
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Ernest	Fine-loamy, mixed, mesic Aquic Fragiudults
Fluvaquents	Fluvaquents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Holly	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Orrville	Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents
Philo	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Pope	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
*Tygart	Clayey, mixed, mesic Aeric Ochraquults
Udifluvents	Udifluvents
Udorthents	Udorthents
Upshur	Fine, mixed, mesic Typic Hapludalfs
Vandalia	Fine, mixed, mesic Typic Hapludalfs
Westmoreland	Fine-loamy, mixed, mesic Ultic Hapludalfs

* The 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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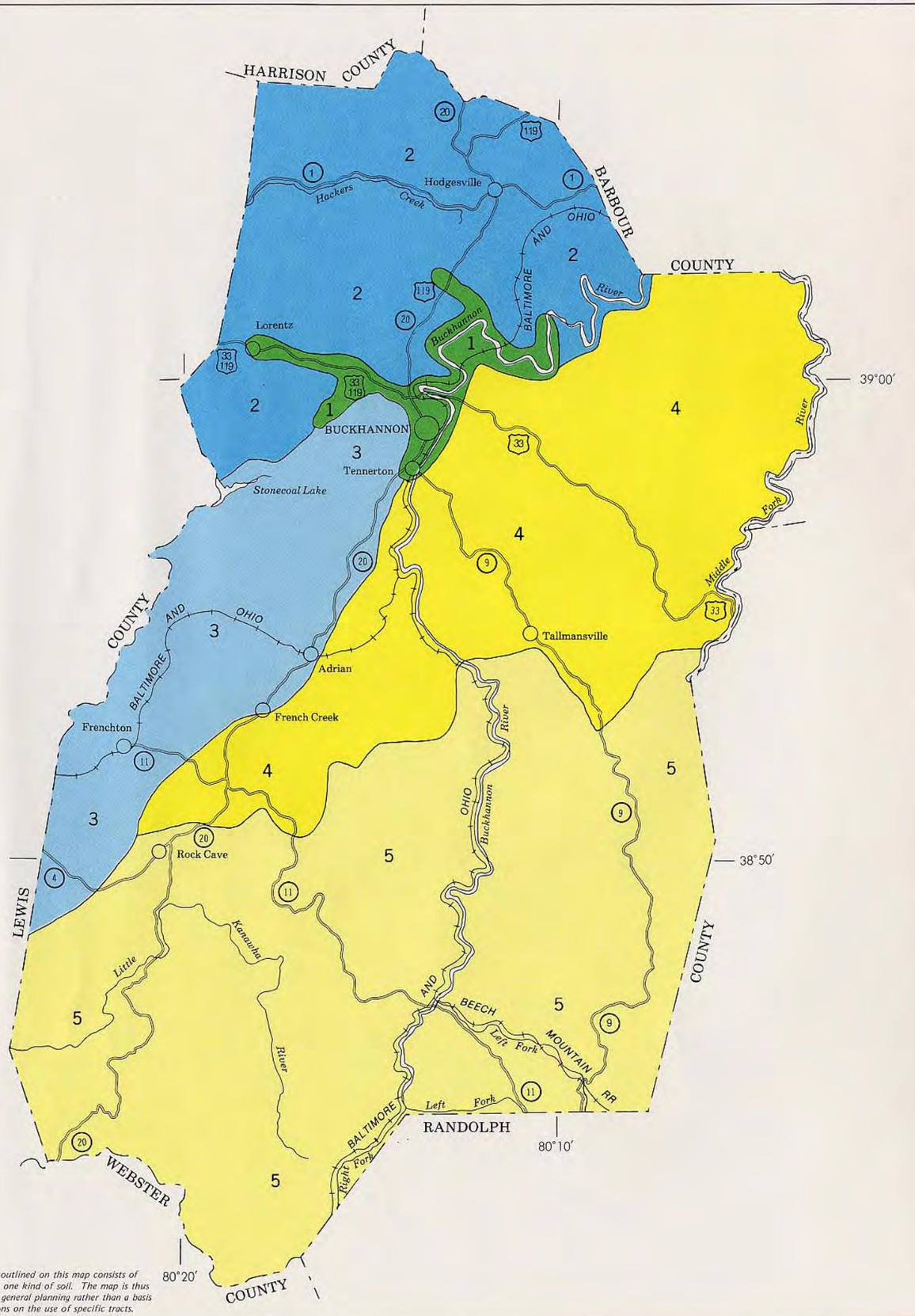


Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LEGEND

1 — UDORTHENTS-MONOGAHELA-TYGART-ORRVILLE: Deep, nearly level and strongly sloping, moderately well drained and somewhat poorly drained, acid and lime-influenced soils; on flood plains and terraces

2 — GILPIN-UPSHUR-VANDALIA: Moderately deep and deep, gently sloping to very steep, well drained, acid and lime-influenced soils; on uplands and foot slopes

3 — GILPIN-UPSHUR-ERNEST: Moderately deep and deep, gently sloping to very steep, well drained and moderately well drained, acid and lime-influenced soils; on uplands and foot slopes

4 — GILPIN-BUCHANAN-ERNEST: Moderately deep and deep, gently sloping to vary steep, well drained and moderately well drained, acid soils; on uplands and foot slopes

5 — GILPIN-DEKALB-BUCHANAN: Moderately deep and deep, gently sloping to very steep, well drained and moderately well drained, acid soils; on mountainous uplands and foot slopes

Compiled 1983

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
WEST VIRGINIA UNIVERSITY AGRICULTURAL AND FORESTRY EXPERIMENT STATION

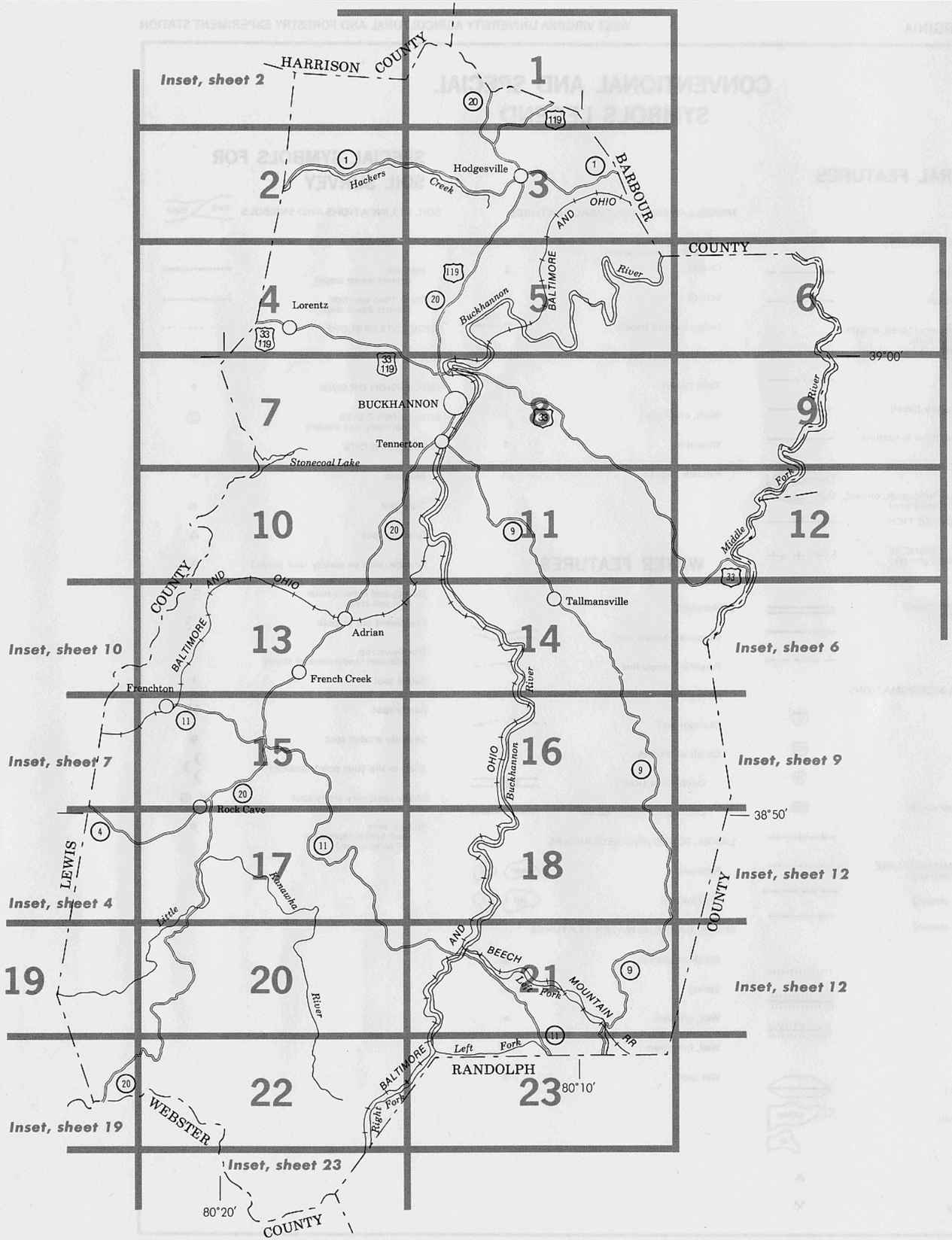
GENERAL SOIL MAP

UPSHUR COUNTY, WEST VIRGINIA

Scale 1:190,080

1 0 1 2 3 4 Miles

1 0 1 2 3 4 Kilometers



N

INDEX TO MAP SHEETS

UPSHUR COUNTY, WEST VIRGINIA

Scale 1:190,080

1 0 1 2 3 4 Miles

1 0 1 2 3 4 Kilometers

SOIL LEGEND

Publication symbols consist of letters or a combination of letters and numbers (e.g., At, GdF, or GwE3). The first letter, always a capital, is the initial letter of the soil name. The second letter is lower case and separates map units, except those that are slope phases, having names that begin with the same letter. The third letter, always a capital B, C, D, E, or F, indicates the slope. Symbols with a slope letter are for nearly level soils or for soils named for higher categories. A final number, 3, indicates the soil is severely eroded.

NAME	SYMBOL
At	Atkins silt loam
BeC	Buchanan and Ernest very stony silt loams, 3 to 15 percent slopes
BeD	Buchanan and Ernest very stony silt loams, 15 to 25 percent slopes
Ch	Chavies loam
DaC	Dekalb channery loam, 8 to 15 percent slopes
DaD	Dekalb channery loam, 15 to 25 percent slopes
DaE	Dekalb channery loam, 25 to 35 percent slopes
DaF	Dekalb channery loam, 35 to 70 percent slopes
DmC	Dekalb extremely stony loam, 3 to 15 percent slopes
DmE	Dekalb extremely stony loam, 15 to 35 percent slopes
DmF	Dekalb extremely stony loam, 35 to 70 percent slopes
EnB	Ernest silt loam, 3 to 8 percent slopes
EnC	Ernest silt loam, 8 to 15 percent slopes
EnD	Ernest silt loam, 15 to 25 percent slopes
Fu	Fluvaquents and Udifluvents, frequently flooded
GaB	Gilpin silt loam, 3 to 8 percent slopes
GaC	Gilpin silt loam, 8 to 15 percent slopes
GaD	Gilpin silt loam, 15 to 25 percent slopes
GbC	Gilpin channery silt loam, 8 to 15 percent slopes
GbD	Gilpin channery silt loam, 15 to 25 percent slopes
GbE	Gilpin channery silt loam, 25 to 35 percent slopes
GbF	Gilpin channery silt loam, 35 to 65 percent slopes
GcC	Gilpin stony silt loam, 3 to 15 percent slopes
GcE	Gilpin stony silt loam, 15 to 35 percent slopes
GcF	Gilpin stony silt loam, 35 to 65 percent slopes
GdE	Gilpin-Dekalb complex, 15 to 35 percent slopes
GdF	Gilpin-Dekalb complex, 35 to 70 percent slopes
GkC	Gilpin-Dekalb complex, stony, 3 to 15 percent slopes
GkE	Gilpin-Dekalb complex, stony, 15 to 35 percent slopes
GkF	Gilpin-Dekalb complex, stony, 35 to 70 percent slopes
GuC	Gilpin-Upshur silt loams, 8 to 15 percent slopes
GuD	Gilpin-Upshur silt loams, 15 to 25 percent slopes
GuE	Gilpin-Upshur silt loams, 25 to 35 percent slopes
GuF	Gilpin-Upshur silt loams, 35 to 65 percent slopes
GwC3	Gilpin-Upshur complex, 8 to 15 percent slopes, severely eroded
GwD3	Gilpin-Upshur complex, 15 to 25 percent slopes, severely eroded
GwE3	Gilpin-Upshur complex, 25 to 35 percent slopes severely eroded
LyB	Lily loam, 3 to 8 percent slopes
LyC	Lily loam, 8 to 15 percent slopes
MoB	Monongahela silt loam, 3 to 8 percent slopes
MoC	Monongahela silt loam, 8 to 15 percent slopes
Oh	Orrville-Holly silt loams
Pa	Philo-Atkins silt loams
Po	Pope sandy loam
Tg	Tygart silt loam
Ua	Udorthents, loamy
Ub	Udorthents, mudstone and limestone, high base
Uc	Udorthents, mudstone and sandstone, high base
Ud	Udorthents, sandstone and mudstone, low base
Ue	Udorthents, sandstone and mudstone, very low base
Uf	Udorthents, smoothed
VaC	Vandalia silt loam, 8 to 15 percent slopes
VaD	Vandalia silt loam, 15 to 25 percent slopes
WuE	Westmoreland-Upshur silt loams, 25 to 35 percent slopes
WuF	Westmoreland-Upshur silt loams, 35 to 65 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate (21)
- Federal (173)
- State (28)
- County, farm or ranch (1283)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Unclassified
- Drainage end

Canals or ditches

- Double-line (label)
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Dumps, mine (each symbol represents 10 acres or less)

UPSHUR COUNTY, WEST VIRGINIA NO. 1

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1
N
BARBOUR COUNTY
Little Pecks Run
119
WuF
GuD
WuE
GuE
GuF
GbE
EnD
GuC
GaC
EnC
VaD
Uf
Uc
GwE3
GbF
GcF
GcE
GbD
GaD
Oh
760 000 FEET
2 245 000 FEET
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

2
N
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1

INSET
HARRISON COUNTY
LEWIS COUNTY
Rooting Creek
2 210 000 FEET
2 200 000 FEET
2 180 000 FEET
765 000 FEET
760 000 FEET
745 000 FEET
(Joins upper right)
(Joins sheet 1)
Frog

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UPSHUR COUNTY, WEST VIRGINIA NO. 3

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

12 215 000 FEET

755 000 FEET

(Joins sheet 1)

(Joins sheet 2)

(Joins sheet 5)

Hackers Creek

Ruraldale

Hodgesville

Pecks Run

Mud Run

Little Pecks water

Sugar Run

BALTIMORE

3
N
(Joins sheet 1)
(Joins sheet 5)
Hodgesville
Teter
Pecks Run
Little Pecks Run
Pecks Run
BARBOUR COUNTY
OHIO AND BALTIMORE
1 Mile
5 000 Feet
2 245 000 FEET
745 000 FEET

INSET

N

1 Mile
5 000 Feet
0 0
¼ 1 000
½ 2 000
¾ 3 000
1 4 000
5 000

GwE3 (Joins inset, sheet 7) | 2 175 000 FEET | GbD | GwC3 | 665 000 FEET | GbD | (Joins sheet 17)

655 000 FEET | 2 172 000 FEET | (Joins sheet 19) | GkF GbE GkF GkF GkE GkE GkF

730 000 FEET | 2 190 000 FEET | VaD | GwD3 GuF | GuC | GuE (Joins she

3000 AND 5000-FOOT GRID TICKS

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 4

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 5

(Joins sheet 4)

5
N
(Joins sheet 3)
(Joins sheet 6)
(Joins sheet 8)
BARBOUR COUNTY
BUCKHANNON RIVER
Miller's Bend
Big Run
Brush Run
Fishing Camp
Post Mill
Kesling Mill
Laurel Fork
Sand Run
BALTIMORE AND OHIO
1 Mile
5 000 Feet
2 245 000 FEET
730 000 FEET

UPSHUR COUNTY, WEST VIRGINIA — SHEET NUMBER 6

INSET

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

INSET

(Joins inset, sheet 10)

2 172 000 FEET

680 000 FEET

2 190 000 FEET

725 000 FEET

LEWIS COUNTY

BIG KNOB

BALTIMORE AND OHIO

West Fork River

Spice Lick Run

Straight Fork

Bear Run

Right Fork

STONECOAL LAKE

Boyd

(Joins sheet 15)

(Joins inset, sheet 4)

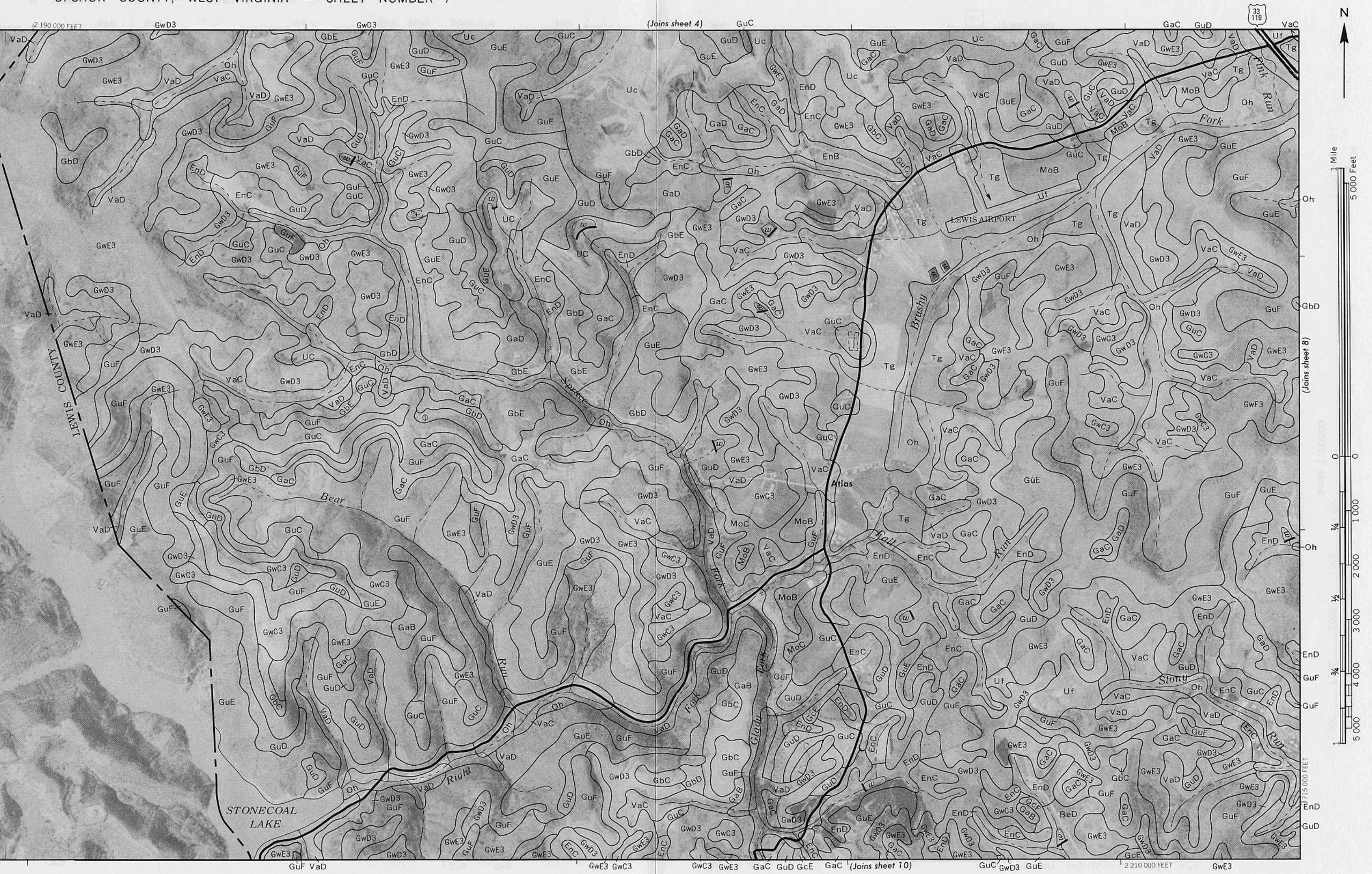
2 175 000 FEET

670 000 FEET

3000 AND 5000-FOOT GRID TICKS

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 7


7
N
(Joins sheet 4)
(Joins sheet 8)
(Joins sheet 10)
2 190 000 FEET
2 210 000 FEET
715 000 FEET
33
119
LEWIS AIRPORT
Atlas
LEWIS COUNTY
STONECOAL LAKE
Bear Run
Right Fork
Spruce Fork
Glady Fork
Brushy Fork
Fall Run
Stony Run
Fink Run
1 Mile
5 000 Feet
0
1000
2000
3000
4000
5000
¼
½
¾
1

N
1 Mile
5 000 Feet
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 11)
2 215 000 FEET
715 000 FEET
BUCKHANNON
(county seat)
WEST VIRGINIA
WESLEYAN COLLEGE
Deanville
Reger
Heavener Grove
Tennerton
BUCKHANNON RIVER
Fink Run
Brushy Fork
Ratcliff Run
Stony Run
Little Sand Run
Childers Run
BALTIMORE AND OHIO

UPSHUR COUNTY, WEST VIRGINIA — SHEET NUMBER 8

2 245 000 FEET

725 000 FEET

Reger

Heavener Grove

Daysville

Childers Run

Sand Run

Laurel Fork

Little Sand Run

33

(Joins sheet 9)

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 8

UPSHUR COUNTY, WEST VIRGINIA NO. 9

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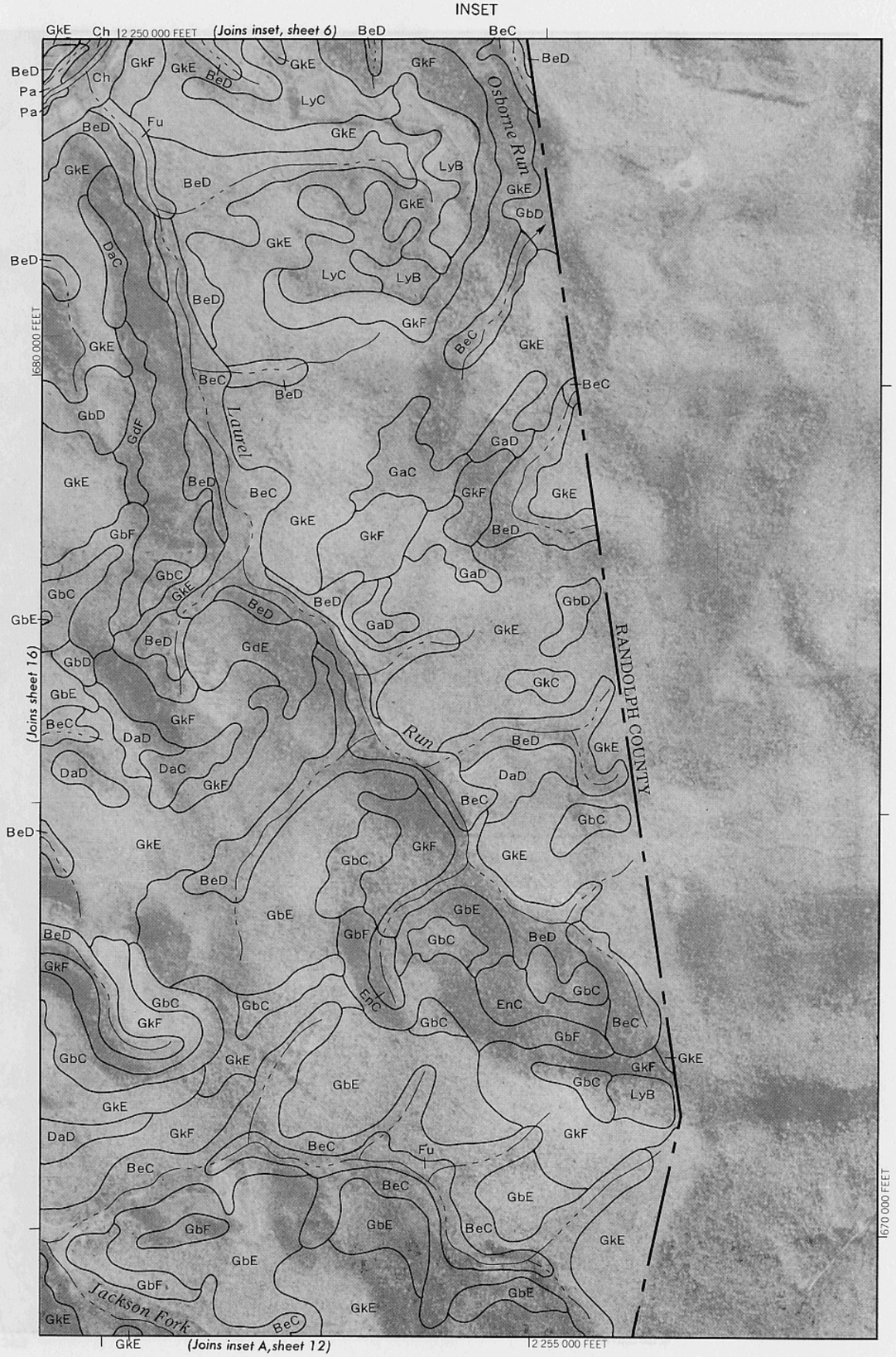
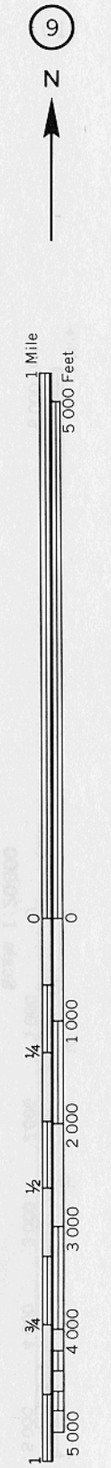
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MIDDLE
Laurel
Run
Hooppole
Run
RIVER
BARBOUR COUNTY
FORK
2 270 000 FEET
715 000 FEET

INSET


2 250 000 FEET
(Joins inset, sheet 6)
(Joins sheet 16)
(Joins inset A, sheet 12)
680 000 FEET
670 000 FEET
2 255 000 FEET
Osborne Run
Laurel
Run
Jackson Fork
RANDOLPH COUNTY


9
N
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
0
1 000
2 000
3 000
4 000
5 000

N
1 Mile
5 000 Feet
0
1 000
2 000
3 000
4 000
5 000
¼
½
¾
1
INSET
2 177 000 FEET
688 000 FEET
685 000 FEET
2 175 000 FEET
(Joins inset, sheet 7)
2000 AND 3000-FOOT GRID TICKS
LEWIS COUNTY
French Creek
WILSON KNOB
(Joins sheet 13)
STONECOAL LAKE
Pringle Fork
Log Hollow Run
Pigeonroost Run
Brushlick Run
Abbott
Freeman
BALTIMORE AND OHIO
Bull Run
700 000 FEET
2 180 000 FEET
(Joins sheet 13)

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 10

UPSHUR COUNTY, WEST VIRGINIA NO. 11

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

(Joins sheet 10)

N

1 Mile

5 000 Feet

(Joins sheet 8)

(Joins sheet 12)

(Joins sheet 14)

Excelsior

Goodwin

Sand Run

Little Sand Run

Left Fork

water

700 000 FEET

2 245 000 FEET

N

1 Mile

5 000 Feet

0 0

¼ 1 000

½ 2 000

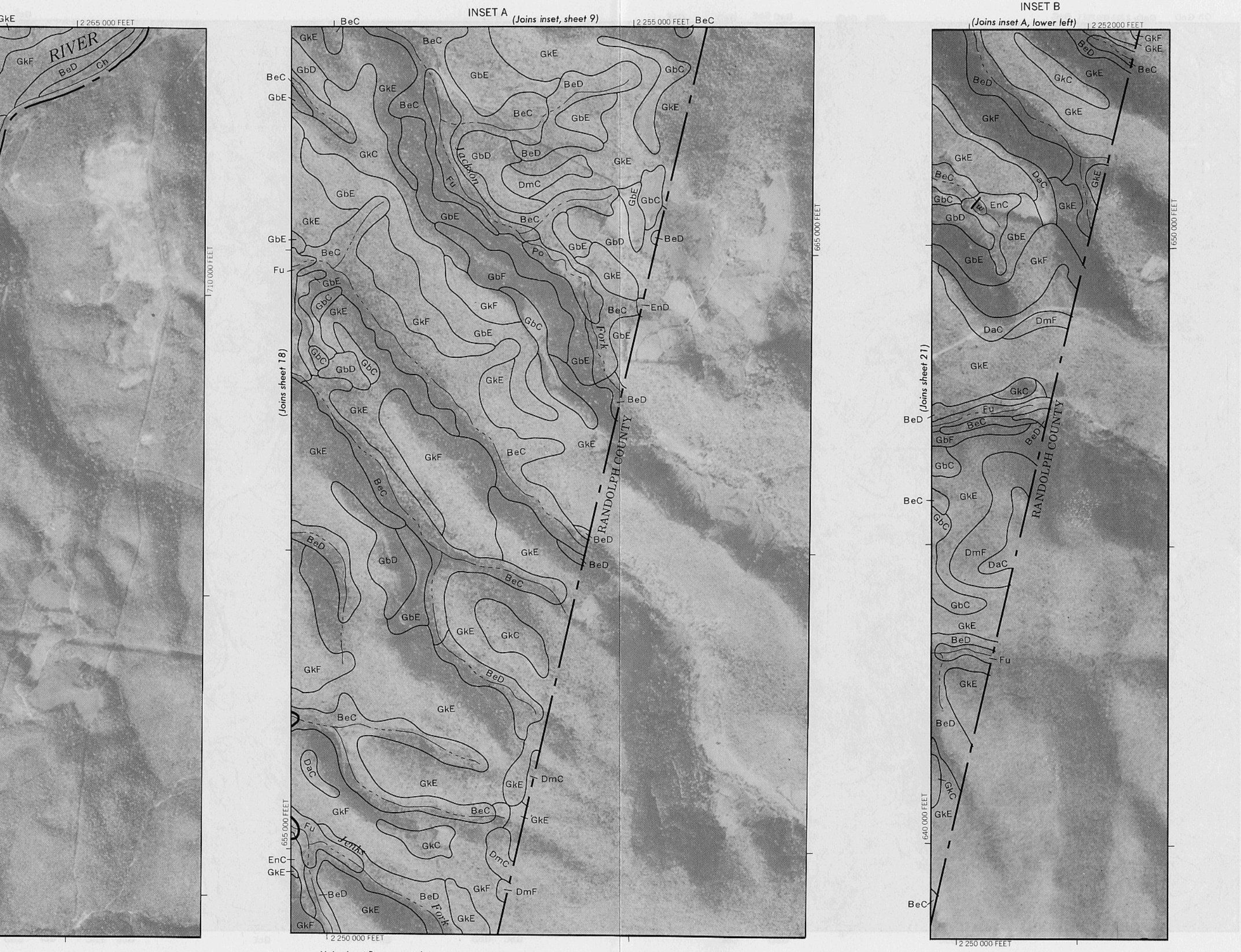
¾ 3 000

1 4 000

5 000

INSET A

INSET B



2000 AND 5000-FOOT GRID TICKS

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 12

UPSHUR COUNTY, WEST VIRGINIA NO. 13

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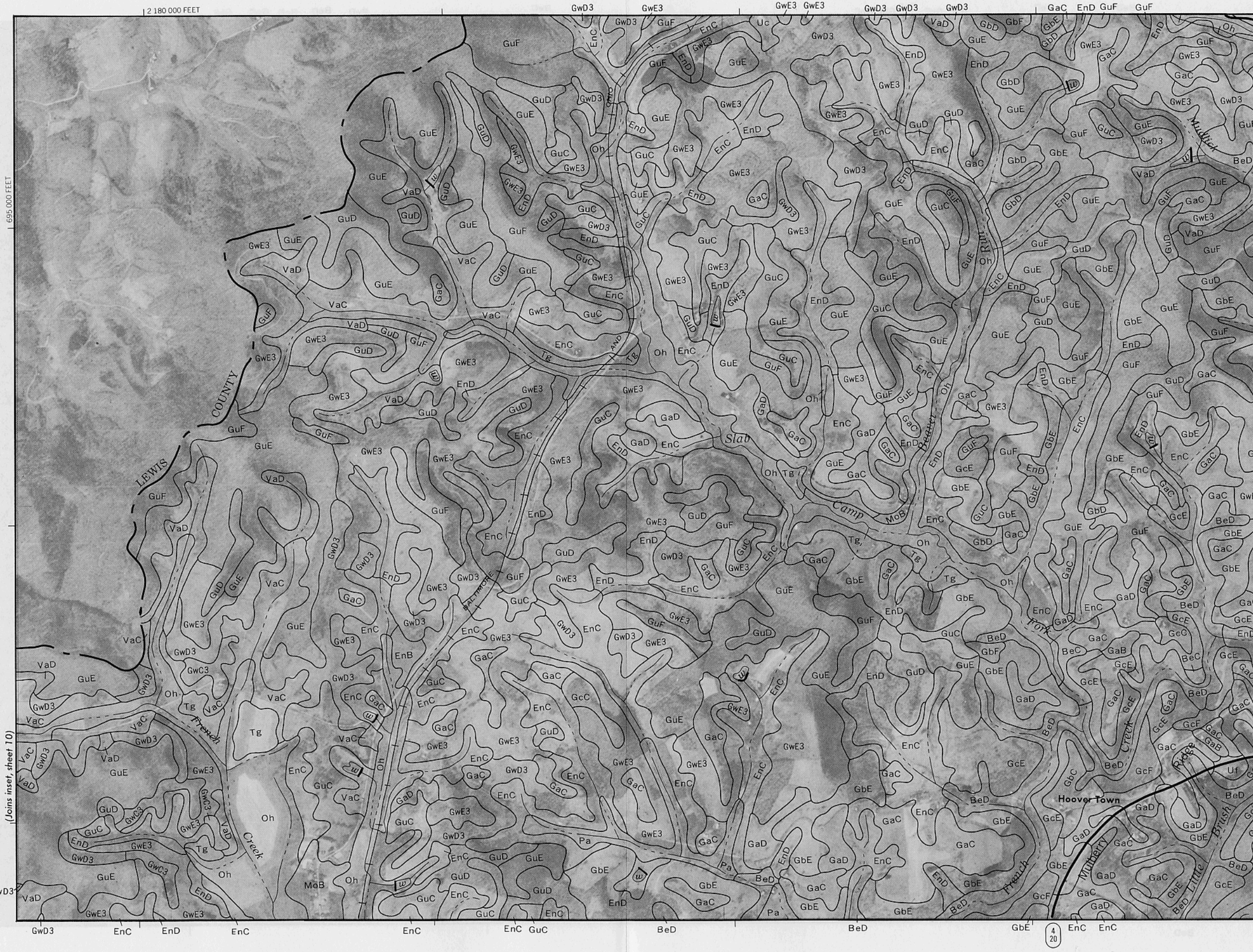
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

2 180 000 FEET

695 000 FEET



(Joins sheet 10)
(Joins sheet 14)
(Joins sheet 15)
N
Adrian
French Creek
Hoover Town
Gould
Mudlick Run
Bull Run
Blacklick Run
New Found Run
Crooked Run
FRENCH CREEK
Grand Camp Run
Camp Run
Beaver Fork
GRUBB HOLLOW
BALTIMORE AND OHIO
Brush Run
Little Brush Run
Mulberry Ridge
French Creek
Kittle Run
Laurel Fork
4
20
1 Mile
5 000 Feet
0
¼
½
¾
1
1 000
2 000
3 000
4 000
5 000
685 000 FEET
2 210 000 FEET

N
1 Mile
5 000 Feet
(Joins sheet 11)
(Joins sheet 13)
(Joins sheet 16)
Sago
Tallmansville
Tenmile
French Creek
BALTIMORE AND OHIO
BUCKHANNON
Grassy Run
Gravel Run
Mill Run
Laurel Run
Little Laurel Run
Grand Camp Run
Run
OHIO
RIVER
2 215 000 FEET
685 000 FEET

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 14

UPSHUR COUNTY, WEST VIRGINIA NO. 15

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

15
N
(Joins sheet 13)
(Joins sheet 16)
(Joins sheet 17)
FRENCH CREEK GAME FARM
Evergreen
Carter
Mulberry Ridge
Little Brush Run
Left Fork
Kanawha Run
Little Run
Laurel Fork
Queens Fork
1 Mile
5 000 Feet
670 000 FEET
2 210 000 FEET

N
1 Mile
5 000 Feet
(Joins sheet 14)
(Joins sheet 15)
(Joins sheet 18)
2 215 000 FEET
670 000 FEET
Tenmile
Imperial
BUCKHANNON
RIVER
Little Laurel Run
Grand Camp Run
Rich Run
Queens Fork
Indian Camp Run
Right Fork
Creek
BALTIMORE AND OHIO

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 16

UPSHUR COUNTY, WEST VIRGINIA NO. 17

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

17
N
(Joins sheet 15)
(Joins sheet 18)
(Joins sheet 20)
PLEASANT RIDGE
Holly Grove
BIG RUN KNOB
Kanawha
Little
Buttonwood
Run
Crassy
Creek
Laurel
Fork
Seng
Run
Big
Cub
River
Po
Uf
Ud
655 000 FEET
2 210 000 FEET
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000

N
1 Mile
5 000 Feet
(Joins sheet 16)
(Joins sheet 17)
(Joins sheet 21)
Beans Mill
Alton
BUCKHANNON
RIVER
Queens
Fork
Big
Run
Panther
Swamp
Run
Herods
Run
Fork
OHIO
AND
BALTIMORE
655 000 FEET
2 215 000 FEET

UPSHUR COUNTY, WEST VIRGINIA — SHEET NUMBER 18

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UPSHUR COUNTY, WEST VIRGINIA NO. 18

UPSHUR COUNTY, WEST VIRGINIA — SHEET NUMBER 19

2 145 000 FEET

1650 000 FEET

INSET

(Joins sheet 19 lower right)

2 171 000 FEET

1635 000 FEET

(Joins sheet 22)

2 175 000 FEET

1630 000 FEET

BeD GkF GbD GbE GkE GbC GbF Pa

LEWIS COUNTY

WEBSTER COUNTY

Right Fork

Little Kanawha River

Honey Run

Camp Run

20

UPSHUR COUNTY, WEST VIRGINIA NO. 19

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

INSET

2 171 000 FEET

635 000 FEET

630 000 FEET

2 175 000 FEET

(Joins sheet 19 lower right)

(Joins sheet 22)

(Joins inset, sheet 4)

(Joins sheet 20)

(Joins inset, upper left sheet 19)

2 175 000 FEET

640 000 FEET

LEWIS COUNTY

WEBSTER COUNTY

Cherry Fork

Right Fork

Panther Fork

Camp Run

Honey Run

Little Kanawha River

Kanawha River

Cave Run

Trace Run

1 Mile

5 000 Feet

1 5 000 0

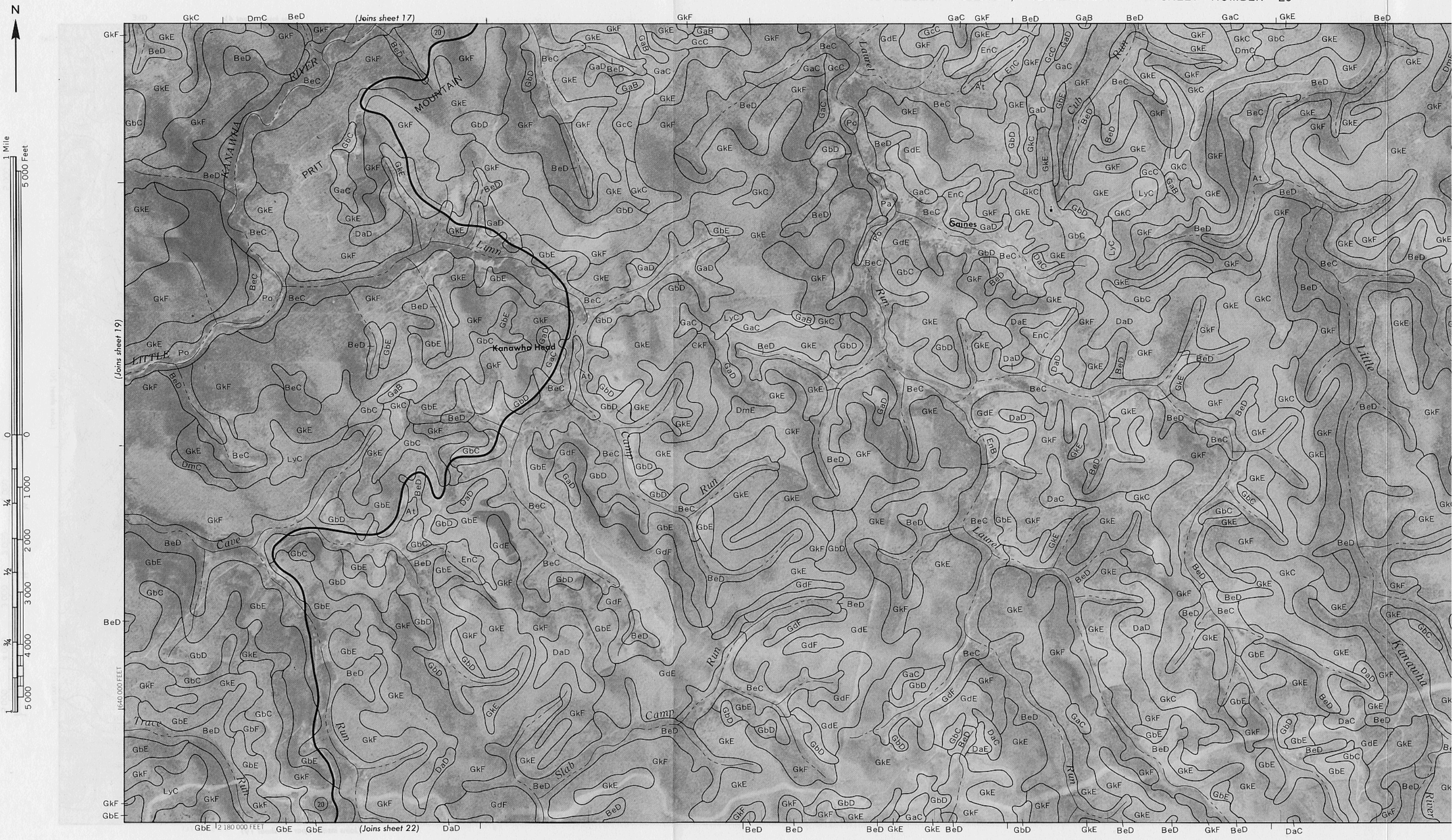
¼ 1 000 2 000

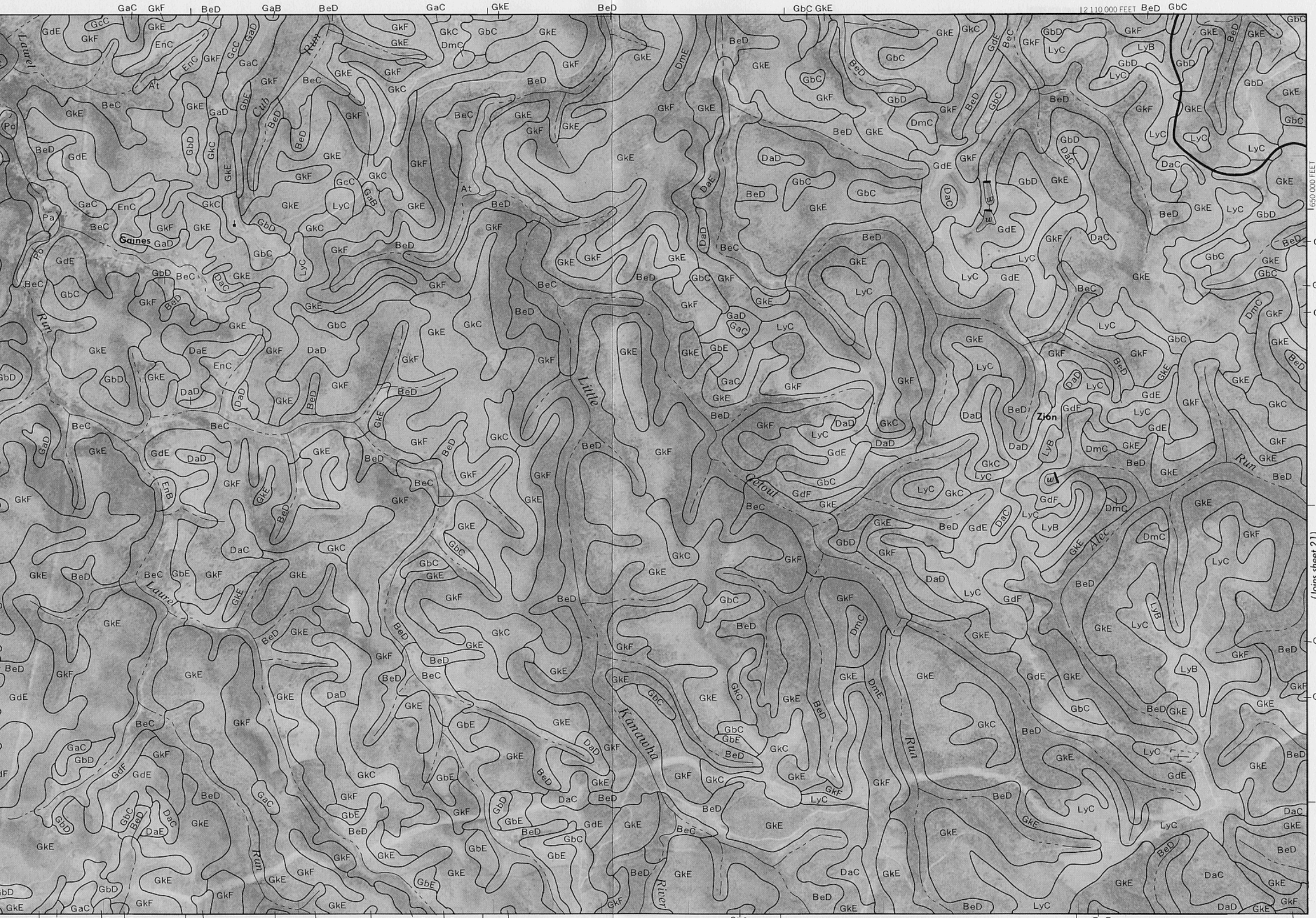
½ 3 000

¾ 4 000

1 5 000

UPSHUR COUNTY, WEST VIRGINIA — SHEET NUMBER 20

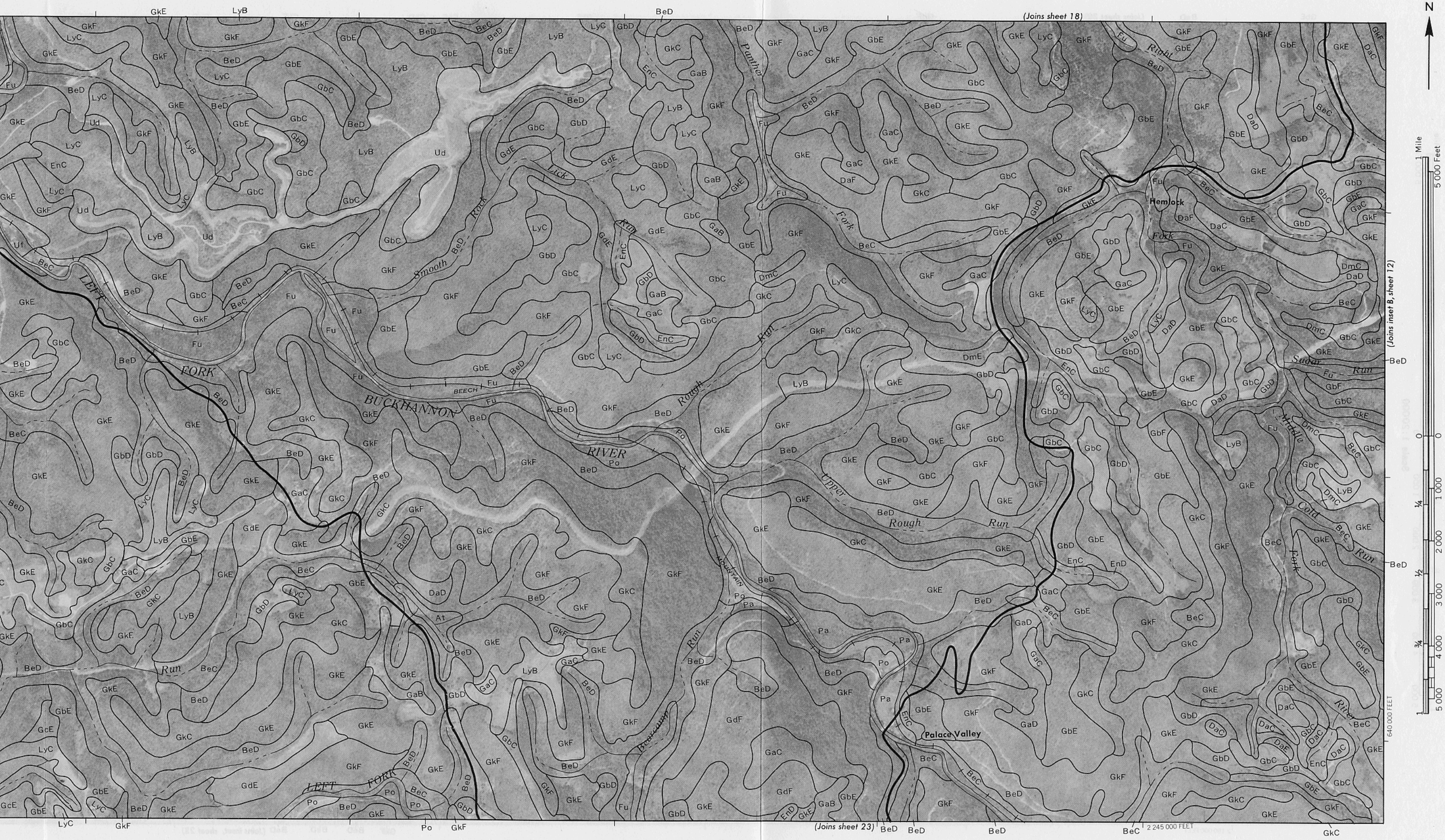




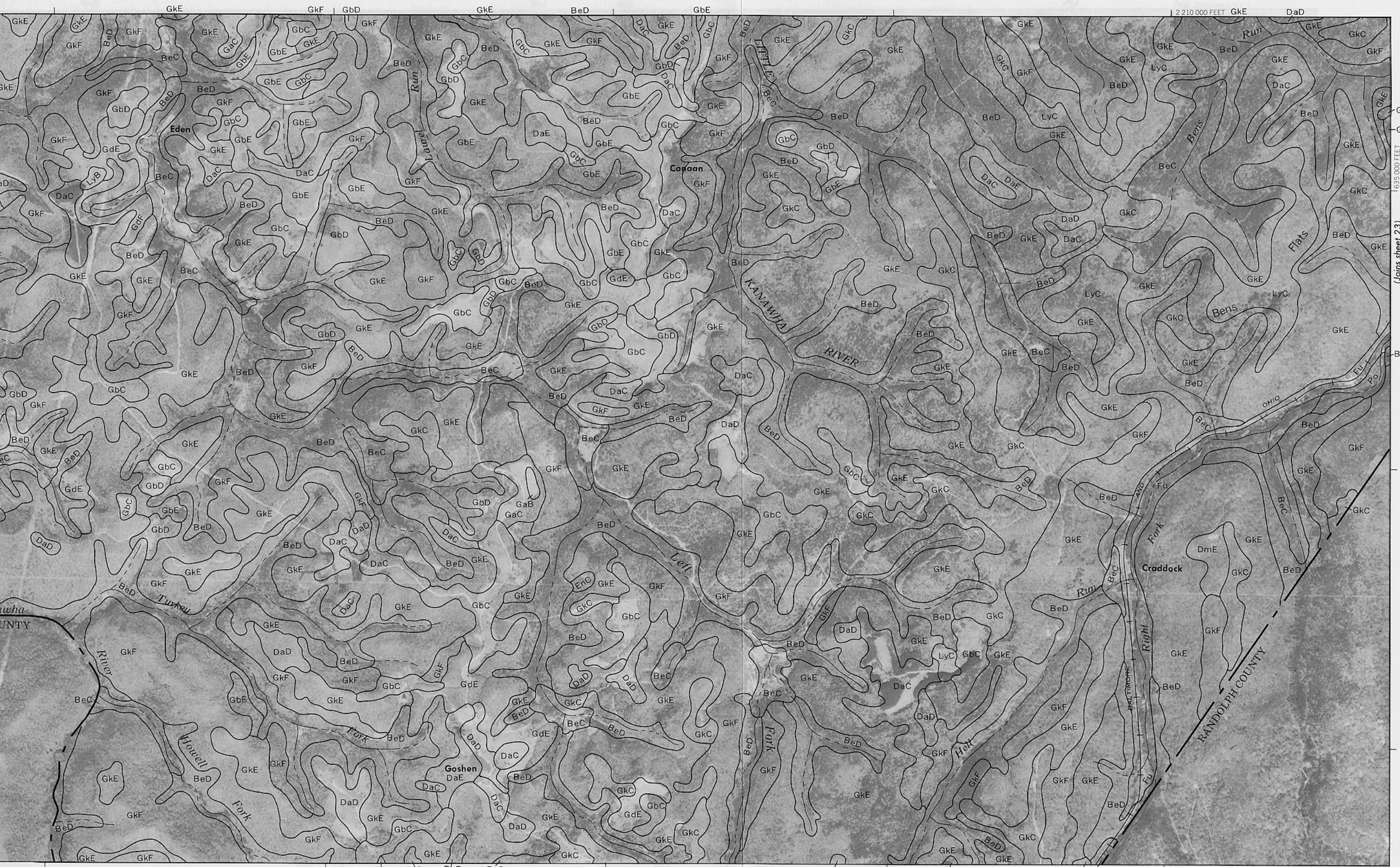
This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 20

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

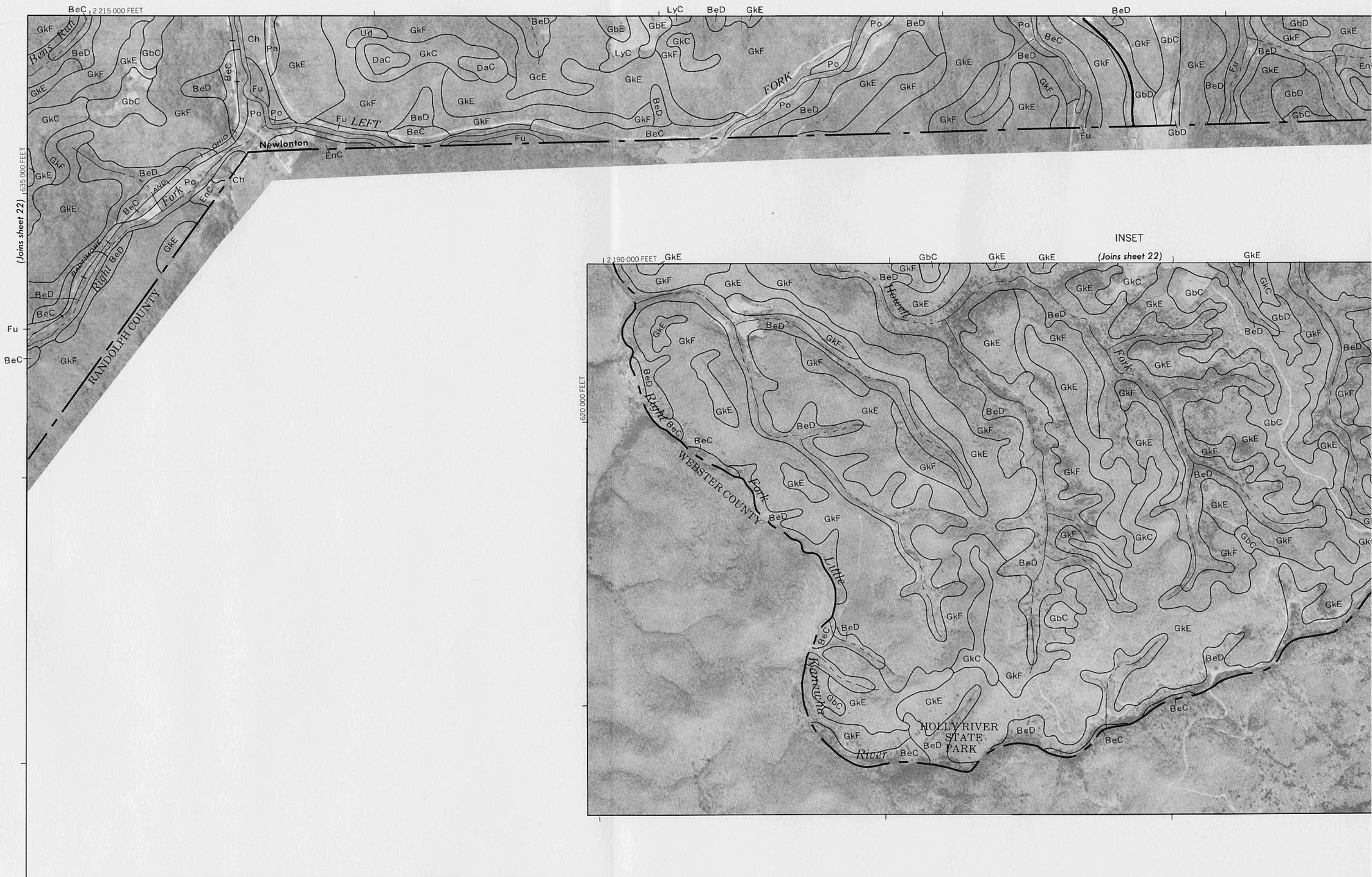

21
N
(Joins sheet 18)
(Joins sheet 23)
(Joins inset B, sheet 12)
Hemlock
Palace Valley
LEFT FORK
BUCKHANNON RIVER
Smooth Rock Run
Lick Run
Panther Fork
Right Fork
Rough Run
Upper Rough Run
Sugar Run
Middle Fork
Cold Run
Beercamp Run
Mountain Run
Beech
1 Mile
5 000 Feet
640 000 FEET
2 245 000 FEET

UPSHUR COUNTY, WEST VIRGINIA — SHEET NUMBER 22



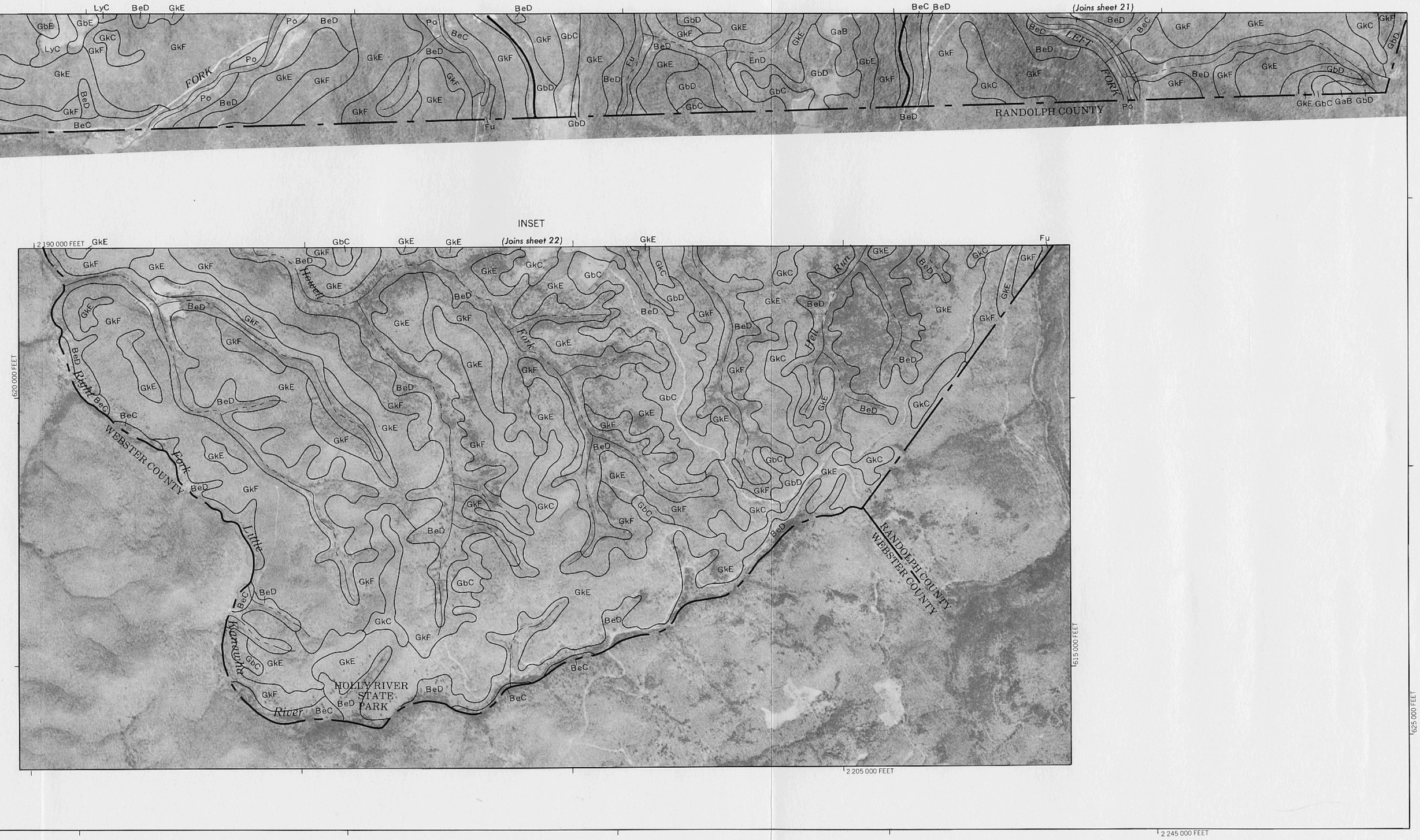
This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

UPSHUR COUNTY, WEST VIRGINIA NO. 22



UPSHUR COUNTY, WEST VIRGINIA NO. 23

This map is compiled on 1978 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.


(Joins sheet 21)
RANDOLPH COUNTY
LEFT FORK
FORK
INSET
(Joins sheet 22)
2 190 000 FEET
620 000 FEET
615 000 FEET
2 205 000 FEET
625 000 FEET
2 245 000 FEET
Hewett
Fork
Hell Run
Right Fork
Little Kanawha River
WEBSTER COUNTY
RANDOLPH COUNTY
WEBSTER COUNTY
HOLLY RIVER STATE PARK
N
1 Mile
5 000 Feet
0
1/4
1/2
3/4
1
1 000
2 000
3 000
4 000
5 000