United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
the Ohio Department of
Natural Resources,
Division of Soil and Water
Conservation; the Ohio
Agricultural Research and
Development Center; the
Ohio State University
Extension; and the Meigs
County Commissioners

Soil Survey of Meigs County, Ohio

How to Use This Soil Survey

General Soil Map

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

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

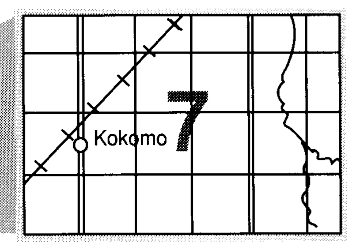
Detailed Soil Maps

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

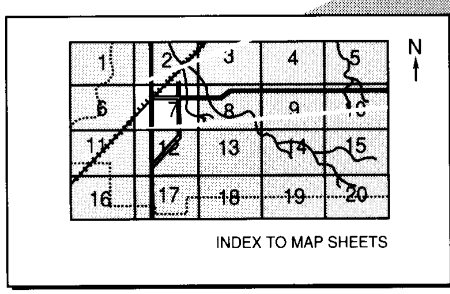
To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

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

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



MAP SHEET



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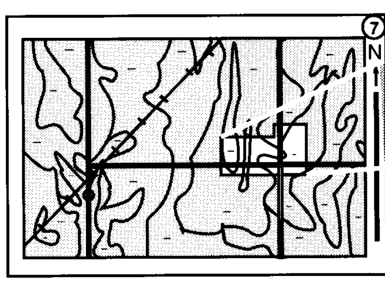

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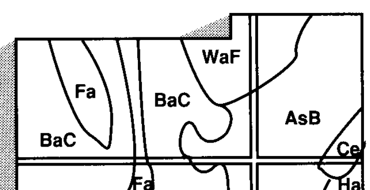

AREA OF INTEREST

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

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 Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1989. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Natural Resources Conservation Service; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; the Ohio Agricultural Research and Development Center; the Ohio State University Extension; and the Meigs County Commissioners. The survey is part of the technical assistance furnished to the Meigs Soil and Water Conservation District. Financial assistance was provided by the Meigs County Commissioners.

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: A pond and homestead in an area of Licking silt loam, 6 to 12 percent slopes, eroded, and Licking silt loam, 12 to 18 percent slopes, eroded. Doles and Licking silt loams are in the higher landscape positions in the background.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 2000

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are moderately deep 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 Natural Resources Conservation Service or the Cooperative Extension Service.

Patrick K. Wolf
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Meigs County, Ohio

By Gordon Gilmore and George Dean Bottrell, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Ohio Department of Natural Resources, Division of Soil and Water Conservation; the Ohio Agricultural Research and Development Center; the Ohio State University Extension; and the Meigs County Commissioners

General Nature of the County

MEIGS COUNTY is in the southeastern part of Ohio (fig. 1). It has a total area of 276,794 acres, or about 435 square miles. In 1990, the population of the county was 22,987. Pomeroy, which is the county seat, had a population of 2,259. Middleport, which is the largest community in the county, had a population of 2,725 (U.S. Department of Commerce 1991). Smaller incorporated villages in the county include Racine, Syracuse, Rutland, Chester, and Tuppers Plains. Many small, unincorporated communities, such as Harrisonville, Letart Falls, and Merritt, are in the county (fig. 2).

A coal company is the largest employer in the county. There also are several large coal-fired electric generating plants in surrounding counties that provide employment for many residents of the county. Shipping on the Ohio River, particularly of coal and chemicals, is another source of employment in the county related to coal production.

Nearly 57 percent of the county is used as woodland, 17 percent as pasture, and 18 percent as cropland. Dairy farming and growing vegetable crops are the major farming enterprises. The steep slopes and the hazard of erosion are the main limitations affecting land use. Other limitations include slippage on hillsides, a high content of clay in the subsoil of the soils, slow permeability, a high potential for shrinking and swelling, seasonal wetness, flooding, and depth to bedrock.

This soil survey updates the survey of Meigs County published in 1908 (Meeker and Tailby 1908). It provides additional information and has larger maps, which show the soils in greater detail.

Climate

Meigs County typically has cold winters, but intermittent thaws generally preclude a long lasting

Figure 1.—Location of Meigs County in Ohio.

Figure 2.—An aerial view of Harrisonville. Omulga, Gallipolis, and Taggart silt loams are in the foreground, and Upshur, Gilpin, and Pinegrove soils are in the background.

snow cover. Summers are generally hot and humid. Precipitation is evenly distributed throughout the year with winter snow and rains providing a good accumulation of soil moisture by spring. Severe drought in summer is usually rare on most soils in the area. Normal annual precipitation is adequate for all crops that are suited to the temperature and length of growing season in the area.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Carpenter, Ohio, in the period 1963 to 1987. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 32 degrees F and the average daily minimum temperature is 22 degrees. The lowest temperature on record, which occurred on January 17, 1977, is -24 degrees. In summer, the average temperature is 71 degrees and the average daily maximum temperature is 84 degrees. The highest recorded temperature, which occurred on July 26, 1964, is 102 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 40 inches. Of this, 23 inches, or about 57 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 21 inches. The heaviest 1-day rainfall during the period of record was 3.39 inches on September 21, 1966. Thunderstorms occur on about 41 days each year. Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

The average seasonal snowfall is about 21 inches. The greatest snow depth at any one time during the period of record was 20 inches. On the average, 15 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 11 miles per hour, in spring.

Physiography, Relief, and Drainage

Meigs County is in the unglaciated Western Allegheny Plateau region of the Appalachian Highlands (Austin 1965). The area has been extensively dissected by drainageways. Most of the soils are underlain by sedimentary rocks of the Conemaugh and Monongahela Formations of the Pennsylvanian System and the Dunkard Group of the Permian System (fig. 3).

The rocks generally are siltstone, shale, sandstone, or coal. Thin layers of limestone or calcareous shale are in some areas. Most areas of the bedrock have a northeast-southwest strike, with an average dip of 30 feet per mile toward the southeast (Sturgeon and others 1958). The western part of the county is

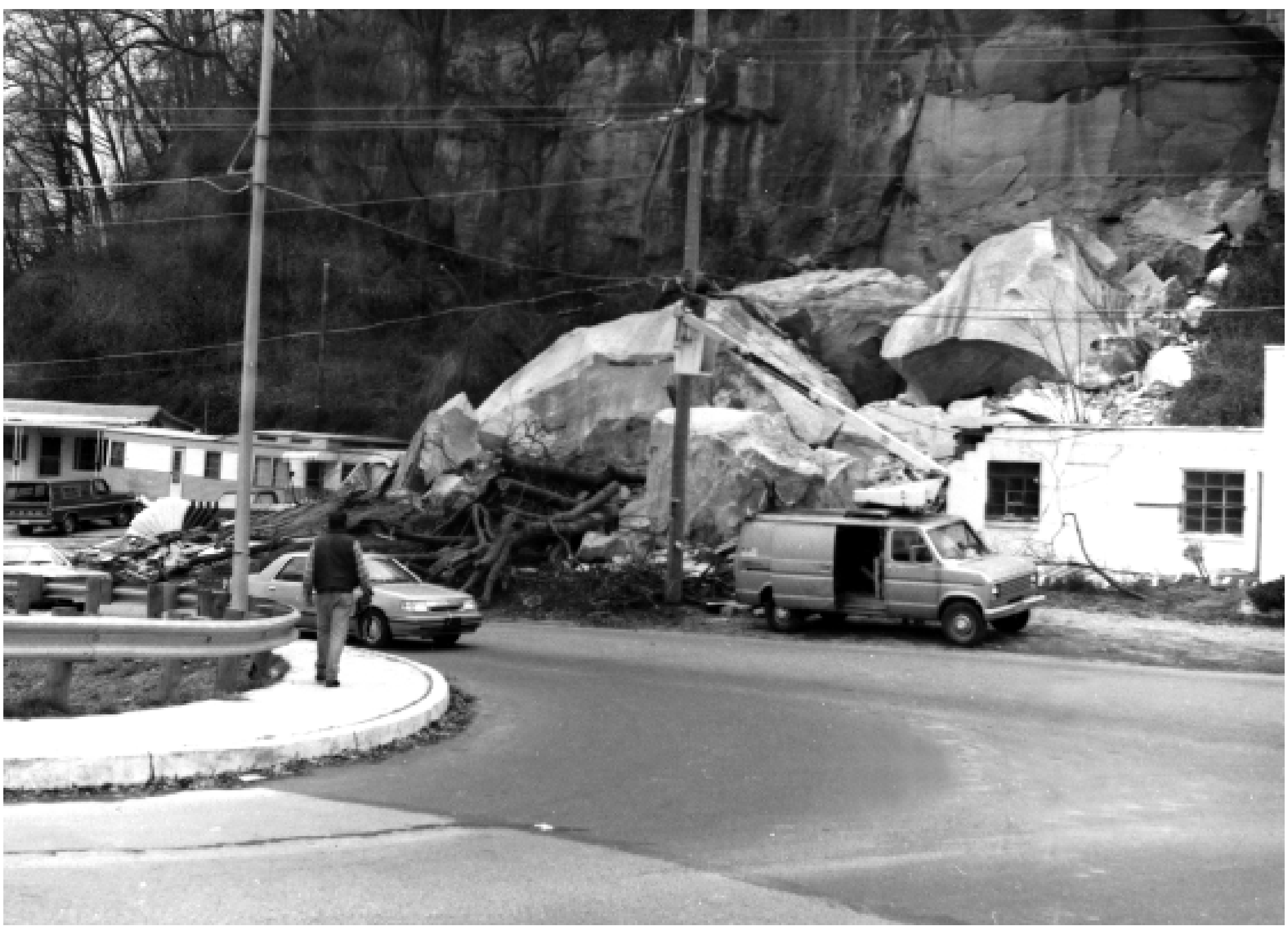

Figure 3.—Rockfall in Pomeroy, Ohio. The cliffs are exposures of Pomeroy sandstone of the Pennsylvania System.

underlain by rocks of the Conemaugh Formation, the central part by rocks of the Monongahela Formation, and the eastern part by rocks of the Permian System.

The landscape is characterized by hills, narrow ridgetops, and stream valleys. The highest point in the county, about 1,007 feet above sea level, is Greenler, which is in section 1 of Scipio Township. The lowest point, about 540 feet above sea level, is in an area of Salisbury Township where the Ohio River leaves the county. The average elevation difference from ridge crest to drainage notch is about 250 feet.

Much of the terrain in the county is rugged and steep or very steep. Preglacial terraces are near Tuppers Plains, Racine, and Salem Center and in numerous other locations. These terraces are remnants of the preglacial Teays River drainage system. The Teays River had a complex drainage system that originated in the Carolinas and flowed generally to the northwest through Ohio.

With the advance of glacial ice, the Teays River and subsequent drainage systems were dammed, forming an extensive lake system. Omulga, Doles, Licking, and Vincent soils formed in the material that accumulated during the damming action of the ice sheets.

Eventually the Ohio River drainage system was formed, and the lakes were drained. The former valleys of the Teays River drainage system are at elevations of 700 to 800 feet. These valleys have more subdued slopes and wider benches than the adjacent residual upland hillslopes.

The drainage system in Meigs County outlets to the Ohio River by way of the Shade River, Leading Creek, Raccoon Creek, and smaller direct drainageways. A very small area in the northeastern part of the county drains into the Hocking River. The Ohio River forms the entire eastern boundary and about half of the southern boundary between Meigs County and Jackson, Mason, and Wood Counties in West Virginia. The Ohio River front stretches about 57 miles in Meigs County.

Agriculture

Agriculture is a major industry in Meigs County and is one of the major land uses in the county. In 1987, the county had 528 farms, which included about 85,076 acres. The average size of the farms was 161 acres (U.S. Department of Commerce 1989). The principal crops were hay on 18,800 acres, corn on 4,600 acres, and vegetables on about 1,500 acres.

With the exception of farms where vegetables are grown, most of the farms are in scattered areas throughout the county. Vegetables are mainly grown on the outwash terraces in the Ohio River valley.

Total cash receipts from farming, not including government payments, was about $8 million in 1987 (Havlicek and others 1988). Of this total, about $5 million come from livestock or livestock products. Milk accounted for about $2.5 million of this total. Total crop production accounted for about $3 million. About $2.2 million was generated by growing vegetables or greenhouse crops and $300,000 by growing corn.

In recent years, many vegetable producers have applied their expertise in greenhouse production to the growing of annual flowers for both wholesale and retail enterprises. The production of these flowers is, unlike vegetable production, totally limited to the greenhouse environment.

Natural Resources

Important natural resources in the county include coal, oil and gas, timber, sand and gravel, and water.

Coal mining began soon after the county was settled and is still important today. All of the present mining operations are deep mines. There are no active strip mines in the county. The Clarion (No. 4a) coalbed presently is being mined. The Redstone (No. 8a), or Pomeroy, coalbed was important in coal production in the past. Currently, mining operations are limited to the western third of the county. Oil and gas are produced from wells in the Berea member of the Mississippian System. The wells are in scattered areas throughout the county.

The natural vegetation of the county is mixed hardwoods. About 60 percent of the acreage supports trees. There are several small logging operations, one pallet mill, and one treated post factory in the county. Wood is also sent to several nearby pulp mills, and some of the higher quality trees are used for veneer.

Sand and gravel are being mined on the outwash terraces along the Ohio River (fig. 4). This is the only source of sand and gravel in the county, but the area is extensive. The sand and gravel beds are about 100 feet thick. Occasionally, some sand and gravel are taken directly from the riverbed.

The principal supply of fresh water in the county comes from wells drilled into the sand and gravel terraces along the Ohio River. The county's water supply in areas away from these terraces is generally handled by two rural water systems. Both of the rural water systems have well fields in the Ohio River valley. Generally, the water in the county away from the Ohio River is of limited quantity or it is of poor quality because it contains salt or sulfur. Many people who are not served by the rural water companies get their water from springs, wells, or cisterns or have water hauled to their residences.

Figure 4.—A sand and gravel pit in an area of Cidermill silt loam and Conotton gravelly loam. Slopes range from 0 to 6 percent.

History

Meigs County has an interesting and varied history. Native Americans were the first inhabitants and settlers in the area that is now Meigs County. It is not known when Europeans first arrived in the county.

George Washington made camp along the Ohio River below Long Bottom during his surveying expedition of 1770. A plaque marks the spot where the expedition encountered a peaceful Native American hunting party as described in Washington's diary.

In 1787, Congress enacted an ordinance that established a form of government for all land north and west of the Ohio River. In the same year the Ohio Land Company was formed by disbanded Revolutionary soldiers with interested citizens as stockholders. This company, through negotiations by Rev. Manassah Cutler, purchased $1\frac{1}{2}$ million acres of land from Congress in 1787. President George Washington appointed individuals, including General Tupper and Colonel Jonathan Meigs, to survey this land. Three sections in every township were reserved for congressional, ministerial, and school purposes.

Meigs County was formed in June 1819 from parts of Gallia, Athens, and Washington Counties. By 1823, the county government had contracted for building the first county courthouse, which was located in Chester.

The economic base of the county advanced from early pioneer necessities and skills to agriculture, which peaked during the Civil War. The population in the county reached its peak in 1880 when coal was the dominant industry. Coal was first mined on a commercial scale in the 1830's when V.B. Horton and Samuel Wyllis Pomeroy arrived in the county.

The production of salt started in about 1816. Many furnaces were operated on both sides of the river. The Excelsior Salt Works, Inc., which was formed in 1960, was the last survivor of this industry. It ceased operation in the 1970's.

The Civil War brought Meigs County to national attention with John Hunt Morgan's raid and the Battle of Buffington Island. President Lincoln later named V.B. Horton to his Peace Commission to smooth the ills and inequities between states during the Reconstruction process.

Around the turn of the century, agriculture again gained dominance. Interest in coal mining, however, returned during World War II and for a time thereafter. Strip mining became the mode of operation. As late as 1970, less than half of the coal produced came from underground mines. In 1979, Meigs County produced the fourth largest amount of coal of all of the counties in Ohio (Meigs County Regional Planning Commission 1983). By the 1980's, all of the coal produced came from underground mines. Reclamation of abandoned strip mines and minimization of damage to small streams by siltation are concerns.

Transportation

The Ohio River provides the county with access to commercial barge traffic. There is presently one coal-loading facility at Minersville. Interstate traffic is served by two bridges across the Ohio River, one at Ravenswood, West Virginia, on Ohio Route 338, and one at Pomeroy on U.S. Route 33, which connects to Mason, West Virginia.

The principal arteries of transportation are Ohio Route 7, which runs along the Ohio River in the southern part of the county and then continues in a northeasterly direction; U.S. Route 33, which crosses the county from north to south; and Ohio Route 124, which enters the county on the west, near the area that is mined, joins Rutland and Pomeroy and skirts the river to the east and north. A railroad provides limited service, running along the Ohio River to Middleport and then northward along Leading Creek to Carpenter and into Athens County. Aircraft are limited to private landing strips and heliports. Small commercial airports in the adjacent counties provide service to residents of the county.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

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

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

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

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

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" (USDA 1996). The soil maps made for conservation planning on individual farms prior to the start of the project soil survey and a description of the local geology of the county were used as references.

Before the fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on aerial photographs, which were taken in 1983 and enlarged to a scale of 1:15,480. U.S. Geologic Survey topographic maps, at a scale of 1:24,000, were studied to relate land and image features.

Soil scientists traversed the landscape on foot, examining the soils. The distance between traverses was dependent upon the complexity of the soil patterns and the intenseness of the land usage. In areas of the Cidermill-Lakin-Gallipolis association and others where land use is intense, the traverses were spaced as close as 200 yards or less. In areas of the Upshur-Gilpin association where the slope is steep and land use is less intensive, the traverses were about a quarter of a mile apart.

As the traverses were made, the soil scientists divided the landscape into segments based on the use and management of the soils. For example, a hillside would be separated from a terrace and a gently sloping ridgetop from a strongly sloping side slope. Several soil examinations were made in each landscape segment. The total number of soil examinations varied based on the size and complexity of each landscape segment.

Observations of such items as landforms, blown-down trees, vegetation, roadbanks, bedrock highwalls, and animal burrows were made wherever possible. Soil boundaries were determined on the basis of soil examinations, observations, and aerial photo interpretation. With the aide of a 3/4-inch diameter soil sampling tube, a bucket auger, or a spade, the soil material was examined to a depth of about 4 feet or to bedrock within a depth of 4 feet. Deeper soils were examined to a depth of 80 inches or more using bucket augers or by digging soil pits. The pedons described as typical were observed and studied in soil pits dug with shovels to a depth of 80 inches or to bedrock within a depth of 80 inches.

Soil mapping was recorded on halftone or film positive mylars of aerial photographs taken in 1983. The drainageways were mapped in the field. Most of the cultural features were recorded from visual observations, but some were transferred from topographic maps.

At the beginning of the survey, sample blocks were selected to represent the major landscapes in the county. These areas were then mapped. Extensive notes were taken on the composition of the map units in these preliminary study areas. Transects were made to determine the composition of soil complexes, range of soil characteristics, and amount and type of inclusions.

Samples for laboratory analysis were taken from representative sites of several soils. The chemical and physical analyses were made by the Soil Characterization Laboratory, School of Natural Resources, Ohio State University, Columbus, Ohio. The results of the analyses are stored in a computerized data file at the laboratory. The results of these analyses can be obtained from the School of Natural Resources, Ohio State University; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; and the Natural Resources Conservation Service, State Office, Columbus, Ohio.

General Soil Map Units

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

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

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

Soils on Uplands

These soils make up about 87 percent of the county. They are well drained and moderately well drained and are nearly level to very steep. They formed in residuum derived from siltstone, sandstone, and shale and in material mixed by surface mining. The landscape is characterized by moderately steep and steep side slopes and ridges. The side slopes are strongly dissected. The soils are used mainly as woodland. The flattest ridges and the broadest valleys are used as cropland. The slope, slow permeability, a high shrink-swell potential, and a severe hazard of erosion are the major management concerns.

1. Upshur-Steinsburg-Gilpin Association

Very deep to moderately deep, strongly sloping to very steep, well drained soils formed in residuum derived from siltstone, sandstone, and shale; on uplands

This association makes up about 4 percent of the county. It is about 40 percent Upshur soils, 40 percent Steinsburg soils, 5 percent Gilpin soils, and 15 percent soils of minor extent.

The deep and very deep, well drained Upshur soils are on strongly sloping to very steep hillsides and ridgetops. Permeability is slow. The shrink-swell potential is high. The soils are subject to hillside slippage in areas where slopes are more than 15 percent.

The moderately deep, well drained Gilpin soils are on strongly sloping to very steep hillsides and narrow ridgetops. Permeability is moderate.

The moderately deep, well drained Steinsburg soils are on moderately steep to very steep hillsides. Permeability is moderately rapid.

Some of the minor soils in this association are the well drained Chagrin, the somewhat poorly drained Orrville, the very poorly drained Kyger, and the well drained Nolin soils on narrow flood plains.

Areas on the narrow ridges and flood plains are used for row crops, pasture, or hay. Areas on the moderately steep shoulders of ridges are used for hay or as woodland. The steep and very steep soils on the side slopes are in woodland. The narrow ridges are poorly suited to row crops and small grain. The moderately steep soils are moderately well suited to pasture and woodland. They are less well suited to hay. The steep and very steep soils are moderately well suited to woodland. They are poorly suited or generally unsuited to most other common uses.

The major management concerns in this association are the slope and the hazard of erosion. The slow permeability, the high shrink-swell potential, and the susceptibility to hillside slippage are additional limitations in areas of the Upshur soils.

2. Gilpin-Rarden-Aaron Association

Moderately deep and deep, strongly sloping to steep, well drained and moderately well drained soils formed in residuum derived from siltstone, sandstone, and shale; on uplands

This association makes up about 7 percent of the county. It is about 45 percent Gilpin soils, 25 percent Rarden soils, 10 percent Aaron soils, and 20 percent soils of minor extent.

The moderately deep, well drained Gilpin soils are on strongly sloping to steep hillsides and ridgetops. Permeability is moderate.

The moderately deep, moderately well drained Rarden soils are on strongly sloping to steep ridgetops and hillsides. Permeability is slow. The shrink-swell potential is high. The seasonal high water table is between depths of 1.5 and 3.0 feet.

The deep, moderately well drained Aaron soils are on strongly sloping ridgetops. Permeability is slow. The shrink-swell potential is high. The seasonal high water table is between depths of 1.5 and 3.0 feet.

Some of the minor soils in this association are the Chagrin, Nolin, Guernsey, Upshur, and Vandalia soils. The well drained Chagrin and Nolin soils are on flood plains. The well drained Upshur soils are on narrow benches and ridges. The moderately well drained Guernsey soils are on side slopes. The well drained Vandalia soils are on colluvial foot slopes.

Areas on the narrow ridges and flood plains are used for row crops, pasture, or hay. Areas on the moderately steep shoulders of ridges are used for hay or as woodland. The steep and very steep soils on the side slopes are in woodland. The strongly sloping ridgetops are moderately well suited to row crops, small grain, and woodland. They are well suited to hay and pasture. The moderately steep soils are moderately well suited to pasture and woodland. The steep soils are moderately well suited to woodland. The Aaron and Rarden soils on ridges and benches on side slopes are moderately well suited to building site development and poorly suited to septic tank absorption fields.

The major management concerns in this association are the slope and the hazard of erosion. The slow permeability and the high shrink-swell potential are limitations on sites for septic tank absorption fields and buildings in areas of the Aaron and Rarden soils.

3. Upshur-Gilpin Association

Very deep to moderately deep, strongly sloping to very steep, well drained soils formed in residuum derived from siltstone, sandstone, and shale; on uplands

This association makes up about 67 percent of the county. It is about 55 percent Upshur soils, 35 percent Gilpin soils, and 10 percent soils of minor extent (fig. 5).

The deep and very deep, well drained Upshur soils are on hillsides and ridgetops. Permeability is slow. The shrink-swell potential is high. The soils are subject to hillside slippage in areas where slopes are more than 15 percent.

The Gilpin soils are moderately deep and well drained. They are on hillsides and narrow ridgetops.

Some of the minor soils in this association are the well drained Chagrin, Moshannon, and Nolin and the somewhat poorly drained Newark soils on flood plains, the moderately well drained Keene soils on ridgetops, and the well drained Vandalia soils on the lower part of hillsides.

Areas on the narrow ridges and flood plains are used for row crops, pasture, or hay. Areas on the moderately steep shoulders of ridges and foot slopes are used for hay or as woodland. Some areas of this association were once cleared of trees but are reverting to brush and woodland. The steep and very steep soils on the side slopes are in woodland. The narrow ridges are poorly suited to row crops and small grain. The moderately steep soils are moderately well suited to pasture and woodland and poorly suited to hay. The steep and very steep soils are moderately well suited to woodland. They are poorly suited or generally unsuited to most other common uses. The Upshur soils on ridgetops are the best sites for buildings.

The major management concerns in this association are the slope and the hazard of erosion. The slow permeability, the high shrink-swell potential, and the susceptibility to hillside slippage are additional limitations in areas of the Upshur soils.

4. Upshur-Gilpin-Pinegrove Association

Very deep to moderately deep, nearly level to very steep, well drained soils formed in residuum derived from siltstone, sandstone, and shale and in material disturbed by surface mining; on uplands

This association makes up about 9 percent of the county. It is about 30 percent Upshur soils, 25 percent Gilpin soils, 20 percent Pinegrove soils, and 25 percent soils of minor extent.

The deep and very deep, well drained Upshur soils are on strongly sloping to very steep hillsides and ridgetops. Permeability is slow. The shrink-swell potential is high. The soils are subject to hillside slippage in areas where slopes are more than 15 percent.

The moderately deep, well drained Gilpin soils are on strongly sloping to very steep hillsides and ridgetops. Permeability is moderate.

The very deep, well drained Pinegrove soils are on nearly level to very steep hillsides and, less commonly, on ridgetops. Permeability is rapid. The hazard of erosion is severe, particularly on the moderately steep to very steep slopes.

Some of the minor soils in this association are the very poorly drained Kyger, the somewhat poorly

Figure 5.—A typical landscape in an area of the Upshur-Gilpin association. Upshur-Gilpin complex, 25 to 50 percent slopes, is on the benched hillside. Vandalia silt loam, 15 to 25 percent slopes, eroded, is at the base of the hillside. Chagrin silt loam, frequently flooded, is on the flood plain in the foreground.

drained Orrville, and the well drained Chagrin soils on flood plains and the moderately well drained Rarden soils on ridgetops and side slopes.

Most areas of this association are wooded. A small acreage in the valleys and on ridge crests is used as cropland or for hay or pasture. The upland ridges are better suited to hay and pasture than to row crops. They are also the better building sites. The moderately steep side slopes are moderately well suited to pasture and woodland. The steep side slopes are moderately well suited to woodland, poorly suited to pasture, and generally unsuited to other common uses.

The major management concerns in this association are the slope and the hazard of erosion. The slow permeability and the high shrink-swell potential are additional limitations in areas of the Upshur soils. The Pinegrove soils are in areas disturbed by surface mining. The mined areas often have been abandoned. As the Pinegrove soils erode, silt and sand are flushed down into the valleys, often choking the channel, lowering the pH of the drainage water, and producing a wet, sometimes ponded flood plain downstream.

Soils on Terraces, in Preglacial Valleys, and on Flood Plains

These soils make up about 13 percent of the county. Soils on terraces along the Ohio River make up about 4 percent of the county, and those on the high terraces of the preglacial valley make up about 5 percent. Soils that formed in alluvial material on low terraces on the flood plain of the tributary valleys make up the remaining 4 percent.

These soils are well drained to somewhat poorly drained and are nearly level to steep. They formed in preglacial valleys, on old high terraces, in the more recent sediment of valley fill, and in comparatively recent alluvium. The terraces of both ancient and Ohio River origin are dominantly on the more subdued slopes. The soils in this group generally are highly regarded as cropland. Because of the prominent relief and a good surface drainage system on the terraces, the soils are also highly favored for building site development. Wetness, slow permeability, a high shrink-swell potential, and the hazard of erosion are the major management concerns in areas on terraces. The wetness and flooding are the major management concerns in areas on flood plains.

5. Cidermill-Lakin-Gallipolis Association

Very deep, nearly level to steep, excessively well drained to moderately well drained soils formed in alluvium and lacustrine sediments; along the Ohio River

This association makes up about 4 percent of the county. It is about 40 percent Cidermill soils, 10 percent Lakin soils, 10 percent Gallipolis soils, and 40 percent soils of minor extent.

The well drained Cidermill soils are on nearly level and gently sloping, wide terraces. Permeability is moderate to rapid.

The excessively drained Lakin soils are on nearly level to steep, wide terraces adjacent to the upland slopes. Permeability is rapid.

The moderately well drained Gallipolis soils are on nearly level and gently sloping terraces. Permeability is moderately slow. The seasonal high water table is at a depth of 24 to 42 inches during extended wet periods. The shrink-swell potential is moderate.

Some of the minor soils in this association are the well drained Conotton, Chagrin, Nolin, and Duncannon and the somewhat poorly drained Taggart soils. Conotton soils are in broad, nearly level areas on terraces along the Ohio River. Taggart soils are in nearly level drainageways. Chagrin and Nolin soils are on flood plains. Duncannon soils are in a few of the higher areas adjacent to upland slopes. Also of minor extent are gravel pits, which are unique to this association. The pits may be quite large locally.

Most of the areas on the wide terraces have been cleared of trees and are farmed. The steeper areas of the Lakin soils adjacent to uplands generally are used for pasture or hay. Steep, dissected areas generally are used as woodland or pasture. The broad areas on the terraces are used for row crops, such as corn or soybeans, or for truck crops, such as tomatoes, peppers, sweet corn, cabbage, melons, or green beans. The soils are well suited or moderately well suited to these crops. The steep soils are generally unsuited to row crops and poorly suited to pasture but are moderately well suited to woodland. The broad, gentle slopes generally provide good building sites.

The major management concern in this association is the possibility of pollution of ground water if effluent from septic tank absorption fields is absorbed into the sand and gravel underlying the wide terrace. Droughtiness during critical moisture times of the year is an additional limitation in areas of the Lakin soils The moderately slow permeability, a moderate potential for frost action, and the moderate shrink-swell potential are additional limitations in areas of the Gallipolis soils.

6. Omulga-Licking-Vincent Association

Very deep, gently sloping to moderately steep, moderately well drained soils formed in old alluvium and lacustrine sediments; on high terraces and in preglacial valleys

This association makes up about 5 percent of the county. It is about 55 percent Omulga soils, 10 percent Licking soils, 5 percent Vincent soils, and 30 percent soils of minor extent.

The gently sloping and strongly sloping Omulga soils are in valleys of abandoned, preglacial drainage systems. They have a fragipan in the lower part of the subsoil that restricts root penetration and water movement. Permeability is moderate above the fragipan and slow in the fragipan. The seasonal high water table is at a depth of 24 to 42 inches during extended wet periods.

The gently sloping to moderately steep Licking soils are on terraces. Permeability is slow. The seasonal high water table is at a depth of 24 to 42 inches during extended wet periods. The shrink-swell potential is high.

The gently sloping and strongly sloping Vincent soils generally are on the slightly lower terraces. Permeability is slow. The seasonal high water table is at a depth of 24 to 48 inches during extended wet periods. The shrink-swell potential is high.

Some of the minor soils in this association are the well drained Gallia, Gilpin, and Upshur and the somewhat poorly drained Doles and Newark soils. Gallia soils are on terraces in preglacial valleys. Doles soils are in depressions and along drainageways in preglacial valleys. Gilpin and Upshur soils are on residual uplands. Newark soils are on flood plains.

Most areas of this association are farmed (fig. 6). The soils are suited to corn, soybeans, small grain, hay, and pasture. They are moderately well suited to woodland and building site development but poorly suited to septic tank absorption fields.

The major management concerns in this association are the slow permeability, seasonal wetness, and the hazard of erosion. The high shrink-swell potential is an additional limitation in areas of the Vincent and Licking soils, and the fragipan is an additional limitation in areas of the Omulga soils.

7. Chagrin-Nolin-Licking Association

Very deep, nearly level and gently sloping, well drained and moderately well drained soils formed in recent alluvium and lacustrine sediment; on flood plains and low terraces in stream valleys

This association makes up about 4 percent of the county. It is about 40 percent Chagrin soils, 15 percent Nolin soils, 10 percent Licking soils, and 35 percent soils of minor extent.

The well drained Chagrin soils are on nearly level flood plains. Permeability is moderate. A seasonal high water table is at a depth of 48 to 72 inches during

Figure 6.—A typical landscape in an area of the Omulga-Licking-Vincent association. The Upshur-Gilpin association is on the wooded hills in the background.

extended wet periods. These soils are subject to frequent flooding.

The well drained Nolin soils are on nearly level flood plains. Permeability is moderate. A seasonal high water table is at a depth of 36 to 72 inches during extended wet periods. These soils are subject to frequent flooding.

The moderately well drained Licking soils are on nearly level and gently sloping, low terraces adjacent to flood plains. Permeability is slow. The shrink-swell potential is high.

Some of the minor soils in this association are the somewhat poorly drained Newark, the well drained Moshannon and Richland, the moderately well drained Gallipolis, and the somewhat poorly drained Taggart soils. Newark and Moshannon soils are on flood plains. Gallipolis and Taggart soils are on terraces. Richland soils are on alluvial fans and colluvial toe slopes.

Most areas of this association have been cleared of trees and are used as cropland or pasture. The soils are well suited to corn, wheat, oats, hay, pasture, and woodland. Growing winter grain crops is limited by the flooding. The higher areas on flood plains and terraces are better suited to small grain than the lower areas on flood plains. Chagrin and Nolin soils generally are unsuitable as sites for buildings. Licking soils, which generally are in the slightly higher landscape positions, often are chosen for building site development even though they are severely limited because of the wetness, the high shrink-swell potential, and the slow permeability. The soils in this association can be cropped intensively. The flooding is the major limitation for most uses.

Detailed Soil Map Units

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

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

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit 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, 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, slope, stoniness, salinity, 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, Conotton gravelly loam, 0 to 2 percent slopes, is a phase of the Conotton series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Upshur-Gilpin complex, 8 to 15 percent slopes, eroded, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Dumps, mine, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other 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 or miscellaneous areas.

Soil Descriptions

AgC—Aaron-Gilpin complex, 8 to 15 percent slopes

These deep and moderately deep, well drained and moderately well drained soils are on ridgetops. The Aaron soil is moderately well drained and deep to bedrock. The Gilpin soil is well drained and moderately deep to bedrock. It is in the more sloping areas of the map unit. Most areas are about 50 percent Aaron soil and 35 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and narrow and range from 10 to 100 acres in size.

Typically, the Aaron soil has a surface layer of dark brown, friable silt loam about 8 inches thick. The subsoil is about 42 inches thick. The upper part is yellowish brown, mottled, firm silty clay loam. The next part is yellowish brown and light olive brown, mottled firm silty clay. The lower part is yellowish brown, mottled, firm silty clay loam. Light olive brown, weathered siltstone bedrock is at a depth of about 50 inches. In some areas the upper part of the subsoil is calcareous.

Typically, the Gilpin soil has a surface layer of dark yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish brown, firm silt loam and loam, and the lower part is yellowish brown, firm channery loam. Sandstone bedrock is at a depth of about 33 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Included in this unit in mapping are small areas of Keene and Upshur soils. Keene soils are deep and moderately well drained. They have less sand and fewer coarse fragments in the subsoil than the Gilpin soil and less clay in the subsoil than the Aaron soil. Upshur soils have more clay in the subsoil than the Aaron and Gilpin soils. Keene and Upshur soils are in the less sloping areas of the map unit. Also included, on the upper part of some slopes, are small areas of soils that are shallow to bedrock. Included soils make up about 15 percent of most areas.

Permeability is slow in the Aaron soil and moderate in the Gilpin soil. Available water capacity is low in the Gilpin soil and moderate in the Aaron soil. Runoff is rapid on both soils. The Aaron soil has a seasonal high water table at a depth of 18 to 36 inches during extended wet periods. The root zone is deep in the Aaron soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the lower part of the subsoil of the Aaron soil.

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

These soils are moderately well suited to corn, soybeans, and small grain. Erosion is a hazard if the soils are plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations, or contour stripcropping helps to control erosion and increase the rate of water infiltration. Grassed waterways help to control excess surface water and prevent the formation of gullies on slopes of less than 12 percent.

These soils are well suited to pasture and hayland. Compaction is a problem in areas of the Aaron soil if pastures are grazed when the soil is too wet. Because of the high potential for frost action in areas of the Aaron soil, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, weed control through mowing, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel and crushed stone on haul roads and log landings improves soil strength. The bedrock underlying the Gilpin soil can be ripped with most construction equipment. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard in areas of the Aaron soil. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Aaron soil.

These soils are moderately well suited to building site development. Buildings should be designed so that they conform to the natural slope of the land. Land shaping may be needed in the steeper areas. Widening the footer trenches and then backfilling with suitable material or reinforcing basement walls and footers helps to prevent the structural damage caused by shrinking and swelling in areas of the Aaron soil. Footer drains and moisture barriers help to keep basements dry in areas of the Aaron soil. The Gilpin soil is better suited to dwellings without basements than to dwellings with basements because of the depth to bedrock.

These soils are poorly suited to septic tank absorption fields because of the seasonal high water table and the slow permeability in the Aaron soil and the depth to bedrock in the Gilpin soil. Installing the absorption field in suitable fill material or mounding the site with suitable material improves the filtering capacity in areas of the Gilpin soil. Subsurface drains installed upslope from absorption fields in areas of the Aaron soil intercept seepage. Enlarging the absorption area and installing the distribution lines on the contour improve the capacity of the absorption fields to absorb effluent and help to prevent seepage of the effluent to the surface.

The land capability classification is IIIe. The woodland ordination symbol is 4C in areas of the Aaron soil and 4A in areas of the Gilpin soil. The pasture and hayland suitability group is A-6 in areas of the Aaron soil and F-1 in areas of the Gilpin soil.

AuC2—Aaron-Upshur complex, 8 to 15 percent slopes, eroded

These deep and very deep, strongly sloping soils are on ridgetops. The Aaron soil is deep and moderately well drained, and the Upshur soil is deep and very deep and is well drained. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are about 50 percent Aaron soil and 35 percent Upshur soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and narrow and range from 10 to 100 acres in size.

Typically, the Aaron soil has a surface layer of dark brown, friable silt loam about 8 inches thick. The subsoil is about 41 inches thick. The upper part is yellowish brown, firm silty clay loam. The next part is strong brown, mottled, firm silty clay. The lower part is yellow, mottled, firm channery silty clay. The substratum is light olive brown, mottled, firm channery silty clay loam. Soft siltstone bedrock is at a depth of about 65 inches. In a few areas the upper part of the subsoil is calcareous.

Typically, the Upshur soil has a surface layer of dark yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 51 inches thick. The upper part is dark red, firm silty clay, and the lower part is red and dark red, firm clay. The substratum is dusky red and light olive brown, firm very channery silty clay loam. Dusky red, light olive brown, and white, soft shale bedrock is at a depth of about 65 inches. In some areas the upper part of the subsoil has more silt and less clay. In other areas the depth to bedrock is less than 60 inches.

Included in this unit in mapping are small areas of Gilpin soils on shoulder slopes. Gilpin soils are moderately deep to bedrock. They have more sand and less clay in the subsoil and more rock fragments in the upper part of the subsoil than the Aaron and Upshur soils. Also included are areas of shallow soils on the steeper parts of some slopes. Included soils make up about 15 percent of most areas.

Permeability is slow in the Aaron and Upshur soils. Available water capacity is high in the Aaron soil and moderate in the Upshur soil. Runoff is rapid on both soils. The Aaron soil has a seasonal high water table at a depth of 18 to 36 inches during extended wet periods. The root zone is deep in both soils. The shrink-swell potential is high.

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

These soils are poorly suited to corn, soybeans, and small grain. The Upshur soil is more susceptible to severe erosion than the Aaron soil; however, both soils have a severe hazard of erosion if they are plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface, contour stripcropping, or a conservation cropping system helps to control erosion. Both soils become compacted and cloddy if they are worked when they are too wet. Limiting tillage when the soils are wet minimizes the formation of clods and compaction. Grassed waterways help to control excess water in the less sloping areas.

These soils are moderately well suited to hay and well suited to pasture. Erosion is a severe hazard, especially in areas of the Upshur soil, if pastures are plowed during seedbed preparation or are overgrazed. It can be controlled by no-till seeding or by growing a cover crop or companion crop during the establishment of a newly seeded pasture. Compaction is severe if pastures are grazed when the soils are wet. Because of the high potential for frost action in areas of the Aaron soil, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard. Applying gravel or crushed stone on haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings.

These soils are moderately well suited to buildings. Widening and backfilling the foundation trench with suitable material and reinforcing footers and basement walls help to prevent the structural damage caused by the shrinking and swelling. Footer drains and moisture barriers help to keep basements dry in areas of the Aaron soil. Land shaping may be needed in some of the steeper areas.

These soils are poorly suited to septic tank absorption fields because of the slow permeability. The seasonal high water table is an additional limitation in areas of the Aaron soil. Increasing the size of the absorption field or mounding the site with suitable material improves the capacity of the field to absorb effluent. Installing surface drains and perimeter drains lowers the seasonal high water table in areas of the Aaron soil. Installing the distribution lines on the contour minimizes the seepage of effluent to the surface.

The land capability classification is IVe. The woodland ordination symbol is 4C in areas of the Aaron soil and 3C in areas of the Upshur soil. The pasture and hayland suitability group is A-6 in areas of the Aaron soil and F-5 in areas of the Upshur soil.

Cg—Chagrin silt loam, frequently flooded

This very deep, well drained, nearly level soil is on flood plains. Most areas are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 12 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown, friable silt loam and sandy loam, and the lower part is dark brown, friable silt loam and loam. The substratum to a depth of about 80 inches is friable and very friable, dark grayish brown and dark brown, mottled, stratified fine sand and silt loam. In some areas, the soil is redder and the subsoil has more silt and less sand.

Included with this soil in mapping are small areas of Orrville and Newark soils. These soils are somewhat poorly drained and are in the lower lying areas of the flood plains. They make up about 10 percent of most areas.

The Chagrin soil is subject to brief, frequent periods of flooding from November to May in most years. Permeability is moderate. Available water capacity is high. Runoff is slow. The seasonal high water table is at a depth of 48 to 72 inches during extended wet periods. The root zone is very deep.

Most areas are used as pasture. Some areas are used for cultivated crops. A few areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. The flooding is a hazard affecting winter wheat. The surface layer is subject to crusting after heavy rains. The soil is well suited to conservation or conventional tillage systems, but a tillage system that leaves crop residue on the surface minimizes crusting of the surface layer.

This soil is well suited to hay and pasture. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting and planting during the drier parts of the year help to overcome the flooding.

This soil generally is unsuited to buildings and septic tank absorption fields because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A. The pasture and hayland suitability group is A-5.

CkA—Cidermill silt loam, 0 to 2 percent slopes

This very deep, nearly level, well drained soil is on terraces along the Ohio River. Most areas are long and narrow and range from 7 to 80 acres in size.

Typically, the surface layer is dark yellowish brown, friable silt loam about 9 inches thick. The subsoil, from a depth of 9 to 40 inches, is yellowish brown and brown, friable and firm silt loam. The lower part of the subsoil, from a depth of 40 to 46 inches, is brown, friable gravelly sandy loam. The substratum to a depth of about 80 inches is brown, loose very gravelly loamy coarse sand. In some areas the subsoil is redder. In other areas it has a higher content of gravel.

Included with this soil in mapping are small areas of Newark, Taggart, and Conotton soils. Newark and Taggart soils are somewhat poorly drained. They are near low lying areas and in areas where new drainageways are forming. Conotton soils have more gravel and sand in the subsoil than the Cidermill soil. They are in landscape positions similar to those of the Cidermill soil. Included soils make up about 10 percent of most areas.

Permeability is moderate in the subsoil of the

Cidermill soil and rapid in the substratum. Available water capacity is moderate. Runoff is slow. The root zone is very deep.

Most areas are used for cultivated crops. Some areas are used for hay or pasture. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is suited to corn, soybeans, and small grain. The surface layer is subject to crusting after hard rains. The soil is suited to all types of tillage systems, but no-till farming or another system of conservation tillage that leaves crop residue on the surface minimizes crusting.

This soil is suited to hay and pasture. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is suited to dwellings and other buildings with or without basements. It is well suited to septic tank absorption fields.

The land capability classification is I. The woodland ordination symbol is 4A. The pasture and hayland suitability group is A-1.

CkB—Cidermill silt loam, 2 to 6 percent slopes

This deep, well drained, gently sloping soil is on terraces along the Ohio River. Most areas are long and narrow and range from 5 to 150 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 44 inches thick. The upper part is dark brown, friable and firm silt loam, and the lower part is dark brown and brown, friable and very friable loam and sandy loam. The substratum to a depth of about 80 inches is brown and yellowish brown, loose very gravelly loamy coarse sand and very gravelly sand. In some areas the subsoil is redder. In a few areas it has a higher content of gravel.

Included with this soil in mapping are small areas of Taggart, Newark, and Conotton soils. Taggart and Newark soils are somewhat poorly drained. They are near low lying areas and along drainageways. Conotton soils have more gravel and sand in the subsoil than the Cidermill soil. They are in landscape positions similar to those of the Cidermill soil. Included soils make up about 10 percent of most areas.

Permeability is moderate in the subsoil of the Cidermill soil and rapid in the substratum. Available water capacity is moderate. Runoff is medium. The root zone is very deep.

Most areas are used for cultivated crops, pasture, or hay. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control erosion. Conventional tillage systems used in conjunction with contour stripcropping or crop rotations are also suitable management practices. The surface layer is subject to crusting after hard rains. A tillage system that leaves crop residue on the surface minimizes crusting of the surface layer. In some areas grassed waterways help to control excess surface water.

This soil is well suited to hay and pasture. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is well suited to buildings with or without basements. It is also well suited to septic tank absorption fields.

The land capability classification is IIe. The woodland ordination symbol is 4A. The pasture and hayland suitability group is A-1.

CnA—Conotton gravelly loam, 0 to 2 percent slopes

This very deep, nearly level, well drained soil is on terraces along the Ohio River. Most areas are long and narrow and range from 5 to 60 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam about 9 inches thick. The subsoil is about 44 inches thick. It is yellowish brown and dark brown. The upper part is friable very gravelly loam and very friable very gravelly coarse sandy loam, and the lower part is very friable very gravelly loamy coarse sand and friable extremely gravelly loamy coarse sand. The substratum to a depth of about 80 inches is dark brown, loose extremely gravelly coarse sand. In some areas the subsoil has a lower content of sand and gravel. In other areas the soil is moderately well drained.

Included with this soil in mapping are small areas of Lakin and Cidermill soils. Lakin soils do not have gravel in the subsoil. They have more sand in the subsoil than the Conotton soil. They generally are in the slightly higher areas. Cidermill soils have less sand and gravel and more clay in the subsoil than the Conotton soil. They generally are in landscape positions similar to those of the Conotton soil. Included soils make up about 10 percent of most areas.

Permeability is rapid in the Conotton soil. Available water capacity is low. Runoff is slow. The root zone is very deep.

Most areas are used for cultivated crops or pasture. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is moderately well suited to corn, soybeans, and small grain. It is suited to all types of tillage systems. It has a low water-holding capacity; however, incorporating crop residue into the soil increases the water-holding capacity of the soil.

This soil is well suited to hay and pasture. Deferred grazing during dry periods, proper stocking rates, pasture rotation, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mulching around seedlings reduces the seedling mortality rate. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil is well suited to buildings. It is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter effluent from septic tanks The poor filtering capacity can result in the pollution of ground-water supplies. Installing the absorption field in suitable fill material improves the filtering capacity of the soil.

The land capability classification is IIIs. The woodland ordination symbol is 4F. The pasture and hayland suitability group is B-1.

CnC—Conotton gravelly loam, 6 to 12 percent slopes

This very deep, well drained, strongly sloping soil is on terraces in the Ohio River valley. Most areas are long and narrow and range from 5 to 20 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam about 8 inches thick. The subsoil is about 40 inches thick. The upper part is dark yellowish brown, friable gravelly sandy loam. The next part is dark brown, very friable very gravelly sandy loam. The lower part is dark brown and strong brown, very friable very gravelly and extremely gravelly loamy coarse sand. The substratum to a depth of about 80 inches is dark brown, loose extremely gravelly coarse sand. In a few areas the subsoil has less gravel and sand.

Included with this soil in mapping are small areas of Lakin and Cidermill soils. Lakin and Cidermill soils are in landscape positions similar to those of the Conotton soil. Lakin soils do not have gravel in the solum. They have less clay in the solum than the Conotton soil. Cidermill soils have less gravel and more silt and clay in the subsoil than the Conotton soil. Included soils make up about 10 percent of most areas.

Permeability is rapid in the Conotton soil. Available water capacity is low. Runoff is medium. The root zone is very deep.

Most areas are used for cultivated crops, hay, or pasture. A few areas are used as woodland.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. The soil has a low water-holding capacity. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control runoff and erosion and increase the rate of water infiltration and the water-holding capacity of the soil.

This soil is moderately well suited to hay and well suited to pasture. Erosion is a hazard if the soil is plowed during pasture establishment or renovation. No-till or conservation reseeding practices help to control runoff and erosion and increase the rate of water infiltration. Deferred grazing during dry periods, pasture rotation, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mulching around seedlings reduces the seedling mortality rate. Cutting and filling to a more desirable slope will improve sites for log landings. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil is moderately well suited to buildings. The slope is a limitation. In a few areas land shaping may be necessary. Buildings should be designed so that they conform to the natural slope of the land.

This soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter effluent from septic tanks. The poor filtering capacity can result in the pollution of ground-water supplies. Installing the absorption field in suitable fill material improves the filtering capacity of the soil. Installing distribution lines on the contour helps to prevent seepage of effluent to the surface.

The land capability classification is IVe. The woodland ordination symbol is 4F. The pasture and hayland suitability group is B-1.

CnE—Conotton gravelly loam, 18 to 40 percent slopes

This very deep, steep, well drained soil is on terraces in the Ohio River valley. Most areas are long and very narrow and range from 5 to 40 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam about 4 inches thick. The subsoil is about 41 inches thick. The upper part is dark yellowish brown, friable gravelly loam. The next part is dark yellowish brown and dark brown, very friable very gravelly sandy loam. The lower part is yellowish brown, very friable extremely gravelly loamy coarse sand. The substratum to a depth of about 80 inches is yellowish brown, loose extremely gravelly sand. In a few areas the subsoil has a lower content of gravel.

Included with this soil in mapping are small areas of Lakin and Cidermill soils. Lakin soils do not have gravel in the subsoil. They have more sand in the subsoil than the Conotton soil. They generally are in landscape positions similar to those of the Conotton soil. Cidermill soils have more silt and clay and less gravel in the subsoil than the Conotton soil. They generally are in the less sloping areas. Included soils make up about 15 percent of most areas.

Permeability is rapid in the Conotton soil. Available water capacity is low. Runoff is rapid. The root zone is very deep.

Most areas are used as woodland or have been abandoned and are reverting to brush. A few areas are pastured.

This soil generally is unsuited to corn, soybeans, and small grain because of the slope and a severe hazard of erosion. It generally is unsuited to hay and poorly suited to pasture because of the slope.

This soil is moderately well suited to trees. The hazard of erosion can be reduced by locating logging roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Establishing logging roads and skid trails on the contour also facilitates the use of equipment. Mulching around seedlings reduces the seedling mortality rate. Less sloping areas, which can be used as log landings, generally are nearby. Special equipment is needed for site preparation and planting. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to buildings because of the slope. Buildings should be designed so that they conform to the natural slope of the land. Land shaping may be necessary in most areas. Better suited building sites generally are nearby.

This soil generally is unsuited to septic tank absorption fields because of the slope and the poor filtering capacity of the soil.

The land capability classification is VIIe. The woodland ordination symbol is 4R. The pasture and hayland suitability group is B-2.

DoA—Doles silt loam, 0 to 2 percent slopes

This very deep, nearly level, somewhat poorly drained soil is on terraces in preglacial valleys. Most areas are irregularly shaped and range from 5 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 63 inches thick. The upper part is light yellowish brown and yellowish brown, mottled, firm and very firm silt loam. The lower part is a fragipan of yellowish brown and strong brown, mottled, extremely firm silty clay loam and silt loam. The substratum to a depth of about 80 inches is strong brown and yellowish brown, mottled, firm silty clay loam and stratified silt loam, sandy loam, and silty clay loam. In a few areas the soil is poorly drained.

Included with this soil in mapping are small areas of Licking, Newark, Omulga, and Taggart soils. Licking, Newark, and Taggart soils do not have a fragipan. Licking soils are moderately well drained. They generally are in the more sloping areas. Newark soils are on the adjacent flood plains. They are subject to frequent periods of flooding. Taggart soils are in landscape positions similar to those of the Doles soil. Omulga soils are moderately well drained or well drained. They generally are in the more sloping areas. Included soils make up about 15 percent of most areas.

Permeability is slow in the Doles soil. Available water capacity is low. Runoff is slow. The seasonal high water table is at a depth of 12 to 24 inches during extended wet periods. The root zone is moderately deep. The fragipan, which is at a depth of about 27 inches, restricts root growth and decreases the available water capacity of the soil.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. A few areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. The seasonal high water table may limit the use of equipment during extended wet periods. The fragipan limits the effectiveness of subsurface drainage systems. Surface drains can be used in some areas to remove excess surface water. The surface layer is subject to crusting after hard rains.

Conservation tillage systems that leave crop residue on the surface minimize crusting of the surface layer.

This soil is well suited to hay and pasture; however, the seasonal high water table may limit grazing and the use of equipment during wet periods. Grazing when the soil is too wet causes compaction and thus decreases the stand and vigor of plants. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Deferred grazing during wet periods, pasture rotation, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. The windthrow hazard can be reduced by harvest methods that do not isolate the remaining trees or leave them widely spaced. Low strength and the wetness may inhibit logging activities. Logging can be done when the soil is frozen or during the drier parts of the year. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to buildings because of the seasonal high water table. Installing footer drains and waterproofing basement walls help to keep basements dry. Widening and backfilling the footer trench with suitable coarse material help to prevent the structural damage caused by shrinking and swelling and increase the effectiveness of the footer drains. The areas around buildings should be graded to keep surface water away from foundations.

This soil is poorly suited to septic tank absorption fields because of the slow permeability in the fragipan and the seasonal high water table. Perimeter drains help to lower the water table. Elevating or mounding the field with suitable fill material helps to overcome the slow permeability. Surface drains help to remove excess surface water in some areas.

The land capability classification is IIw. The woodland ordination symbol is 4D. The pasture and hayland suitability group is C-2.

Dp—Dumps, mine

This map unit generally is in nearly level to strongly sloping areas in valleys and at the bottom of hillsides near coal mines and coal-processing and -loading facilities. It generally consists of piles of coal fragments, roof shales, underclay, and rock fragments. One map unit is about 80 acres in size, but several other map units are only 3 acres or less in size. Slopes are complex, and areas generally are irregular in shape.

Typically, the material to a depth of about 80 inches is a mixture of coal and rock fragments, underclay, roof shales, and some soil material. A few areas have been graded, shaped, and reclaimed using soil material. These areas generally are seeded to grasses. Unreclaimed areas generally are very acid and support little vegetation. Erosion and sedimentation from these areas can cause local damage to nearby streams.

No land capability classification, woodland ordination symbol, or pasture and hayland suitability group has been assigned.

DuC—Duncannon silt loam, 6 to 12 percent slopes

This very deep, well drained, strongly sloping soil is on terraces in the Ohio River valley. Most areas are irregularly shaped and range from 5 to 20 acres in size.

Typically, the surface layer is dark yellowish brown, friable silt loam about 8 inches thick. The subsoil is yellowish brown, friable and firm silt loam about 35 inches thick. The substratum to a depth of about 70 inches is yellowish brown and dark yellowish brown, mottled, friable and firm silt loam. In a few areas, the soil is moderately well drained or it has slopes of less than 6 percent.

Included with this soil in mapping are small areas of Lakin soils. Lakin soils have more sand and less silt than the Duncannon soil. They generally are on the lower terraces. They make up about 5 percent of most areas.

Permeability is moderate in the Duncannon soil. Available water capacity is high. Runoff is rapid. The root zone is very deep.

Most areas are used for pasture or hay. A few areas are used for cultivated crops or woodland.

This soil is moderately well suited to corn, soybeans, and small grain. It is subject to crusting after heavy rains if the surface is left bare. Erosion is a severe hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface most of the year, contour stripcropping, or crop rotations help to control runoff and erosion, increase the rate of water infiltration, and minimize crusting. In some areas grassed waterways help to collect and remove excess surface water.

This soil is well suited to hay and pasture. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. No-till or conservation seeding practices that leave residue on the surface help to control runoff and erosion and increase the rate of water infiltration. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Cutting and filling to a more desirable slope will improve sites for log landings. Plant competition can be easily controlled by removing vines and the less desirable trees and shrubs.

This soil is well suited to buildings. In some of the steeper areas, land shaping may be necessary. Buildings should be designed so that they conform to the natural slope of the land.

This soil is moderately well suited to septic tank absorption fields. The slow permeability and the slope are the main limitations. Enlarging the absorption area and installing the distribution lines on the contour help to prevent seepage of the effluent to the surface.

The land capability classification is IIIe. The woodland ordination symbol is 4A. The pasture and hayland suitability group is A-6.

EkA—Elkinsville silt loam, 0 to 2 percent slopes

This very deep, well drained, nearly level soil is on low terraces near small streams and rivers. Most areas are irregularly shaped and range from 5 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 42 inches thick. The upper part is strong brown, firm silt loam and silty clay loam. The lower part is strong brown, friable stratified silt loam and loam. The substratum to a depth of about 80 inches is brown and light yellowish brown, friable stratified silt loam, loam, and fine sandy loam. In some areas the subsoil has less sand. In other areas it has more sand and gravel. In a few areas the soil is moderately well drained.

Included with this soil in mapping are small areas of Chagrin and Taggart soils. Chagrin soils are on the adjacent flood plains. They have more sand in the subsoil than the Elkinsville soil. Taggart soils are somewhat poorly drained. They have less sand in the subsoil than the Elkinsville soil and are on the lower parts of the landscape. Included soils make up about 10 percent of most areas.

Permeability is moderate in the Elkinsville soil. Available water capacity is high. Runoff is slow. The root zone is very deep.

Most areas are used for cultivated crops or pasture. A few areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. The surface layer is subject to crusting after hard rains. The soil is suited to all tillage systems, but no-till farming or another system of conservation tillage that leaves crop residue on the surface most of the year minimizes crusting and increases the rate of water infiltration.

This soil is well suited to hay and pasture. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, deferred grazing during wet periods, pasture rotation, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone on haul roads and log landings improves soil strength.

This soil is well suited to buildings and septic tank absorption fields. Backfilling basement walls with porous material helps to prevent the structural damage caused by shrinking and swelling of the subsoil. Increasing the size of the absorption field improves the capacity of the field to absorb effluent.

The land capability classification is I. The woodland ordination symbol is 5A. The pasture and hayland suitability group is A-6.

GaC—Gallia loam, 6 to 12 percent slopes

This very deep, well drained, strongly sloping soil is in preglacial valleys. Most areas are irregularly shaped and range from 5 to 40 acres in size.

Typically, the surface layer is dark yellowish brown, friable loam about 12 inches thick. The subsoil is about 74 inches thick. The upper part is friable, strong brown loam. The next part is friable and firm, yellowish red sandy clay loam, sandy loam, and gravelly sandy loam. The lower part is loose and friable, brown and strong brown, mottled loam and gravelly loamy sand. In places the subsoil is not so red and has a higher content of coarse fragments.

Included with this soil in mapping are small areas of Omulga and Vincent soils. Omulga soils are moderately well drained and have a fragipan in the subsoil. Vincent soils are moderately well drained. They have more clay, less sand, and fewer coarse fragments in the subsoil than the Gallia soil. Omulga and Vincent soils are in landscape positions similar to those of the Gallia soil, but they generally are higher on the landscape. Also included are a few small areas of moderately deep soils on the steeper parts of some slopes. Included soils make up about 10 percent of most areas.

Permeability is moderate in the Gallia soil. Available water capacity is high. Runoff is rapid. The root zone is very deep.

Most areas are used for hay or pasture. A few areas are used for row crops or as woodland.

This soil is moderately well suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed or if the surface is left bare. No-till farming or another system of conservation tillage that leaves crop residue on the surface most of the year used in conjunction with crop rotations or contour stripcropping will help to control runoff and erosion and increase the rate of water infiltration. Grassed waterways help to control excess surface water in the less sloping areas.

This soil is well suited to hay and pasture. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. No-till or conservation seeding practices help to control runoff and erosion and increase the rate of water infiltration. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Cutting and filling to a more desirable slope will improve sites for log landings.

This soil is moderately well suited to building site development. Buildings should be designed so that they conform to the natural slope of the land. In some areas land shaping may be needed. A surface drainage system helps to control excess surface water. The shrink-swell potential in the subsoil is a moderate limitation. Widening and backfilling the foundation trench with suitable material helps to prevent the structural damage caused by shrinking and swelling.

This soil is moderately well suited to septic tank absorption fields. The slope is the main limitation. Installing distribution lines on the contour helps to prevent seepage of the effluent to the surface.

The land capability classification is IIIe. The woodland ordination symbol is 5A. The pasture and hayland suitability group is A-1.

GaD—Gallia loam, 12 to 18 percent slopes

This very deep, well drained, moderately steep soil is in areas of old alluvial fill in preglacial valleys. Most areas are irregularly shaped and range from 10 to 40 acres in size.

Typically, the surface layer is dark yellowish brown, friable loam about 7 inches thick. The subsoil is about 73 inches thick. The upper part is reddish yellow and strong brown, friable loam and gravelly loam. The next part is yellowish red, firm and friable sandy loam, gravelly sandy loam, and gravelly sandy clay loam. The lower part is brownish yellow, friable gravelly loamy sand. In some areas the subsoil is not so red.

Included with this soil in mapping are small areas of Gilpin and Upshur soils on side slopes on uplands. Gilpin soils are moderately deep to bedrock. Upshur soils have more clay and less sand in the subsoil than the Gallia soil. Also included are a few areas of moderately deep soils on the upper part of some slopes. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Gallia soil. Available water capacity is high. Runoff is rapid. The root zone is very deep.

Most areas are used for hay or pasture. A few areas are used as woodland.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed or if the surface is left bare. The use of equipment may be limited in the steeper areas. A conservation tillage system that leaves crop residue on the surface used in conjunction with contour stripcropping will help to control runoff and erosion and increase the rate of water infiltration.

This soil is moderately well suited to pasture and hay. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. Conservation tillage systems that leave crop residue on the surface help to control runoff and erosion and increase the rate of water infiltration. The use of equipment may be limited in the steeper areas. Proper stocking rates, limited grazing during wet periods, pasture rotation, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of erosion can be reduced by locating logging roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Cutting and filling to a more desirable slope will improve sites for log landings. Building haul roads and skid trails on the contour also facilitates the use of equipment.

This soil is moderately well suited to buildings. The moderately steep slope is a limitation. Buildings should be designed so that they conform to the natural slope of the land. Extensive land shaping may be necessary in many areas. Diversions may be needed to divert excess surface runoff away from building sites. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling.

This soil is poorly suited to septic tank absorption fields because of the slope. Septic tank absorption fields should be located on nearby, less sloping soils. Land shaping is needed in some areas. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface.

The land capability classification is IVe. The woodland ordination symbol is 5R. The pasture and hayland suitability group is A-1.

GbA—Gallipolis silt loam, 0 to 2 percent slopes

This very deep, nearly level, moderately well drained soil is on terraces in the Ohio River valley and along smaller streams. Most areas are 5 to 50 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 11 inches thick. The subsoil is about 66 inches thick. The upper part is brown, firm silty clay loam, and the lower part is mottled, strong brown, firm and very firm silty clay loam and silt loam. The substratum to a depth of about 80 inches is brown, mottled, firm silt loam. In a few areas the soil is well drained. In other areas the upper 10 inches of the argillic horizon has gray mottles.

Included with this soil in mapping are small areas of Licking and Taggart soils. Licking soils have more clay in the subsoil than the Gallipolis soil. They are in landscape positions similar to those of the Gallipolis soil. Taggart soils are somewhat poorly drained. They generally are in depressions. Included soils make up about 10 percent of the map unit.

Permeability is moderately slow in the Gallipolis soil. Available water capacity is high. Runoff is slow. The seasonal high water table is at a depth of 24 to 42 inches during extended wet periods. The root zone is very deep.

Most areas are used for cultivated crops, hay, or pasture. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is well suited to corn, soybeans, and small grain. It is suited to all types of tillage systems. The surface layer is subject to crusting after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the soil surface most of the year minimizes crusting. Random subsurface drains may be needed in small wet spots in some fields. Grassed waterways help to remove excess surface water that runs off the steeper, adjacent slopes.

This soil is suited to pasture and hay. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone on haul roads and log landings improves soil strength.

This soil is moderately well suited to buildings and to most recreational uses. Installing perimeter drains and waterproofing basement walls help to keep basements dry. The shrink-swell potential in the subsoil is a moderate limitation. Strengthening foundations and backfilling footer trenches with suitable material help to prevent the structural damage caused by shrinking and swelling.

This soil is moderately well suited to septic tank absorption fields because of the seasonal high water table and the moderately slow permeability. Perimeter drains help to lower the water table. Installing the absorption field in suitable fill material helps to prevent surfacing of effluent. Enlarging the absorption area improves the capacity of the field to absorb effluent.

The land capability classification is I. The woodland ordination symbol is 5A. The pasture and hayland suitability group is A-6.

GbB—Gallipolis silt loam, 2 to 6 percent slopes

This very deep, gently sloping, moderately well drained soil is on terraces in the Ohio River valley and along smaller streams. Most areas are 2 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 11 inches thick. The subsoil is about 62 inches thick. The upper part is yellowish brown, firm silt loam and silty clay loam, and the lower part is yellowish brown and dark yellowish brown, mottled, firm and very firm silty clay loam and silt loam. The substratum to a depth of about 80 inches is dark yellowish brown, mottled, firm silt loam. In some areas the upper part of the subsoil has gray mottles. In other areas the soil is well drained.

Included with this soil in mapping are small areas of Licking and Taggart soils. Licking soils have more clay in the subsoil than the Gallipolis soil. They are in landscape positions similar to those of the Gallipolis soil. Taggart soils are somewhat poorly drained. They are in depressions. Included soils make up about 15 percent of most areas.

Permeability is moderately slow in the Gallipolis soil. Available water capacity is high. Runoff is medium. The seasonal high water table is at a depth of 24 to 42 inches during extended wet periods. The root zone is very deep.

Most areas are used for cultivated crops or hay. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. The surface layer is subject to crusting after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control erosion, minimize crusting, and increase the rate of water infiltration. Conventional tillage practices used in conjunction with crop rotations or stripcropping will help to control erosion. Random subsurface drains may be needed in the wetter areas. Grassed waterways help to remove excess surface water that runs off the steeper, adjacent slopes.

This soil is well suited to hay and pasture. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, deferred grazing during wet periods, pasture rotation, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone on haul roads and log landings improves soil strength.

This soil is moderately well suited to buildings. The seasonal high water table and a moderate shrink-swell potential are the main limitations. Installing footer drains and waterproofing basement walls help to keep basements dry. Strengthening foundations and backfilling footer trenches with suitable material help to prevent the structural damage caused by shrinking and swelling.

This soil is moderately well suited to septic tank absorption fields. The seasonal high water table and the moderately slow permeability are the main limitations. Enlarging the absorption area improves the capacity of the field to absorb effluent. Perimeter drains help to lower the seasonal high water table.

The land capability classification is IIe. The woodland ordination symbol is 5A. The pasture and hayland suitability group is A-6.

GhB—Gilpin silt loam, 3 to 8 percent slopes

This moderately deep, gently sloping, well drained soil is on ridgetops. Most areas are long and narrow and range from 5 to 15 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 8 inches thick. The subsoil is about 27 inches thick. The upper part is yellowish brown, firm silt loam, and the lower part is brownish yellow, firm loam and channery loam. Sandstone bedrock is at a depth of about 35 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Included with this soil in mapping are small areas of Aaron, Rarden, Steinsburg, and Upshur soils and small areas of shallow soils. Aaron soils are deep and moderately well drained. Rarden soils are moderately well drained and have red colors. Steinberg soils have more sand and less clay in the subsoil than the Gilpin soil. Upshur soils are deep and very deep and are red. They have more clay in the subsoil than the Gilpin soil. The included soils are in scattered areas throughout the unit. They make up about 10 percent of most areas.

Permeability is moderate in the Gilpin soil. Available water capacity is low. Runoff is medium. The root zone is moderately deep.

Most areas are used for hay or pasture. Some areas are used for cultivated crops. A few areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control runoff and erosion and increase the rate of water infiltration.

This soil is well suited to hay and pasture. Proper stocking rates, deferred grazing during wet periods, pasture rotation, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. In most areas the bedrock can be ripped with construction equipment.

This soil is well suited to buildings without basements and moderately well suited to buildings with basements. The construction of basements is hindered by the moderately deep bedrock. In many areas the bedrock is soft and rippable and can be dug with a backhoe.

This soil is poorly suited to septic tank absorption fields because of the depth to bedrock. Installing the absorption field in suitable fill material or mounding the site with suitable fill material improves the filtering capacity of the soil.

The land capability classification is IIe. The woodland ordination symbol is 4A. The pasture and hayland suitability is F-1.

GhC2—Gilpin silt loam, 8 to 15 percent slopes, eroded

This moderately deep, strongly sloping, well drained soil is on ridgetops. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are long and narrow and range from 5 to 100 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 4 inches thick. The subsoil is about 30 inches thick. The upper part is yellowish brown, friable and firm silt loam, and the lower part is olive brown, firm channery loam. Sandstone bedrock is at a depth of about 34 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Included with this soil in mapping are small areas of Aaron, Rarden, Steinsburg, and Upshur soils. Aaron soils are deep and moderately well drained. Upshur soils are red and are deep and very deep. They have more clay and less sand in the subsoil than the Gilpin soil. They generally are in the less sloping areas. Rarden soils are moderately well drained and have more clay and less sand in the subsoil than the Gilpin soil. They are intermingled with areas of the Gilpin soil. Steinberg soils have more sand and less clay throughout than the Gilpin soil. They generally are in the steeper areas. Also included are areas of shallow soils on the steeper part of some slopes. Included soils make up about 10 percent of most areas.

Permeability is moderate in the Gilpin soil. Available water capacity is low. Runoff is rapid. The root zone is moderately deep.

Most areas are used as woodland. Some areas are used for pasture or hay. A few areas are used for cultivated crops.

This soil is moderately well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface, stripcropping, and crop rotations help to control erosion and increase the rate of water infiltration. In some areas grassed waterways help to remove excess surface water.

This soil is well suited to hay and pasture. Conservation tillage systems or reseeding practices that leave residue on the surface help to control erosion. Proper stocking rates, pasture rotation, limited grazing during wet periods, weed control through mowing, and applications of lime and fertilizer are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The bedrock can be ripped with construction equipment. Cutting and filling to a more desirable slope will improve sites for log landings.

This soil is moderately well suited to buildings without basements and is poorly suited to buildings with basements. Buildings should be designed so that they conform to the natural slope of the land. Land shaping may be necessary in some areas. The construction of basements is hindered by the bedrock. In many areas the bedrock is soft and rippable and can be dug with a backhoe.

This soil is poorly suited to septic tank absorption fields because of the depth of bedrock. Installing the absorption field in suitable fill material or mounding the site improves the filtering capacity of the soil.

The land capability classification is IIIe. The woodland ordination symbol is 4A. The pasture and hayland suitability group is F-1.

GkD2—Gilpin-Rarden complex, 15 to 25 percent slopes, eroded

These moderately deep, moderately steep soils are on side slopes and ridgetops. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are about 50 percent Gilpin silt loam and 30 percent Rarden silt loam. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and continuous and range from 15 to several hundred acres in size.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 2 inches thick. The subsoil is about 30 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is strong brown, firm channery silty clay loam, channery loam, and very channery loam. Sandstone bedrock is at a depth of about 32 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Typically, the Rarden soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsurface layer is yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish red, firm silty clay loam, and the lower part is yellowish brown and dark red, mottled, firm silty clay. Olive yellow, weathered siltstone bedrock is at a depth of about 34 inches and siltstone bedrock is at a depth of about 37 inches. In some areas the depth to bedrock is more than 40 inches. In other areas the subsoil is not so red.

Included in this unit in mapping are small areas of Guernsey, Steinsburg, and Upshur soils. Guernsey and Upshur soils are deep to bedrock. They generally are on large benches or near the ridgetops. Upshur soils are well drained. Steinsburg soils also are well drained. They have more sand and less silt and clay in the subsoil than the Gilpin and Rarden soils. They are on the steeper part of the landscape. Also included are areas of shallow soils on the steeper part of some slopes. Included soils make up about 20 percent of most areas.

Permeability is moderate in the Gilpin soil and slow in the Rarden soil. Available water capacity is low in both soils. Runoff is rapid. The root zone is moderately deep. The Rarden soil has a seasonal high water table at a depth of about 18 to 36 inches during extended wet periods. The shrink-swell potential is high in the Rarden soil.

Most areas are used as woodland. Some areas are used as pasture. A few areas are used for hay.

These soils generally are unsuited to corn, soybeans, and small grain because of the slope and a severe hazard of erosion. They are moderately well suited to pasture and poorly suited to hay. The moderately steep slopes may limit the use of equipment in many areas. Erosion is a severe hazard if the soils are plowed during pasture establishment or renovation, especially in areas of the Rarden soil. No-till or conservation reseeding practices should be applied when pastures are renovated or reseeded. Because of the high potential for frost action in areas of the Rarden soil, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard in areas of the Rarden soil. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Rarden soil. Planting seedlings that have been transplanted once also reduces the seedling mortality rate. Building haul roads and skid trails on the contour facilitates the use of equipment. Cutting and filling to a more desirable slope will improve sites for log landings. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. In most areas the bedrock can be ripped with construction equipment. Haul roads and log landings should not be located on active slips.

These soils are poorly suited to buildings. The moderate depth to bedrock is a limitation affecting the construction of basements. Buildings should be designed so that they conform to the natural slope of the land. In some areas land shaping may be necessary. The high shrink-swell potential, the seasonal high water table, and the hazard of slippage are additional limitations in areas of the Rarden soil. Widening and backfilling footer trenches with suitable material and reinforcing basement walls and footers help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry. Cutting and filling during construction can increase the hazard of slippage and should be avoided as much as possible.

These soils generally are unsuited to septic tank absorption fields because of the slope, the depth to bedrock, the slow permeability, and the seasonal high water table.

The land capability classification is VIe. The woodland ordination symbol is 4R in areas of the Gilpin soil and 3R in areas of the Rarden soil. The pasture and hayland suitability group is F-1 on both soils.

GkE—Gilpin-Rarden complex, 25 to 40 percent slopes

These moderately deep, steep soils are on side slopes. Most areas are about 60 percent Gilpin silt loam and 25 percent Rarden silt loam. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and continuous and range from 20 to several hundred acres in size.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsoil is yellowish brown and is about 28 inches thick. The upper part is friable silt loam. The next part is firm channery silt loam. The lower part is firm channery and very channery loam. Sandstone bedrock is at a depth of about 31 inches. In some areas the depth to bedrock is more than 40 inches. In other areas the soil is moderately well drained.

Typically, the Rarden soil has a surface layer of dark brown, friable silt loam about 5 inches thick. The subsoil is about 23 inches thick. The upper part is yellowish brown, friable silty clay loam. The next part is yellowish red, firm silty clay loam. The lower part is strong brown, mottled, firm channery silty clay. Light olive brown, weathered siltstone bedrock is at a depth of about 28 inches. Hard siltstone bedrock is at a depth of about 36 inches. In some areas the depth to hard bedrock is more than 40 inches. In other areas the subsoil is not so red.

Included in this unit in mapping are small areas of Guernsey, Steinsburg, and Upshur soils. Guernsey and Upshur soils are deep or very deep. They generally are on large benches or near the crest of hills. Upshur soils are well drained. Steinsburg soils also are well drained. They have more sand and less silt and clay in the subsoil than the Gilpin and Rarden soils. They are on the upper part of slopes. Also included are areas of shallow soils on the steeper part of some slopes. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Gilpin soil and slow in the Rarden soil. Available water capacity is low in both soils. Runoff is rapid. The root zone is moderately deep. The Rarden soil has a seasonal high water table at a depth of 18 to 36 inches during extended wet periods. The shrink-swell potential is high in the Rarden soil.

Most areas are used as woodland. A few areas are used for pasture or hay.

These soils generally are unsuited to corn, soybeans, and small grain because of the slope and a severe hazard of erosion. They generally are unsuited to hay and poorly suited to pasture. The steep slopes may limit the use of equipment when pastures are established or renovated. Erosion is a severe hazard if pastures are overgrazed. Proper stocking rates, pasture rotation, weed control through mowing, applications of lime and fertilizer, and deferred grazing during wet periods are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard in areas of the Rarden soil. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Rarden soil. Planting seedlings that have been transplanted once also reduces the seedling mortality rate. Building haul roads and skid trails on the contour facilitates the use of equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. In most areas the bedrock can be ripped with construction equipment. Haul roads and log landings should not be located on active slips.

These soils generally are unsuited to septic tank absorption fields because of the slope and the depth to bedrock. The Rarden soil generally is unsuited to buildings because of the slope, the hazard of slippage, the wetness, and the high shrink-swell potential. The Gilpin soil is poorly suited to buildings because of the slope. Buildings should be designed so that they conform to the natural slope of the land. In many areas land shaping may be needed. The depth to bedrock can hinder the construction of basements.

The land capability classification is VIIe. The woodland ordination symbol is 4R in areas of the Gilpin soil and 3R in areas of the Rarden soil. The pasture and hayland suitability group is F-2 on both soils.

GuC—Gilpin-Upshur complex, 8 to 15 percent slopes

These moderately deep to very deep, strongly sloping soils are on ridgetops. Most areas are about 50 percent Gilpin soil and 35 percent Upshur soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and narrow and range from 5 to 20 acres in size.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 6 inches thick. The subsoil is about 25 inches thick. The upper part is yellowish brown, firm silt loam, and the lower part is yellowish brown, firm silty clay loam and channery silty clay loam. Sandstone bedrock is at a depth of about 31 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Typically, the Upshur soil has a surface layer of dark yellowish brown, friable silt loam about 7 inches thick. The subsoil is about 49 inches thick. The upper part is yellowish red, firm silty clay, and the lower part is red, yellowish red, and weak red clay. The substratum is weak red, dark red, olive brown, and dark reddish gray, firm channery silty clay loam. Soft shale bedrock is at a depth of about 61 inches. In some areas the soil is moderately well drained.

Included in this unit in mapping are small areas of the moderately well drained Aaron and Rarden soils. Aaron and Rarden soils are in scattered areas throughout the unit. Also included are areas of shallow soils on the steeper parts of some slopes. Included soils make up about 15 percent of the map unit.

Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Available water capacity is moderate in the Upshur soil and low in the Gilpin soil. Runoff is rapid on the Upshur soil and moderate on the Gilpin soil. The root zone is deep in the Upshur soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the subsoil of the Upshur soil.

Most areas are used for hay or pasture. A few areas are used for cultivated crops, and a few are used as woodland.

These soils are moderately well suited to corn, soybeans, and small grain. Erosion is a hazard if the soils are plowed, especially in areas of the Upshur soil. The Upshur soil becomes compact and cloddy if it is worked when it is too wet. Limiting tillage when the soils are wet minimizes the formation of clods and compaction in areas of the Upshur soil. Conservation tillage systems that leave crop residue on the surface, contour stripcropping, and crop rotations help to control erosion and increase the rate of water infiltration. Grassed waterways help to control excess surface water and prevent the formation of gullies on slopes of less than 12 percent.

These soils are well suited to hay and pasture. Erosion is a hazard if the soils are plowed during pasture renovation, especially in areas of the Upshur soil. A system of conservation tillage that leaves vegetative residue on the surface should be applied when pastures are renovated and reseeded. The Upshur soil is also subject to severe compaction if pastures are grazed when the soil is too wet. Limited grazing during wet periods, proper stocking rates, pasture rotation, weed control through mowing, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings. In most areas the bedrock can be ripped with construction equipment.

These soils are moderately well suited to buildings. The depth to bedrock in the Gilpin soil and the shrink-swell potential in the Upshur soil are limitations. The Gilpin soil is better suited to buildings than the Upshur soil. Limiting the construction of buildings to those without basements helps to overcome the limited depth to bedrock in areas of the Gilpin soil. Reinforcing basement walls and footers and widening and backfilling the foundation trench with suitable coarse material help to prevent the structural damage caused by shrinking and swelling in areas of the Upshur soil. Land shaping is necessary in the steeper areas.

These soils are poorly suited to septic tank absorption fields. Enlarging the absorption area improves the capacity of the absorption fields to absorb effluent. Because bedrock is at a depth of only 20 to 40 inches, the Gilpin soil does not adequately filter the effluent. If the effluent seeps into cracks in the underlying rock, ground-water supplies can become polluted. Raising or mounding the site with suitable fill material improves the filtering capacity of the absorption field.

The land capability classification is IIIe. The woodland ordination symbol is 4A in areas of the Gilpin soil and 3C in areas of the Upshur soil. The pasture and hayland suitability group is F-1 in areas of the Gilpin soil and F-5 in areas of the Upshur soil.

GuD—Gilpin-Upshur complex, 15 to 25 percent slopes

These moderately deep and deep, moderately steep soils are on side slopes and ridgetops. Most areas are about 45 percent Gilpin soil and 40 percent Upshur soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and narrow and range from 5 to 20 acres in size.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 2 inches thick. The subsurface layer is dark yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 26 inches thick. The upper part is yellowish brown, firm silt loam and channery silt loam, and the lower part is yellowish brown, firm channery loam. Sandstone bedrock is at a depth of about 31 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Typically, the Upshur soil has a surface layer of dark yellowish brown, friable silt loam about 4 inches thick. The subsurface layer is yellowish brown, friable silt loam about 2 inches thick. The subsoil is about 41 inches thick. The upper part is red, firm silty clay loam. The next part is red and yellowish red, firm clay and silty clay. The lower part is reddish brown, firm clay. The substratum is red, dark reddish gray, and light olive brown, very firm channery silty clay loam. Siltstone bedrock is at a depth of about 53 inches. In some areas the soil is moderately well drained. In other areas the upper part of the subsoil contains more than 15 percent rock fragments.

Included in this unit in mapping are small areas of Guernsey, Rarden, and Steinsburg soils. Guernsey and Rarden soils are moderately well drained. They are in scattered areas throughout the unit. Steinsburg soils are moderately deep and have more sand and less silt and clay in the subsoil than the Gilpin and Upshur soils. They generally are in the steeper areas. Also included are areas of shallow soils on the upper part of some slopes. Included soils make up about 15 percent of the map unit.

Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Available water capacity is moderate in the Upshur soil and low in the Gilpin soil. Runoff is rapid on both soils. The root zone is deep in the Upshur soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the subsoil of the Upshur soil.

Most areas are used as woodland. A few areas are used for pasture or hay.

These soils are poorly suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soils are plowed. The Upshur soil becomes compacted and cloddy if it is worked when it is too wet. A conservation tillage system that leaves crop residue on the surface used in conjunction with contour stripcropping will help to control runoff and erosion. Limiting tillage when the soils are wet minimizes the formation of clods and compaction in areas of the Upshur soil.

These soils are moderately well suited to pasture and poorly suited to hay. The moderately steep slopes can limit the use of equipment in some areas. Erosion is a severe hazard if the soils are plowed during pasture renovation, especially in areas of the Upshur soil. No-till farming or another system of conservation tillage that leaves vegetative residue on the surface should be applied when pastures are renovated and reseeded. The Upshur soil is subject to severe compaction if pastures are grazed when the soil is too wet. Limited grazing during wet periods, proper stocking rates, pasture rotation, weed control through mowing, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to woodland. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Upshur soil. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard. Building haul roads and skid trails on the contour also facilitates the use of equipment. Cutting and filling to a more desirable slope will improve sites for log landings. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. In most areas the bedrock can be ripped with construction equipment. Haul roads and log landings should not be located on active slips.

These soils are poorly suited to buildings because of the slope. The hazard of slippage and the high shrink-swell potential are additional limitations in areas of the Upshur soil. The Gilpin soil is better suited to buildings than the Upshur soil. Limiting the construction of buildings to those without basements helps to overcome the limited depth to bedrock in areas of the Gilpin soil. Reinforcing basement walls and footers and widening and backfilling the foundation trench with suitable material help to prevent the structural damage caused by shrinking and swelling in areas of the Upshur soil. Cutting and filling during construction or land shaping may be necessary in some areas, but these measures can increase the hazard of slippage in areas of the Upshur soil. Buildings should be designed so that they conform to the natural slope of the land.

These soils generally are unsuited to septic tank absorption fields because of the slow permeability, the slope, the hazard of slippage, and the depth to bedrock.

The land capability classification is IVe. The woodland ordination symbol is 4R in areas of the Gilpin soil. It is 4R on north- and east-facing slopes and 3R on south- and west-facing slopes of the Upshur soil. The pasture and hayland suitability group is F-1 in areas of the Gilpin soil and F-5 in areas of the Upshur soil.

GuE—Gilpin-Upshur complex, 25 to 50 percent slopes

These moderately deep and deep, steep and very steep soils are on side slopes. Most areas are about 45 percent Gilpin soil and 35 percent Upshur soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are irregularly shaped and range from 5 to 40 acres in size.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 2 inches thick. The subsurface layer is yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish brown, firm silt loam and channery silt loam. The lower part is yellowish brown, firm channery loam. Sandstone bedrock is at a depth of about 33 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Typically, the Upshur soil has a surface layer of dark brown, friable silt loam about 2 inches thick. The subsurface layer is strong brown, friable silt loam about 4 inches thick. The subsoil is about 45 inches thick. The upper part is red, firm silty clay, and the lower part is red and dark red, firm clay. The substratum is red, reddish brown, light gray, and light olive brown, firm channery silty clay loam. Siltstone bedrock is at a depth of about 57 inches. In some areas the soil is moderately well drained. In other areas the upper part of the subsoil contains more than 15 percent rock fragments.

Included in this unit in mapping are small areas of Guernsey, Rarden, and Steinsburg soils. Guernsey and Rarden soils are moderately well drained. The are in scattered areas throughout the unit. Steinsburg soils are moderately deep and have more sand and less silt and clay in the subsoil than the Gilpin and Upshur soils. They generally are in the steeper areas. Also included are small areas of soils that have slopes of more than 40 percent and small areas of bedrock escarpments. The escarpments generally are on side slopes near the Ohio River. Inclusions make up about 20 percent of the map unit.

Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Available water capacity is moderate in the Upshur soil and low in the Gilpin soil. Runoff is rapid on both soils. The root zone is deep in the Upshur soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the Upshur soil.

Most areas are used as woodland. Some areas are used as pasture.

These soils generally are unsuited to corn, soybeans, and small grain because of the slope and a severe hazard of erosion. They generally are unsuited to hay and poorly suited to pasture because of the slope and a severe hazard of erosion. The slope can limit the use of equipment when pastures are renovated. Erosion is a severe hazard if pastures are overgrazed. The Upshur soil is subject to severe compaction if pastures are grazed when the soil is too wet. Proper stocking rates, pasture renovation, limited grazing during wet periods, weed control through mowing, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seeding mortality rate in areas of the Upshur soil. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Building haul roads and skid trails on the contour also facilitates the use of equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. In most areas the bedrock can be ripped with construction equipment. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Haul roads and log landings should not be located on active slips.

These soils generally are unsuited to buildings and septic tank absorption fields because of the slope. The Upshur soil is also limited by the hazard of slippage, the high shrink-swell potential, and the slow permeability.

The land capability classification is VIe. The woodland ordination symbol is 4R in areas of the Gilpin soil. It is 4R on north- and east-facing slopes and 3R on south- and west-facing slopes of the Upshur soil. The pasture and hayland suitability group is F-2 in areas of the Gilpin soil and F-6 in areas of the Upshur soil.

GwD—Guernsey-Gilpin complex, 15 to 25 percent slopes

These very deep to moderately deep, well drained and moderately well drained, moderately steep soils are on side slopes. Most areas are about 45 percent Guernsey soil and 40 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are irregularly shaped and range from 5 to 50 acres in size.

Typically, the Guernsey soil has a surface layer of dark brown, friable silt loam about 6 inches thick. The subsoil is about 54 inches thick. The upper part is yellowish brown and strong brown, mottled, firm and friable silt loam and silty clay loam. The next part is yellowish brown, light olive brown, and light brownish gray, mottled, firm silty clay. The lower part is brown, mottled, firm silty clay loam. The substratum is grayish brown, mottled, very firm silty clay loam. Weathered siltstone bedrock is at a depth of about 72 inches. In some areas the upper part of the subsoil is calcareous.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 2 inches thick. The subsurface layer is dark yellowish brown, friable silt loam about 2 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish brown, firm loam, and the lower part is strong brown, firm channery loam. Sandstone bedrock is at a depth of about 32 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Included in this unit in mapping are small areas of deep and very deep Upshur soils. Upshur soils are well drained and have red colors in the subsoil. They generally are in the less sloping areas. Also included are areas of soils that have slopes of more than 25 percent and small areas of moderately deep and shallow soils on the upper part of some slopes. Included soils make up about 15 percent of most areas.

Permeability is moderately slow or slow in the Guernsey soil and moderate in the Gilpin soil. Available water capacity is low in the Gilpin soil and moderately low in the Guernsey soil. Runoff is rapid on both soils. The Guernsey soil has a seasonal high water table at a depth of 18 to 36 inches during extended wet periods. The root zone is deep or very deep in the Guernsey soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the Guernsey soil.

In most areas, these soils are used as woodland or the acreage is idle land. Some areas are used for pasture or hay.

These soils are poorly suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soils are plowed. The moderately steep slopes may limit the use of equipment in many areas. No-till farming or another system of conservation tillage that leaves crop residue on the surface and contour stripcropping help to control erosion and increase the rate of water infiltration.

These soils are moderately well suited to pasture and poorly suited to hay. The moderately steep slopes may limit the use of equipment during haying operations. Some of the less sloping areas in the map unit may be suitable for haying. Erosion is a severe hazard if the soils are plowed during pasture establishment or renovation. No-till or conservation reseeding practices should be applied during pasture renovation. The Guernsey soil is subject to compaction if pastures are grazed when the soil is too wet. Because of the high potential for frost action in areas of the Guernsey soil, new plantings should be made in early fall or in spring to minimize damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Planting techniques that spread the roots of seedlings and increase the soil-root contact also reduce the seedling mortality rate. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Building haul roads and skid trails on the contour also facilitates the use of equipment. Cutting and filling to a more desirable slope will improve sites for log landings. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. In most areas the bedrock can be ripped with construction equipment. Haul roads and log landings should not be located on active slips.

These soils are poorly suited to buildings because of the slope of both soils and the high shrink-swell potential, the seasonal high water table, and the hazard of slippage in areas of the Guernsey soil. Buildings should be designed so that they conform to the natural slope of the land. In some areas land shaping may be necessary. Widening and backfilling the foundation trench with suitable material and strengthening footers and basement walls help to prevent the structural damage caused by shrinking and swelling in areas of the Guernsey soil. Installing footer drains and waterproofing basement walls help to keep basements dry. Cutting and filling should be kept to a minimum in areas of the Guernsey soil in order to reduce the hazard of slippage. The depth to bedrock may hinder the construction of basements in some areas of the Gilpin soil. In many areas the bedrock can be ripped and often can be dug with a backhoe.

These soils generally are unsuited to septic tank absorption fields because of the slope, the wetness, the restricted permeability, and the depth to bedrock.

The land capability classification is IVe. The woodland ordination symbol is 4R. The pasture and hayland suitability group is A-2 in areas of the Guernsey soil and F-1 in areas of the Gilpin soil.

GwE—Guernsey-Gilpin complex, 25 to 40 percent slopes

These deep and moderately deep, well drained and moderately well drained, steep soils are on side slopes. Most areas are about 45 percent Guernsey soil and 45 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are irregularly shaped and range from 20 to 50 acres in size.

Typically, the Guernsey soil has a surface layer of dark brown, friable silt loam about 6 inches thick. The subsoil is about 43 inches thick. The upper part is dark yellowish brown and yellowish brown, friable and firm silt loam and silty clay loam. The lower part is yellowish brown and dark grayish brown, mottled, firm silty clay and channery silty clay. The substratum is grayish brown, mottled, very firm channery silty clay loam. Weathered siltstone bedrock is at a depth of about 55 inches. In some areas the upper part of the subsoil is calcareous.

Typically, the Gilpin soil has a surface layer of very dark grayish brown, friable silt loam about 2 inches thick. The subsurface layer is dark yellowish brown, friable silt loam about 2 inches thick. The subsoil is about 25 inches thick. The upper part is yellowish brown, firm channery silt loam and loam, and the lower part is light olive brown, firm very channery loam. Sandstone bedrock is at a depth of about 29 inches. In a few areas the depth to bedrock is more than 40 inches. In other areas the soil is moderately well drained.

Included in this unit in mapping are small areas of Rarden, Steinsburg, and Upshur soils. Rarden soils are moderately deep and moderately well drained. Upshur soils are deep and very deep and are well drained. Rarden and Upshur soils have red colors in the subsoil. They are in the less sloping areas. Steinsburg soils are well drained and moderately deep. They have more sand and less silt and clay in the subsoil than the Guernsey and Gilpin soils. They generally are in the steeper areas. Also included are areas of shallow soils on the upper part of some slopes. Included soils make up about 10 percent of most areas.

Permeability is moderately slow or slow in the Guernsey soil and moderate in the Gilpin soil. Available water capacity is low in the Gilpin soil and moderate in the Guernsey soil. Runoff is rapid on both soils. The root zone is deep in the Guernsey soil and moderately deep in the Gilpin soil. The Guernsey soil has a seasonal high water table at a depth of 18 to 36 inches during extended wet periods. The shrink-swell potential is high in the Guernsey soil.

Most areas are used as woodland. Some areas are used as pasture.

These soils generally are unsuited to corn, soybeans, and small grain because of the slope and a severe hazard of erosion. They generally are unsuited to hay because of the slope. They are poorly suited to pasture. The steep slope limits the use of equipment when pastures are renovated. Proper stocking rates, pasture rotation, deferred grazing during wet periods, weed control through mowing, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Guernsey soil. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Building haul roads and skid trails on the contour will also facilitate the use of equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. In most areas the bedrock can be ripped with construction equipment. Haul roads and log landings should not be located on active slips.

The Guernsey soil generally is unsuited to buildings because of the slope, the hazard of slippage, the shrink-swell potential, and the wetness. The Gilpin soil is poorly suited to buildings because of the slope. Buildings should be designed so that they conform to the natural slope of the land. Land shaping may be limited by the depth to bedrock. The construction of basements also may be hindered by the moderately deep bedrock.

These soils generally are unsuited to septic tank absorption fields because of the slope of both soils, the restricted permeability and the seasonal high water table in areas of the Guernsey soil, and the depth to bedrock in areas of the Gilpin soil.

The land capability classification is VIe. The woodland ordination symbol is 4R. The pasture and hayland suitability group is A-3 in areas of the Guernsey soil and F-2 in areas of the Gilpin soil.

KeB—Keene silt loam, 2 to 6 percent slopes

This deep and very deep, moderately well drained, gently sloping soil is on ridgetops. Most areas are irregularly shaped and range from 5 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 40 inches thick and is mottled below a depth of about 16 inches. The upper part is yellowish brown, friable silt loam, and the lower part is yellowish brown, mottled, friable to very firm silt loam and silty clay loam. Weathered siltstone and sandstone bedrock is at a depth of about 48 inches. In some areas the subsoil has more clay. In other areas the soil is well drained.

Included with this soil in mapping are small areas of Aaron, Gilpin, Upshur, and Woodsfield soils. These soils are in landscape positions similar to those of the Keene soil. Aaron soils have more clay and less silt in the subsoil than the Keene soil. Gilpin, Upshur, and Woodsfield soils are well drained. Gilpin soils are moderately deep to bedrock. Upshur and Woodsfield soils have a subsoil that is dominantly red in color. Included soils make up about 15 percent of most areas.

Permeability is moderate or moderately slow in the upper part of the subsoil in the Keene soil and moderately slow or slow in the lower part. Available water capacity is moderate. Runoff is medium. The root zone is deep or very deep. The seasonal high water table is at a depth of 18 to 36 inches during extended wet periods.

Most areas are used as pasture. Some areas are used for cultivated crops. A few areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. It tends to crust after hard rains. Erosion is a hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control erosion, increase the rate of water infiltration, and minimize crusting. Crop rotations and stripcropping also help to control erosion. Grassed waterways help to control excess surface water.

This soil is well suited to hay and pasture. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, applications of lime and fertilizer, deferred grazing during wet periods, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone on haul roads and log landings improves soil strength. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil is moderately well suited to buildings because of a moderate shrink-swell potential and the wetness. Strengthening foundations and basement walls and backfilling foundation trenches with suitable material help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry.

This soil is moderately well suited to septic tank absorption fields because of the slow permeability and the seasonal high water table. Perimeter drains help to lower the seasonal high water table. Mounding or elevating the absorption field with suitable fill material helps to overcome the slow permeability. Enlarging the absorption area improves the capacity of the field to absorb effluent.

The land capability classification is IIe. The woodland ordination symbol is 4A. The pasture and hayland suitability group is A-6.

KeC—Keene silt loam, 6 to 12 percent slopes

This deep and very deep, moderately well drained, strongly sloping soil is on ridgetops. Most areas are irregularly shaped and range from 5 to 15 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 6 inches thick. The subsoil is about 43 inches thick. It is mottled below a depth of about 16 inches. The upper part is yellowish brown and strong brown, friable and firm silt loam, and the lower part is strong brown and yellowish brown, mottled, firm silty clay loam and channery silty clay loam. Weathered siltstone and sandstone bedrock is at a depth of about 49 inches. In a few areas the soil is well drained. In other areas the subsoil has more clay.

Included with this soil in mapping are small areas of Aaron, Gilpin, Upshur, and Woodsfield soils. These soils are in landscape positions similar to those of the Keene soil. Aaron soils have more clay and less silt in the subsoil than the Keene soil. Gilpin, Upshur, and Woodsfield soils are well drained. Gilpin soils are moderately deep to bedrock. Upshur and Woodsfield soils have a subsoil that is dominantly red in color. Included soils make up about 20 percent of most areas.

Permeability is moderate or moderately slow in the upper part of the subsoil in the Keene soil and moderately slow or slow in the lower part. Available water capacity is moderate. Runoff is rapid. The root zone is deep or very deep. The seasonal high water table is at a depth of 18 to 36 inches during extended wet periods.

Most areas are used as pasture. Some areas are used for cultivated crops or as woodland.

This soil is moderately well suited to corn, soybeans, and small grain. It tends to crust after hard rains. Erosion is a severe hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface used in conjunction with contour stripcropping or crop rotations will help to control erosion, increase the rate of water infiltration, and minimize surface crusting. Grassed waterways help to control excess surface water in the less sloping areas.

This soil is well suited to hay and pasture. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. No-till or conservation seeding practices that leave residue on the surface help to control erosion. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

The soil is moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone on haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil is moderately well suited to buildings. A moderate shrink-swell potential, the slope, and the wetness are the main limitations. Strengthening foundations and basement walls and backfilling foundation trenches with suitable material help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry. Buildings should be designed so that they conform to the natural slope of the land.

This soil is moderately well suited to septic tank absorption fields. The slow permeability and the seasonal high water table are the main limitations. Perimeter drains help to lower the water table. Mounding or elevating the absorption field with a more permeable material or enlarging the absorption area improves the capacity of the field to absorb effluent.

The land capability classification is IIIe. The woodland ordination symbol is 4A. The pasture and hayland suitability group is A-6.

Ky—Kyger loamy sand, frequently flooded

This deep, poorly drained and very poorly drained, level and nearly level soil is on flood plains near areas that have undergone extensive surface mining (fig. 7). Most areas are long and narrow and range from 5 to 100 acres in size.

Typically, this soil has 42 inches of recent overwash sediments underlain by alluvium. The upper 19 inches of the overwash is strong brown, loose stratified loamy sand. The lower 23 inches is dark gray and dark grayish brown, friable stratified silt loam and loam. The buried alluvium to a depth of about 80 inches is dark

Figure 7.—A typical landscape in an area of Kyger loamy sand, frequently flooded. This soil formed in sandy material eroded from abandoned strip mines and deposited on flood plains and low terraces.

yellowish brown, loose and friable stratified loamy sand and sandy loam. In some areas the soil has more silt and less sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Orrville soils. These soils are in landscape positions similar to those of the Kyger soil. They did not form in alluvium derived from mining operations. They make up about 5 percent of most areas.

Permeability is moderate or moderately rapid in the Kyger soil. Available water capacity is high. Runoff is very slow or ponded. The soil is subject to long, frequent periods of flooding from November to May in most years. The seasonal high water table is about 2 feet above the surface to 1 foot below the surface during extended wet periods. The root zone is deep.

Most of the acreage is idle land. A few areas are used as pasture.

This soil generally is unsuited to corn, soybeans, small grain, hay, pasture, and woodland because of the seasonal high water table and the flooding. It also generally is unsuited to buildings and septic tank absorption fields because of the seasonal high water table and the flooding.

The land capability classification is VIw. No woodland ordination symbol is assigned. The pasture and hayland suitability group is H-1.

LaB—Lakin loamy fine sand, 1 to 6 percent slopes

This very deep, excessively well drained, nearly level and gently sloping soil is on terraces in the Ohio

River valley. Most areas are long and narrow and range from 5 to 40 acres in size.

Typically, the surface layer is dark yellowish brown, very friable loamy fine sand about 8 inches thick. The subsurface layer is yellowish brown, very friable and loose loamy fine sand about 12 inches thick. The subsoil is about 42 inches thick. The upper part is yellowish brown and brownish yellow, very friable and loose loamy fine sand. The lower part is strong brown, very friable and loose loamy fine sand and fine sand. The substratum to a depth of about 80 inches is strong brown, loose fine sand. In some areas the lower part of the subsoil and the substratum have more silt and less sand. In a few areas the subsoil has more clay.

Included with this soil in mapping are small areas of Cidermill soils. These soils are in scattered areas throughout the unit. They have more clay and silt in the subsoil than the Lakin soil and are underlain by sand and gravel. They make up about 5 percent of most areas.

Permeability is rapid in the Lakin soil. Available water capacity is low. Runoff is slow. The root zone is deep or very deep.

Most areas are used for cultivated crops. Some areas are used for hay or pasture. A few areas are used as woodland.

This soil is moderately well suited to corn, soybeans, and small grain. It is droughty. The rapid permeability and excessive drainage result in rapid leaching of soil amendments. Measures that increase the organic matter content and the water-holding capacity of the soil should be applied. A conservation tillage system that leaves crop residue on the surface increases the organic matter content and the water-holding capacity of the soil. Plant nutrients are leached from the soil at a rather rapid rate; consequently, the soil generally responds better to timely or smaller, more frequent applications of fertilizer.

This soil is suited to hay and pasture. The droughtiness may limit grazing during dry periods. Proper stocking rates, pasture rotation, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil is well suited to buildings with or without basements. It is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter effluent from septic tanks. The poor filtering capacity can result in the pollution of ground-water supplies.

The land capability classification is IIIs. The woodland ordination symbol is 3S. The pasture and hayland suitability group is B-1.

LaC—Lakin loamy fine sand, 6 to 12 percent slopes

This very deep, excessively well drained, strongly sloping soil is on terraces in the Ohio River valley. Most areas are long and narrow and range from 5 to 75 acres in size.

Typically, the surface layer is dark yellowish brown, very friable loamy fine sand about 9 inches thick. The subsurface layer is yellowish brown, very friable and loose loamy fine sand about 34 inches thick. The subsoil is yellowish brown and dark brown, very friable and loose loamy fine sand about 29 inches thick. The substratum to a depth of about 80 inches is dark brown, loose fine sand. In some areas the lower part of the subsoil and the substratum have more silt and less sand. In a few areas the subsoil has more clay.

Included with this soil in mapping are small areas of Cidermill soils. These soils are in scattered areas throughout the unit. They have more clay and silt in the subsoil than the Lakin soil and are underlain by sand and gravel. They make up about 5 percent of most areas.

Permeability is rapid in the Lakin soil. Available water capacity is low. Runoff is medium. The root zone is deep or very deep.

Most areas are used for hay or pasture. A few areas are used for cultivated crops, and a few are used as woodland.

This soil is poorly suited to corn, soybeans, and small grain because of droughtiness and the hazard of erosion. Plant nutrients are leached from the soil at a rather rapid rate; consequently, the soil generally responds better to timely or smaller, more frequent applications of fertilizer. Measures that increase the organic matter content and the water-holding capacity of the soil should be applied. A conservation tillage system that leaves residue on the surface helps to control runoff and erosion and increase the organic matter content and the water-holding capacity of the soil.

The soil is moderately well suited to hay and pasture. The droughtiness may limit grazing during dry periods. Proper stocking rates, pasture rotation, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Cutting and filling to a more desirable slope will improve sites for log landings. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil is well suited to buildings. In some of the steeper areas, some land shaping may be needed. Buildings should be designed so that they conform to the natural slope of the land.

This soil is poorly suited to septic tank absorption fields. It readily absorbs but does not adequately filter effluent from septic tanks. The poor filtering capacity may result in the pollution of ground-water supplies.

The land capability classification is IVs. The woodland ordination symbol is 3S. The pasture and hayland suitability group is B-1.

LaD—Lakin loamy fine sand, 12 to 18 percent slopes

This very deep, excessively well drained, moderately steep soil is on terraces in the Ohio River valley. Most areas are long and narrow and range from 5 to 40 acres in size.

Typically, the surface layer is dark brown, very friable loamy fine sand about 7 inches thick. The subsurface layer is yellowish brown, very friable and loose loamy fine sand about 23 inches thick. The subsoil is dark yellowish brown, very friable and loose loamy fine sand about 35 inches thick. The substratum to a depth of about 80 inches is dark yellowish brown, loose fine sand. In some areas the lower part of the subsoil and the substratum have more silt and less sand. In a few areas the subsoil has more clay.

Included with this soil in mapping are small areas of Conotton soils. These soils have more gravel and clay than the Lakin soil and are on the steeper part of the landscape. They make up about 5 percent of most areas.

Permeability is rapid in the Lakin soil. Available water capacity is low. Runoff is medium. The root zone is deep or very deep.

In most areas, this soil is used for pasture or the acreage is idle land. A few areas are used as woodland.

This soil generally is unsuited to corn, soybeans, and small grain because of the droughtiness and the hazard of erosion. It is poorly suited to hay and moderately well suited to pasture. The moderately steep slopes and the loose, sandy textures may limit the use of equipment during haying operations. Erosion is a hazard if pastures are overgrazed or the soil is plowed during pasture renovation. Conservation reseeding practices help to control water erosion and wind erosion. The droughtiness may limit grazing during dry periods. Proper stocking rates, pasture rotation, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Building haul roads and skid trails on the contour facilitates the use of equipment. Cutting and filling to a more desirable slope will improve sites for log landings. Special equipment is needed for site preparation and planting. Erosion can be reduced by locating logging roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices.

This soil is moderately well suited to buildings. The slope is the main limitation. Land shaping may be needed in many areas. Buildings should be designed so that they conform to the natural slope of the land.

This soil generally is unsuited to septic tank absorption fields because of the slope and the poor filtering capacity of the soil.

The land capability classification is VIs. The woodland ordination symbol is 3R. The pasture and hayland suitability group is B-1.

LaE—Lakin loamy fine sand, 18 to 40 percent slopes

This very deep, excessively well drained, steep soil generally is on terrace risers in the Ohio River valley. Most areas are long and very narrow and range from 5 to 45 acres in size.

Typically, the surface layer is very dark grayish brown, very friable loamy fine sand about 2 inches thick. The subsurface layer is yellowish brown, very friable and loose loamy fine sand about 29 inches thick. The subsoil is about 32 inches thick. The upper part is yellowish brown, very friable and loose loamy fine sand, and the lower part is strong brown, very friable and loose fine sand. The substratum to a depth of about 80 inches is yellowish brown, loose fine sand. In a few areas the lower part of the subsoil and the substratum have more silt and less sand.

Included with this soil in mapping are small areas of Conotton soils. These soils have more gravel and clay than the Lakin soil. They are on the steeper part of the landscape. They make up about 10 percent of most areas.

Permeability is rapid in the Lakin soil. Available water capacity is low. Runoff is rapid. The root zone is deep or very deep.

In most areas, this soil is used as woodland or the acreage is idle land. A few areas are pastured. The soil generally is unsuited to corn, soybeans, small grain, hay, and pasture because of the slope, droughtiness, and the hazard of erosion.

This soil is moderately well suited to trees. The hazard of erosion can be reduced in the steeper areas by establishing logging roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Building haul roads and skid trails on the contour also facilitates the use of equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. Special equipment is needed for site preparation and planting.

This soil generally is unsuited to buildings and septic tank absorption fields because of the slope and the poor filtering capacity of the soil.

The land capability classification is VIIs. The woodland ordination symbol is 3R. The pasture and hayland suitability group is B-2.

LkB—Licking silt loam, 1 to 6 percent slopes

This very deep, nearly level and gently sloping, moderately well drained soil is on terraces. Most areas are irregularly shaped and range from 2 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 56 inches thick. The upper part is yellowish brown, friable silt loam. The next part is yellowish brown, mottled, firm silty clay loam. The lower part is yellowish brown, brown, and dark yellowish brown, mottled, firm silty clay. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm silty clay. In some areas the soil is well drained. In other areas the subsoil has less clay and more silt.

Included with this soil in mapping are small areas of Taggart, Omulga, and Vincent soils. Taggart soils are somewhat poorly drained. Omulga soils have a fragipan and have less clay in the subsoil than the Licking soil. Vincent soils have red colors in the subsoil. Vincent and Omulga soils are in landscape positions similar to those of the Licking soil. Taggart soils are in the lower lying areas of the terrace. Also included are small areas of somewhat poorly drained soils in the lower landscape positions. Included soils make up about 10 percent of most areas.

Permeability is slow in the Licking soil. Available water capacity is moderate. Runoff is medium. The seasonal high water table is at a depth of 18 to 36 inches during extended wet periods. The root zone is deep or very deep. The shrink-swell potential is high.

Most areas are used for pasture, hay, or cultivated crops. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control erosion and increase the rate of water infiltration. Crop rotations and stripcropping also help to control erosion. Random subsurface drains may be needed in wet spots in some fields. The surface layer tends to crust after heavy rains. Applying a conservation tillage system minimizes crusting. Grassed waterways help to remove excess surface water from adjacent, steep slopes.

This soil is well suited to hay and pasture. Erosion is a hazard if the soil is plowed during pasture renovation. Conservation reseeding practices help to control runoff and erosion. Grazing when the soil is too wet causes compaction and thus decreases the stand and vigor of plants. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Deferred grazing during wet periods, pasture rotation, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Frequent, light thinning and harvesting increase the vigor of the stand and reduce the windthrow hazard.

This soil is moderately well suited to buildings. The seasonal high water table and the high shrink-swell potential are the main limitations. Widening and backfilling the foundation trench with suitable material help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry. A surface drainage system may be needed to remove excess surface water from around building sites.

This soil is poorly suited to septic tank absorption fields because of the slow permeability and the seasonal high water table. Perimeter drains help to lower the seasonal high water table. Mounding or elevating the absorption field with a more permeable fill material and enlarging the absorption area improve the capacity of the field to absorb effluent.

The land capability classification is IIe. The woodland ordination symbol is 4C. The pasture and hayland suitability group is A-6.

LkC2—Licking silt loam, 6 to 12 percent slopes, eroded

This very deep, moderately well drained, strongly sloping soil is on terraces. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are irregularly shaped and range from 2 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 49 inches thick. The upper part is strong brown, mottled, firm silty clay loam. The lower part is yellowish brown, mottled, firm silty clay. The substratum to a depth of about 80 inches is yellowish brown, mottled firm silty clay. In a few areas the soil is well drained. In other areas the subsoil has more silt and less clay.

Included with this soil in mapping are small areas of Omulga, Taggart, and Vincent soils. Omulga soils have a fragipan and less clay in the subsoil than the Licking soil. Taggart soils are somewhat poorly drained. Vincent soils have red colors in the subsoil. Vincent and Omulga soils are in landscape positions similar to those of the Licking soil. Taggart soils generally are in the lower lying areas. Also included are small areas of somewhat poorly drained soils in depressions. Included soils make up about 15 percent of most areas.

Permeability is slow in the Licking soil. Available water capacity is moderate. Runoff is rapid. The seasonal high water table is at a depth of 18 to 36 inches during extended wet periods. The root zone is deep or very deep. The shrink-swell potential is high.

Most areas are used for pasture or hay. Some areas are used for cultivated crops. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed. A conservation tillage system that leaves crop residue on the surface used in conjunction with contour stripcropping will help to control erosion. Random subsurface drains may be needed in small wet areas. The surface layer tends to crust after heavy rains. Applying a conservation tillage system minimizes crusting. Grassed waterways help to remove excess surface water from adjacent, steep slopes.

This soil is moderately well suited to hay and well suited to pasture. Erosion is a severe hazard if the soil is plowed during pasture renovation. Conservation reseeding practices help to control runoff and erosion. Grazing when the soil is too wet causes severe compaction and thus decreases the stand and vigor of plants. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Deferred grazing during wet periods, pasture rotation, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings. Frequent, light thinning and harvesting increase the vigor of the stand and reduce the windthrow hazard.

This soil is moderately well suited to buildings because of the seasonal high water table and the high shrink-swell potential. Widening and backfilling the foundation trench with suitable material and reinforcing foundations and basement walls help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry. In some areas land shaping may be needed.

This soil is poorly suited to septic tank absorption fields because of the slow permeability and the seasonal high water table. Perimeter drains help to lower the seasonal high water table. Mounding or elevating the absorption field with a more permeable fill material and enlarging the absorption area improve the capacity of the field to absorb effluent.

The land capability classification is IVe. The woodland ordination symbol is 4C. The pasture and hayland suitability group is A-6.

LkD2—Licking silt loam, 12 to 18 percent slopes, eroded

This very deep, moderately well drained, moderately steep soil is on terraces. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are irregularly shaped and range from 2 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 48 inches thick. The upper part is yellowish brown, firm silty clay loam, and the lower part is yellowish brown and strong brown, mottled, firm silty clay. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm silty clay. In some areas the upper part of the subsoil has more clay and less silt.

Included with this soil in mapping are small areas of Omulga and Vincent soils. Omulga soils have a fragipan and have less clay in the subsoil than the Licking soil. Vincent soils have red colors in the subsoil. Omulga and Vincent soils are in landscape positions similar to those of the Licking soil. Also included are small areas of somewhat poorly drained soils at the base of slopes. Included soils make up about 10 percent of most areas.

Permeability is slow in the Licking soil. Available water capacity is moderate. Runoff is rapid. The seasonal high water table is at a depth of 18 to 36 inches during extended wet periods. The root zone is deep or very deep. The shrink-swell potential is high.

Most areas are used for pasture or hay. Some areas are used as woodland. A few areas are used for cultivated crops.

This soil generally is unsuited to corn, soybeans, and small grain because of a severe hazard of erosion and the slope. It is moderately well suited to pasture and poorly suited to hay. Erosion is a severe hazard if the soil is plowed during pasture renovation. Conservation reseeding practices help to control runoff and erosion. Grazing when the soil is too wet causes severe compaction and thus decreases the stand and vigor of plants. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Deferred grazing during wet periods, pasture rotation, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. The hazard of erosion can be reduced by locating logging roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings. Building haul roads and skid trails on the contour facilitates the use of equipment. Special equipment is needed for site preparation and planting. Frequent, light thinning and harvesting increase the vigor of the stand and reduce the windthrow hazard.

This soil is poorly suited to buildings because of the slope, the high shrink-swell potential, and the wetness. Buildings should be designed so that they conform to the natural slope of the land. Land shaping may be necessary in some areas. Widening and backfilling the foundation trench with suitable material and reinforcing foundations and basement walls help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry.

This soil is poorly suited to septic tank absorption fields because of the slope, the wetness, and the slow permeability. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface. Perimeter drains help to lower the seasonal high water table. Enlarging the absorption area and mounding or elevating the absorption field with a more permeable material improves the capacity of the field to absorb effluent.

The land capability classification is VIe. The woodland ordination symbol is 4R. The pasture and hayland suitability group is A-6.

Mo—Moshannon silt loam, frequently flooded

This very deep, well drained, nearly level soil is on flood plains. Most areas are long and narrow and range from 20 to 200 acres in size.

Typically, the surface layer is dark reddish brown, friable silt loam about 7 inches thick. The subsoil is reddish brown, friable silt loam about 33 inches thick. The substratum to a depth of about 80 inches is reddish brown, friable silt loam and very friable stratified silt loam to sandy loam. In some areas the subsoil is not so red.

Included with this soil in mapping are small areas of Chagrin and Elkinsville soils and small areas of somewhat poorly drained soils. Chagrin soils are well drained and do not have a red colored subsoil. They have more sand in the solum than the Moshannon soil. They are in scattered areas throughout the unit. Elkinsville soils have more sand in the subsoil and substratum than the Moshannon soil. They are on low terraces adjacent to the flood plains. The somewhat poorly drained soils are in low lying areas of the flood plains. Included soils make up about 10 percent of most areas.

Permeability is moderate in the Moshannon soil. Available water capacity is high. Runoff is slow. The seasonal high water table is at a depth of 48 to 72 inches in February and March and during extended wet periods. The soil is subject to frequent, brief periods of flooding from January to May in most years. The root zone is very deep.

Most areas are used for cultivated crops or pasture. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is well suited to corn, soybeans, and small grain. The flooding is a hazard affecting winter wheat. The soil is suited to all cropping systems. It tends to crust after hard rains. A conservation tillage system that leaves crop residue on the surface minimizes crusting.

This soil is well suited to hay and pasture. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting and planting during the drier parts of the year help to overcome the flooding. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil generally is unsuited to septic tank absorption fields and buildings because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A. The pasture and hayland suitability group is A-5.

Nk—Newark silt loam, frequently flooded

This very deep, somewhat poorly drained, nearly level soil is on flood plains. Most areas are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 30 inches thick. The upper part is light olive brown, mottled, friable silt loam, and the lower part is grayish brown and light brownish gray, mottled, friable and firm silt loam. The substratum to a depth of about 80 inches is light olive brown and grayish brown, mottled, firm silt loam. In a few areas the upper part of the subsoil has more sand or clay. In other areas it has more rock fragments.

Included with this soil in mapping are areas of the well drained Chagrin and Nolin soils. These soils generally are in the slightly higher landscape positions and near drainageways. Also included are areas of poorly drained soils in high water channels and depressions. Included soils make up about 10 percent of most areas.

Permeability is moderate in the Newark soil. Available water capacity is high. Runoff is very slow. The seasonal high water table is at a depth of 6 to 18 inches during extended wet periods. The soil is subject to brief, frequent periods of flooding from January to April of most years. Unless the soil is drained, rooting depth is restricted by the water table.

Most areas are used for hay or pasture. Some areas are used for cultivated crops. In a few areas, the acreage is idle land or the soil is used as woodland.

This soil is well suited to corn, soybeans, and small grain. The flooding is a hazard affecting winter wheat. The seasonal high water table may limit the use of equipment during extended wet periods. Surface and subsurface drainage systems help to overcome the wetness. If drained, the soil is suited to all types of tillage systems. The surface layer is subject to crusting after hard rains. In areas where the soil is drained, no-till farming or another system of conservation tillage that leaves crop residue on the surface minimizes crusting of the surface layer.

This soil is suited to hay and pasture. The flooding and the seasonal high water table may limit the use of equipment during extended wet periods. The wetness may also be a limitation affecting the selection of forage species. Grazing when the soil is too wet causes compaction and thus decreases the stand and vigor of plants. Because of the high potential for frost action, new plantings should be made in early fall or in spring to reduce the damage caused by frost heaving. Deferred grazing during wet periods, pasture rotation, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting and planting during the drier parts of the year help to overcome the flooding. Logging can be done when the soil is frozen or during the drier parts of the year.

This soil generally is unsuited to buildings and septic tank absorption fields because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A. The pasture and hayland suitability group is C-3.

No—Nolin silt loam, frequently flooded

This very deep, nearly level, well drained soil is on flood plains. Most areas of this soil are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is dark yellowish brown, friable silt loam about 31 inches thick. The substratum to a depth of about 80 inches is dark yellowish brown, friable loam, sandy loam, and silt loam. In a few areas the soil is moderately well drained. In some areas the subsoil has a higher content of rock fragments and sand.

Included with this soil in mapping are small areas of Licking, Newark, and Orrville soils. Licking soils are moderately well drained. They are on terraces adjacent to the flood plains. Newark and Orrville soils are somewhat poorly drained. They generally are in the lower lying areas of the flood plains. Also included are areas of soils on terraces. These soils have more rock fragments and clay in the subsoil than the Nolin soil. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Nolin soil. Available water capacity is high. Runoff is slow. The soil is subject to brief, frequent periods of flooding from February to May of most years. The seasonal high water table is at a depth of 36 to 72 inches during extended wet periods. The root zone is deep or very deep.

Most areas are used for cultivated crops. Some areas are used for hay or pasture. A few areas are used as woodland.

This soil is moderately well suited to corn, soybeans, and small grain. The frequent flooding is a limitation affecting winter wheat. The surface layer is subject to crusting after hard rains. The soil is suited to no-till farming or another system of conservation tillage that leaves crop residue on the surface and to conventional tillage systems. A conservation tillage system that leaves crop residue on the surface minimizes crusting and improves the movement of air and water.

This soil is well suited to hay and pasture. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Grazing when the soil is wet causes compaction and thus decreases the stand and vigor of plants. Pasture rotation, deferred grazing during wet periods, proper stocking rates, and weed control through mowing are good management practices.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting and planting during the drier parts of the year help to overcome the flooding. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil generally is unsuited to buildings and septic tank fields because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A. The pasture and hayland suitability group is A-5.

OmB—Omulga silt loam, 2 to 6 percent slopes

This very deep, gently sloping, moderately well drained soil is on terraces in preglacial valleys. Most areas are irregularly shaped and range from 5 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 58 inches thick. The upper part is yellowish brown, friable and firm silt loam. The next part is yellowish brown, mottled, extremely firm and brittle silt loam. The next part is a fragipan of yellowish brown, mottled, extremely firm and brittle silty clay loam. The lower part is yellowish brown, mottled, firm and very firm silt loam and silty clay loam. The substratum to a depth of about 80 inches is reddish brown, mottled, firm silty clay loam. In some areas the soil is well drained.

Included with this soil in mapping are small areas of Guernsey, Licking, Upshur, Vincent, and Woodsfield soils. These soils do not have a fragipan. Guernsey, Upshur, and Woodsfield soils are on the adjacent hillslopes. They have more clay in the upper part of the subsoil than the Omulga soil. Licking and Vincent soils are in landscape positions similar to those of the Omulga soil. They have more clay in the subsoil than the Omulga soil. Included soils make up about 10 percent of most areas.

Permeability is moderate above the fragipan in the Omulga soil and slow in the fragipan. Available water capacity is low. Runoff is medium. A perched seasonal high water table is at a depth of 24 to 42 inches during extended wet periods. The root zone is mainly restricted to the 24 to 36 inches above the fragipan.

Most areas are used as pasture. Some areas are used for cultivated crops. A few areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. The soil tends to crust after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control erosion, increase the rate of water infiltration, and minimize crusting. Crop rotations or stripcropping also help to control erosion. Grassed waterways help to remove excess surface water.

This soil is well suited to hay and pasture. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, deferred grazing during wet periods, pasture rotation, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard. Applying gravel or crushed stone to haul roads and log landings improves soil strength.

This soil is moderately well suited to buildings. A moderate shrink-swell potential and the wetness are the main limitations. Foundations and basement walls should be strengthened and backfilled with suitable material to help prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry.

This soil is poorly suited to septic tank absorption fields because of the slow permeability and the seasonal high water table. Perimeter drains help to lower the water table. Mounding or elevating the absorption field with a more permeable material improves the capacity of the field to absorb effluent and reduces seepage of effluent to the surface.

The land capability classification is IIe. The woodland ordination symbol is 4D. The pasture and hayland suitability group is F-3.

OmC—Omulga silt loam, 6 to 12 percent slopes

This very deep, moderately well drained, strongly sloping soil is on terraces in preglacial valleys. Most areas are irregularly shaped and range from 5 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 55 inches thick. The upper part is yellowish brown, friable and firm silt loam. The next part is a fragipan of yellowish brown, mottled, very firm and extremely firm silt loam and silty clay loam. The lower part is yellowish brown, mottled, firm silty clay loam. The substratum to a depth of about 80 inches is red, firm silty clay. In some areas the soil is well drained.

Included with this soil in mapping are small areas of Guernsey, Licking, Upshur, and Vincent soils. These soils do not have a fragipan. Guernsey and Licking soils are moderately well drained. Licking, Upshur, and Vincent soils have more clay in the subsoil than the Omulga soil. Guernsey and Upshur soils are on the adjacent hillslopes. Vincent and Licking soils are in the lower areas of the lacustrine terraces. Included soils make up about 20 percent of most areas.

Permeability is moderate above the fragipan in the Omulga soil and slow in the fragipan. Available water capacity is low. Runoff is rapid. A perched seasonal high water table is at a depth of 24 to 42 inches during extended wet periods. The root zone is moderately deep. The fragipan restricts root growth and decreases the available water capacity of the soil.

Most areas are used as pasture. Some areas are used for cultivated crops. A few areas are used as woodland.

This soil is moderately well suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed. The soil tends to crust after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, contour stripcropping, or crop rotations help to control erosion, increase the rate of water infiltration, and minimize crusting. Grassed waterways help to remove excess surface water in the less sloping areas.

This soil is well suited to hay and pasture. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. No-till and conservation seeding practices that leave residue on the surface help to control erosion and increase the rate of water infiltration. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings.

This soil is moderately well suited to buildings. A moderate shrink-swell potential, the wetness, and the slope are the main limitations. Reinforcing foundations and basement walls and backfilling with porous material help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry. Buildings should be designed so that they conform to the natural slope of the land. Land shaping may be necessary in some areas.

This soil is poorly suited to septic tank absorption fields because of the slow permeability in the fragipan and the seasonal high water table. Perimeter drains help to low the water table. Mounding or raising the field with a more permeable material improves the capacity of the field to absorb effluent and reduces seepage of effluent to the surface.

The land capability classification is IIIe. The woodland ordination symbol is 4D. The pasture and hayland suitability group is F-3.

Or—Orrville silt loam, frequently flooded

This very deep, somewhat poorly drained, level and nearly level soil is on flood plains. Most areas are long and narrow and range from 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown, mottled, friable silt loam about 4 inches thick. The subsoil is about 38 inches thick. The upper part is yellowish brown, mottled, firm silt loam. The next part is grayish brown, mottled, firm silt loam. The lower part is dark yellowish brown, mottled, firm loam and stratified silt loam, loam, and sandy loam. The substratum to a depth of about 80 inches is dark yellowish brown, dark grayish brown, and brown, mottled stratified silt loam, loam, loamy sand, and silty clay loam. In some areas the soil is better drained.

Included with this soil in mapping are small areas of Chagrin, Kyger, and Moshannon soils. Chagrin and Moshannon soils are well drained. They are near drainageways and in the higher positions on the flood plains. Kyger soils are poorly drained. They have more stratification in the upper part of the subsoil and generally have more sand and less silt and clay in the substratum than the Orrville soil. They are on the lower parts of the flood plains. Also included are areas of poorly drained soils in high water channels and depressions. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Orrville soil. Available water capacity is high. Runoff is very slow. The soil is subject to very brief or brief, frequent periods of flooding from November to May in most years. The seasonal high water table is at a depth of 12 to 30 inches during extended wet periods. Unless the soil is drained, rooting depth is restricted by the high water table.

Most areas are used for hay or pasture. A few areas are used for cultivated crops. In other areas, this soil is used as woodland or the acreage is idle land.

This soil is well suited to corn, soybeans, and small grain. The flooding is a hazard affecting winter wheat. The seasonal high water table may limit the use of equipment during extended wet periods. Surface and subsurface drainage systems help to overcome the wetness. If drained, this soil is suited to all types of tillage systems.

This soil is well suited to hay and pasture. The flooding and the seasonal high water table may limit the use of equipment during extended wet periods. The wetness may also be a limitation affecting the selection of forage species. Grazing when the soil is too wet causes compaction and thus decreases the stand and vigor of plants. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Deferred grazing during wet periods, pasture rotation, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting and planting during the drier parts of the year help to overcome the flooding. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil generally is unsuited to buildings and septic tank absorption fields because of the flooding and the seasonal high water table.

The land capability classification is IIw. The woodland ordination symbol is 5A. The pasture and hayland suitability group is C-3.

PnB—Pinegrove coarse sandy loam, 0 to 8 percent slopes

This very deep, excessively well drained, nearly level and gently sloping soil is in areas that have been surface mined for coal. It is on ridgetops in areas of mine spoil. Most areas range from 2 to 50 acres in size and are long and narrow. Some are irregularly shaped.

Typically, the surface layer is brown, very friable coarse sandy loam about 2 inches thick. The substratum to a depth of about 80 inches is yellowish brown and strong brown, very friable channery and very channery loamy coarse sand. In some areas the slope is more than 8 percent. In a few areas the surface layer and substratum have more rock fragments.

Included with this soil in mapping are highwalls and small areas of the moderately deep Gilpin and Steinsburg soils. Gilpin and Steinsburg soils are in undisturbed areas that are adjacent to or within disturbed areas. They do not contain coal fragments. Steinsburg soils contain fewer rock fragments than the Pinegrove soil. Also included are small areas of soils that have slopes of more than 15 percent. These areas generally are near waterways. Inclusions make up about 10 percent of most areas.

Permeability is rapid in the Pinegrove soil. Available water capacity is low. Runoff is medium. The root zone is very deep.

Most of the acreage is idle land. This soil generally is unsuited to corn, soybeans, and small grain. The water-holding capacity is low, and large stones and boulders can damage equipment or limit the use of equipment.

This soil generally is unsuited to pasture and hay. The low water-holding capacity, a low fertility rate, and acid conditions severely limit forage production. The highwalls and large boulders and stones can severely limit the use of equipment.

The tree species that can tolerate the acid, droughty conditions should be selected for planting.

Once this soil has settled, it is moderately well suited to buildings. The large stones may cause problems when basements or footers are dug.

This soil is poorly suited to septic tank absorption fields because of unstable fill and the rapid permeability. Absorption fields should only be installed in areas that have had sufficient time to settle after regrading. The soil readily absorbs but does not adequately filter effluent from septic tanks. Installing the absorption field in suitable fill material improves the filtering capacity of the soil.

The land capability classification is VIIs. No woodland ordination symbol is assigned. The pasture and hayland suitability group is H-1.

PnD—Pinegrove coarse sandy loam, 8 to 25 percent slopes

This very deep, excessively well drained, strongly sloping and moderately steep soil is in areas that have been surface mined for coal. It is on ridgetops and side slopes in areas of mine spoil. Most areas range from 2 to 50 acres in size and are long and narrow. Some are irregularly shaped.

Typically, the surface layer is strong brown, very friable coarse sandy loam about 2 inches thick. The substratum to a depth of about 72 inches is strong brown and yellowish brown, mottled, very friable channery and very channery loamy coarse sand. In a few areas the surface layer and substratum have more rock fragments. In other areas the slope is more than 25 percent.

Included with this soil in mapping are highwalls and small areas of the moderately deep Gilpin and Steinsburg soils. Gilpin and Steinsburg soils are in undisturbed areas that are adjacent to or within disturbed areas. They do not contain coal fragments. Also included are small areas of soils that have slopes of more than 25 percent. These areas are near the edge of waterways. Inclusions make up about 15 percent of most areas.

Permeability is rapid in the Pinegrove soil. Available water capacity is low. Runoff is rapid. The root zone is very deep.

Most of the acreage is idle land. This soil generally is unsuited to corn, soybeans, and small grain because of the strongly acid to extremely acid soil conditions and the droughtiness. The highwalls limit accessibility by farm equipment. Large stones and boulders can damage equipment or limit the use of equipment.

This soil generally is unsuited to pasture and hay. The water-holding capacity, a low fertility rate, and acid conditions severely limit forage production. The highwalls and large stones and boulders can severely limit the use of equipment.

This soil is best suited to trees that can tolerate the acid, droughty conditions. Building haul roads and skid trails on the contour facilitates the use of equipment. Log landings should be located on the less sloping soils nearby. Special equipment is needed for site preparation and planting.

Once this soil has settled, it is moderately well suited to buildings. In some of the steeper areas, land shaping may be needed. The large stones can increase the cost of digging basements and footers.

This soil is poorly suited to septic tank absorption fields because of unstable fill, the rapid permeability, and the slope. Absorption fields should only be installed in areas that have had sufficient time to settle after regrading. The soil readily absorbs but does not adequately filter effluent from septic tanks. Installing the septic tank absorption fields in suitable fill material improves the filtering capacity of the soil. Installing the distribution lines of absorption fields on the contour helps to prevent seepage of effluent to the surface.

The land capability classification is VIIs. No woodland ordination symbol is assigned. The pasture and hayland suitability group is H-1.

PnF—Pinegrove coarse sandy loam, 25 to 70 percent slopes

This very deep, excessively well drained, steep and very steep soil is in areas that have been surface mined for coal. It is on side slopes in areas of mine spoil. Most areas are long and narrow and range from 10 to 50 acres in size.

Typically, the surface layer is pale brown, loose coarse sandy loam about 1 inch thick. The substratum to a depth of about 80 inches is strong brown and yellowish brown, loose very channery coarse sandy loam and channery loamy coarse sand. In a few areas the substratum has more rock fragments. In other areas it has thin layers that have more clay.

Included with this soil in mapping are small areas of Gilpin, Guernsey, Steinsburg, and Upshur soils. These soils are in undisturbed areas that are adjacent to or within disturbed areas. They have not been affected by surface mining. Gilpin and Steinsburg soils are moderately deep. Guernsey and Upshur soils are deep and very deep. They have a clayey subsoil. In addition, Guernsey soils are moderately well drained and Upshur soils have red colors in the subsoil. Also included are highwalls in areas that have been surface mined. Inclusions make up about 15 percent of most areas.

Permeability is rapid in the Pinegrove soil. Available water capacity is low. Runoff is rapid. The root zone is very deep.

Most of the acreage is idle land. This soil generally is unsuited to corn, soybeans, and small grain because of the slope, the droughtiness, the strongly acid to extremely acid soil conditions, and the limited accessibility by farm equipment in the included areas of highwalls. Large boulders and stones are in some areas.

This soil generally is unsuited to hay and pasture because of the slope, the included areas of highwalls, the low water-holding capacity, the strongly acid to extremely acid soil conditions, and the large boulders and stones. It generally is unsuited to trees.

This soil generally is unsuited to buildings and septic tank absorption fields because of the slope, unstable fill, and the rapid permeability.

The land capability classification is VIIe. No woodland ordination symbol is assigned. The pasture and hayland suitability group is H-1.

PuB—Pinegrove silty clay loam, 0 to 8 percent slopes

This very deep, excessively well drained, nearly level and gently sloping soil is in areas that have been surface mined for coal. It is on ridgetops in areas of mine spoil. It has been reclaimed by grading and blanketing the surface with a layer of material removed from areas of other soils. Most areas range from 5 to 100 acres in size and are long and narrow. Some are irregularly shaped.

Typically, the surface layer is red, firm silty clay loam about 5 inches thick. The subsurface layer is brown, firm silty clay loam about 4 inches thick. The substratum to a depth of about 80 inches is yellowish brown and brownish yellow, loose loamy coarse sand and gravelly loamy coarse sand. In places small layers and pockets of silty clay loam have been mixed with the substratum. In a few areas the substratum has more rock fragments.

Included with this soil in mapping are highwalls and small areas of the moderately deep Gilpin and Steinsburg soils. These soils have not been disturbed by surface mining. They are in areas that are adjacent to or within disturbed areas. Steinsburg soils have more sand and less clay in the solum than the Pinegrove soils. Inclusions make up about 5 percent of most areas.

Permeability is rapid in the Pinegrove soil. Available water capacity is low. Runoff is slow or medium. The root zone is very deep.

Most areas are used for wildlife habitat or for pasture and hay. This soil is poorly suited to corn, soybeans, and small grain. The low water-holding capacity, the strongly acid to extremely acid condition in the substratum, and a low fertility rate adversely affect crop yields. A system of conservation tillage that leaves crop residue on the surface helps to increase the rate of water infiltration and the water-holding capacity of the soil. It also reduces the erosion hazard in the more sloping areas. Applications of lime and fertilizer improve crop yields and the condition of the soil.

This soil is moderately well suited to hay and pasture. The low water-holding capacity, the acid condition in the substratum, and the low fertility rate limit forage production. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing help to maintain the stand and vigor of plants and improve the condition of the soil.

The tree species that can tolerate the acid, droughty conditions of this soil should be selected for planting.

Once this soil has settled, it is moderately well suited to buildings. Large stones may cause problems when basements or footers are dug.

This soil is poorly suited to septic tank absorption fields because of unstable fill and the rapid permeability. Absorption fields should only be installed in areas that have had sufficient time to settle after regrading. The soil readily absorbs but does not adequately filter effluent from septic tanks. Installing the absorption field in suitable fill material improves the filtering capacity of the soil.

The land capability classification is VIs. No woodland ordination symbol is assigned. The pasture and hayland suitability group is G-1.

PuD—Pinegrove silty clay loam, 8 to 25 percent slopes

This very deep, excessively well drained soil is in areas that have been surface mined for coal. It is on ridgetops and side slopes in areas of mine spoil. It has been reclaimed by grading and blanketing the surface with a layer of material removed from areas of other soils. Most areas are long and narrow and range from 5 to 20 acres in size.

Typically, the surface layer is red, firm silty clay loam about 6 inches thick. The subsurface layer is dark grayish brown, firm silty clay loam about 3 inches thick. The substratum to a depth of about 80 inches is yellowish brown and brownish yellow, loose gravelly loamy coarse sand and loamy coarse sand. In some areas thin, discontinuous layers and pockets of clayey material have been mixed with the substratum. In a few areas the substratum has more rock fragments.

Included with this soil in mapping are highwalls and small areas of Gilpin, Guernsey, Steinsburg, and Upshur soils. These soils have not been disturbed by surface mining. They generally are in areas that are adjacent to or within disturbed areas. Steinsburg and Gilpin soils are moderately deep to bedrock. Guernsey and Upshur soils have clayey textures in the subsoil and are deep and very deep. In addition, Guernsey soils are moderately well drained and Upshur soils are well drained and have red colors in the subsoil. Inclusions make up about 10 percent of most areas.

Permeability is rapid in the Pinegrove soil. Available water capacity is low. Runoff is rapid. The root zone is very deep.

In most areas, the acreage is idle land or this soil is used for wildlife habitat. A few areas are used as pasture.

This soil generally is unsuited to corn, soybeans, and small grain because of the slope, the low water-holding capacity, a low fertility rate, and the strongly acid to extremely acid conditions in the substratum. It is poorly suited to hay and pasture because of the low water-holding capacity, the low fertility rate, the strongly acid to extremely acid conditions in the substratum, and the slope. Erosion is a severe hazard if the soil is left bare during pasture establishment or renovation. Conservation seeding practices that leave residue on the surface help to control runoff and erosion and increase the rate of water infiltration. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

The tree species that can tolerate the acid, droughty conditions of this soil should be selected for planting.

Once this soil has settled, it is moderately well suited or poorly suited to buildings. The less sloping areas are better suited to buildings. Land shaping may be necessary in some areas. Buildings should be designed so that they conform to the natural slope of the land. Large boulders may cause problems when foundations are dug.

This soil generally is unsuited to septic tank absorption fields if the slope is more than 15 percent. Absorption fields should only be installed in areas that have had sufficient time to settle after regrading. In the less sloping areas, the soil readily absorbs but does not adequately filter effluent from septic tanks. Elevating or mounding the absorption field with suitable fill material improves the filtering capacity of the soil.

The land capability classification is VIs. No woodland ordination symbol is assigned. The pasture and hayland suitability group is G-1.

PuF—Pinegrove silty clay loam, 25 to 70 percent slopes

This very deep, excessively well drained, steep and very steep soil is on side slopes in areas that have been surface mined for coal. It has been reclaimed by grading and blanketing the surface with a layer of material removed from areas of other soils. Most areas are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is red, firm silty clay loam about 3 inches thick. The subsurface layer is grayish brown, firm silty clay loam about 6 inches thick. The substratum to a depth of about 80 inches is yellowish brown and brownish yellow, loose gravelly loamy coarse sand. In places small layers and pockets of silty clay loam have been intermixed with the substratum. In a few areas the substratum has more rock fragments.

Included with this soil in mapping are highwalls and small areas of Gilpin, Guernsey, Steinsburg, and Upshur soils. These soils are in undisturbed areas adjacent to the surface mined areas. Gilpin and Steinsburg soils are moderately deep to bedrock. Steinsburg soils have more sand and less clay in the solum than the Pinegrove soil. Upshur soils are red. Guernsey soils are moderately well drained. Upshur and Guernsey soils have more clay and less sand in the solum than the Pinegrove soil. Also included are small areas of soils that have slopes of more than 40 percent. Inclusions make up about 15 percent of most areas.

Permeability is rapid in the Pinegrove soil. Available water capacity is low. Runoff is rapid. The root zone is very deep.

In most areas, the acreage is idle land or this soil is used for wildlife habitat. A few areas are used as pasture.

This soil generally is unsuited to corn, soybeans, and small grain because of the slope, a hazard of erosion, a low water-holding capacity, a low fertility rate, and the strongly acid to extremely acid conditions in the substratum. It also generally is unsuited to hay and pasture. The slope limits the use of equipment. The low water-holding capacity, the low fertility rate, and the strongly acid to extremely acid conditions in the substratum limit forage production.

The tree species that can tolerate the acid, droughty conditions of this soil should be selected for planting.

This soil generally is unsuited to buildings and septic tank absorption fields because of the slope, unstable fill, and the rapid permeability.

The land capability classification is VIIe. No woodland ordination symbol is assigned. The pasture and hayland suitability group is H-1.

Px—Pits, gravel

This map unit consists of nearly level to very steep areas from which sand and gravel have been mined or are presently being mined. It is on terraces along the Ohio River. Active sites are constantly being enlarged. Most pits are large. Some are several hundred acres in size. Several smaller pits range from 5 to 20 acres in size.

The material being mined consists of stratified layers of sand and gravel of varying thickness and orientation. The kind and size of the aggregates generally are uniform within any one layer but differ from layer to layer.

The soils around the pits generally are disturbed, and large berms of soil material are often built around the pits. The hazard of erosion is severe in these areas. Most pits are filled with water and are suited to development for wildlife habitat or for water-related uses.

No land capability classification, woodland ordination symbol, or pasture and hayland suitability group has been assigned.

RaC2—Rarden silt loam, 8 to 15 percent slopes, eroded

This moderately deep, moderately well drained, strongly sloping soil generally is on ridgetops. In a few areas it is on benches or side slopes. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are long and narrow and range from 5 to 50 acres in size.

Typically, the surface layer is dark yellowish brown, friable silt loam about 6 inches thick. The subsoil is about 26 inches thick. The upper part is strong brown, friable silt loam. The next part is reddish brown and yellowish red, mottled, firm silty clay loam and silty clay. The lower part is strong brown, mottled, firm channery clay. Light yellowish brown, weathered siltstone bedrock is at a depth of about 32 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the subsoil is not so red.

Included with this soil in mapping are small areas of Gilpin, Keene, and Upshur soils. These soils are in landscape positions similar to those of the Rarden soil. Gilpin soils are well drained and have more sand and less clay in the subsoil than the Rarden soil. Upshur soils are deep and very deep and are well drained. They have fewer rock fragments in the subsoil than the Rarden soil. Keene soils are deep and very deep and are moderately well drained. They have more silt, less clay, and fewer rock fragments in the subsoil than the Rarden soil. Included soils make up about 20 percent of most areas.

Permeability is slow in the Rarden soil. Available water capacity is low. Runoff is rapid. The seasonal high water table is at a depth of 18 to 36 inches during extended wet periods. The root zone is moderately deep. The shrink-swell potential is high.

Some areas are used for hay or pasture. Others are used as woodland. A few areas are used for cultivated crops.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface, contour stripcropping, or crop rotations help to control erosion and increase the rate of water infiltration. Grassed waterways help to remove excess surface water on slopes of less than 12 percent.

This soil is well suited to pasture and hayland. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. Conservation seeding practices that leave residue on the surface help to control erosion and increase the rate of water infiltration. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings.

This soil is moderately well suited to buildings. The high shrink-swell potential and the wetness are the main limitations. Widening and backfilling the foundation trench with suitable material and reinforcing basement walls and footers help to prevent the structural damage caused by shrinking and swelling. The construction of basements may be hindered by the moderately deep bedrock. Installing footer drains and waterproofing basement walls help to keep basements dry.

This soil is poorly suited to septic tank absorption fields because of the slow permeability, the depth to bedrock, and the wetness. Perimeter drains help to lower the seasonal high water table. Mounding or elevating the field with a more permeable material and enlarging the absorption area improve the capacity of the field to absorb effluent.

The land capability classification is IVe. The woodland ordination symbol is 4C. The pasture and hayland suitability group is F-1.

RcB—Richland silt loam, 2 to 6 percent slopes

This very deep, gently sloping, well drained soil is on alluvial fans. Most areas are irregularly shaped and range from 3 to 15 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 44 inches thick. The upper part is yellowish brown, firm silty clay loam. The next part is brown and strong brown, firm and very friable loam and gravelly loam. The lower part is strong brown and dark brown, mottled, friable and very friable loam and gravelly loam. The substratum to a depth of about 80 inches is dark yellowish brown and brown, mottled, loose and very friable loam and very gravelly loam. In some areas the subsoil has more silt, less sand, and fewer rock fragments. In other areas the soil is moderately well drained.

Included with this soil in mapping are small areas of Gallipolis and Taggart soils. These soils are on low stream terraces. Gallipolis soils are moderately well drained. They have more silt, less sand, and fewer rock fragments in the subsoil than the Richland soil. Taggart soils are somewhat poorly drained. Included soils make up about 15 percent of most areas.

Permeability and available water capacity are moderate in the Richland soil. Runoff is medium. The seasonal high water table is at a depth of 36 to 72 inches during extended wet periods. The root zone is very deep.

Most areas are used for pasture or hay. Some areas are used as woodland or for cultivated crops.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control erosion. Conventional tillage systems used in conjunction with contour stripcropping or crop rotations are suitable management practices.

This soil is well suited to hay and pasture. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Applying gravel or crushed stone on haul roads and log landings improves soil strength. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil is well suited to buildings (fig. 8). Waterproofing basement walls and installing drains at the base of footings help to keep basements dry. Widening and backfilling the foundation trench with porous material help to prevent the structural damage caused by shrinking and swelling.

This soil is moderately well suited to septic tank absorption fields. The seasonal high water table is the main limitation. Installing subsurface drains around the perimeter of septic tank absorption fields helps to overcome the wetness.

The land capability classification is IIe. The woodland ordination symbol is 5A. The pasture and hayland suitability group is A-1.

StF—Steinsburg fine sandy loam, 40 to 70 percent slopes

This moderately deep, very steep, well drained soil is on side slopes. Most areas are long and narrow and range from 10 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, very friable fine sandy loam about 3 inches thick. The subsoil is yellowish brown, very friable fine sandy loam about 15 inches thick. The substratum is yellowish brown, very friable channery fine sandy loam. Sandstone bedrock is at a depth of about 26 inches. In a few areas the soil has more silt and clay.

Included with this soil in mapping are small areas of Gilpin and Steinsburg soils on ridgetops. These soils have slopes of less than 15 percent. Gilpin soils have more clay, more rock fragments, and less sand in the subsoil than the Steinsburg soil. Included soils made up about 15 percent of most areas.

Permeability is moderately rapid in the Steinsburg soil. Available water capacity is very low. Runoff is rapid. The root zone is moderately deep.

Most areas are used as woodland. A few small areas are pastured.

This soil generally is unsuited to corn, soybeans, small grain, hay, and pasture because of the very

Figure 8.—Houses built in an area of Richland silt loam, 2 to 6 percent slopes. Upshur-Gilpin complex, 25 to 50 percent slopes, is on the wooded hills, and Chagrin silt loam, frequently flooded, is on the flood plain in the foreground.

steep slopes. It is moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Building haul roads and skid trails on the contour facilitates the use of equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. Special equipment is needed for site preparation and planting.

This soil generally is unsuited to buildings and septic tank absorption fields because of the slope and the depth to bedrock.

The land capability classification is VIIe. The woodland ordination symbol is 4R on north- and east-facing slopes and 3R on south- and west-facing slopes. The pasture and hayland suitability group is H-1.

TaA—Taggart silt loam, 0 to 2 percent slopes

This very deep, nearly level, somewhat poorly drained soil is on terraces in the Ohio River valley and along small streams.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 64 inches thick. The upper part is brown, mottled, friable and firm silt loam and silty clay loam. The lower part is yellowish brown, mottled, firm silty clay loam. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm silty clay loam. In some areas the subsoil has more clay.

Included with this soil in mapping are small areas of Gallipolis and Licking soils. These soils are moderately well drained. They are in the higher areas on stream terraces. Licking soils have more clay in the subsoil than the Taggart soil. Also included are small areas of poorly drained soils in depressions. Included soils make up about 15 percent of the map unit.

Permeability is slow in the Taggart soil. Available water capacity is high. Runoff is slow. The seasonal high water table is at a depth of 12 to 36 inches during extended wet periods. Unless the soil is drained, rooting depth is restricted by the water table.

Most areas are used for cultivated crops, pasture, or hay. In a few areas, this soil is used as woodland or the acreage is idle land.

This soil is well suited to corn, soybeans, and small grain. The seasonal high water table may limit the use of equipment during extended wet periods. Surface and subsurface drainage systems help to overcome the wetness. If drained, the soil is suited to all types of tillage systems. The surface layer is subject to crusting after hard rains. In areas where the soil is drained, no-till farming or another system of conservation tillage that leaves crop residue on the surface minimizes crusting of the surface layer.

This soil is well suited to hay and pasture; however, the seasonal high water table may limit grazing and the use of equipment during wet periods. Grazing when the soil is too wet causes compaction and thus decreases the stand and vigor of plants. Because of the high potential for frost action, new plantings should be made in early fall or in spring to minimize the damage caused by frost heaving. Deferred grazing during wet periods, pasture rotation, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Logging can be done when the soil is frozen or during drier parts of the year. Mechanical planting, harvesting, and mowing are easily accomplished.

This soil is poorly suited to buildings because of the seasonal high water table. Installing footer drains and waterproofing basement walls help to keep basements dry. The areas around buildings should be graded to keep surface water away from structures.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table and the moderately slow permeability. Enlarging the absorption area improves the capacity of the field to absorb effluent. Perimeter drains help to lower the seasonal high water table.

The land capability classification is IIw. The woodland ordination symbol is 4A. The pasture and hayland suitability group is C-1.

UbC—Upshur silt loam, 8 to 15 percent slopes

This deep and very deep, strongly sloping, well drained soil is on ridgetops. Most areas are long and narrow and range from 5 to 200 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 1 inch thick. The subsoil is about 53 inches thick. The upper part is brown, friable silt loam. The next part is dark red, reddish brown, and weak red, firm silty clay. The lower part is red, mottled, firm silty clay loam. The substratum is dark red, dark reddish gray, black, and grayish brown, firm channery silty clay loam. Soft shale bedrock is at a depth of about 60 inches. In some areas the soil is moderately well drained.

Included with this soil in mapping are small areas of Woodsfield, Gilpin, and Aaron soils. Gilpin soils are moderately deep and have more sand and rock fragments and less clay in the subsoil than the Upshur soil. They generally are in the steeper areas. Woodsfield soils have more silt and less clay in the upper part of the subsoil than the Upshur soil. Aaron soils are moderately well drained. They do not have the dominant red colors in the subsoil. They generally are in landscape positions similar to those of the Upshur soil. Included soils make up about 10 percent of the map unit.

Permeability is slow in the Upshur soil. Available water capability is moderate. Runoff is rapid. The root zone is deep. The shrink-swell potential is high.

Most areas are used as woodland. A few areas are used for cultivated crops. Some areas are used for hay or pasture.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the soil surface and contour stripcropping help to control erosion. The soil becomes compacted and cloddy if it is worked when it is too wet. Limiting tillage when the soil is wet minimizes compaction and cloddiness. In some of the less sloping areas, grassed waterways help to remove excess surface water.

This soil is moderately well suited to hay and well suited to pasture. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. Conservation reseeding practices that leave residue on the surface help to control erosion. Compaction is a hazard if pastures are grazed when the soil is too wet. Proper stocking rates, pasture rotation, limited grazing during wet periods, weed control through mowing, and applications of lime and fertilizer are good management practices.

The soil is moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings.

This soil is moderately well suited to buildings. Widening and backfilling foundation trenches with a more porous material and reinforcing footers and basement walls help to prevent the structural damage caused by shrinking and swelling of the subsoil.

This soil is poorly suited to septic tank absorption fields because of the slow permeability. Enlarging the absorption area or mounding the site with a more permeable material improves the capacity of the field to absorb effluent.

The land capability classification is IVe. The woodland ordination symbol is 3C. The pasture and hayland suitability group is F-5.

UgC2—Upshur-Gilpin complex, 8 to 15 percent slopes, eroded

These strongly sloping soils are on ridgetops. The Upshur soil is deep and very deep and is well drained. The Gilpin soil is moderately deep and well drained. It generally is in the steeper areas. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are about 45 percent Upshur soil and 40 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and narrow and range from 20 to 100 acres in size.

Typically, the Upshur soil has a surface layer of dark yellowish brown, friable silt loam about 6 inches thick. The subsoil is about 45 inches thick. The upper part is yellowish red, firm silty clay loam, and the lower part is weak red and yellowish red, firm silty clay. The substratum is weak red, dark red, dark reddish gray, and olive brown, firm channery silty clay loam. Soft shale and siltstone bedrock is at a depth of about 62 inches. In some areas the soil is moderately well drained.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 5 inches thick. The subsoil is about 26 inches thick. The upper part is yellowish brown, firm silt loam, and the lower part is yellowish brown, firm silty clay loam and loam. Sandstone bedrock is at a depth of about 31 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Included in this unit in mapping are small areas of Aaron, Rarden, and Steinsburg soils. Steinsburg soils have more sand and less silt and clay in the subsoil than the Upshur and Gilpin soils. Aaron and Rarden soils are moderately well drained. Aaron, Rarden, and Steinsburg soils are in landscape positions similar to those of the Upshur and Gilpin soils. Also included are areas of shallow soils on the upper part of some slopes. Included soils make up about 15 percent of the map unit.

Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Available water capacity is moderate in the Upshur soil and low in the Gilpin soil. Runoff is medium on the Gilpin soil and rapid on the Upshur soil. The root zone is deep in the Upshur soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the Upshur soil.

Most areas are used as woodland. Some areas are used for hay or pasture. A few areas are used for cultivated crops.

These soils are poorly suited to corn, soybeans, and small grain. The Upshur soil is subject to severe erosion if it is plowed. It also becomes compacted and cloddy if it is worked when it is too wet. The Gilpin soil is droughty during extended dry periods. It has a moderately deep root zone. A conservation tillage system that leaves crop residue on the surface used in conjunction with contour stripcropping will help to control erosion and increase the rate of water infiltration. Limiting tillage to periods when the soils are at the optimum range of moisture content minimizes the formation of clods and compaction in areas of the Upshur soil.

These soils are well suited to pasture and moderately well suited to hay. Erosion is a severe hazard in areas of the Upshur soil if the soils are plowed during pasture renovation. A system of conservation tillage that leaves residue on the surface should be applied when pastures are renovated and reseeded. The Upshur soil is subject to severe compaction if pastures are grazed when the soil is too wet. Limited grazing during wet periods, proper stocking rates, pasture rotation, weed control through mowing, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Upshur soil. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings. In most areas the bedrock can be ripped with construction equipment.

These soils are moderately well suited to buildings. The depth to bedrock is a limitation on sites for buildings with basements in areas of the Gilpin soil. Reinforcing basement walls and footers and widening and backfilling the foundation trench with suitable porous material help to prevent the structural damage caused by shrinking and swelling in areas of the Upshur soil. Land shaping is necessary in the steeper areas.

These soils are poorly suited to septic tank absorption fields. The slow permeability is a limitation in areas of the Upshur soil, and the depth to bedrock is a limitation in areas of the Gilpin soil. Enlarging the absorption area improves the capacity of the field to absorb effluent in areas of the Upshur soil. Elevating or mounding the site with suitable fill material improves the filtering capacity of the Gilpin soil.

The land capability classification is IVe. The woodland ordination symbol is 3C in areas of the Upshur soil and 4A in areas of the Gilpin soil. The pasture and hayland suitability group is F-5 in areas of the Upshur soil and F-1 in areas of the Gilpin soil.

UgD—Upshur-Gilpin complex, 15 to 25 percent slopes

These deep and moderately deep, moderately steep, well drained soils are on side slopes and ridgetops. The Upshur soil generally is on the less sloping benches but may be on smooth slopes. The Gilpin soil generally is in the steeper areas above and below the Upshur soil. Most areas are about 60 percent Upshur soil and 25 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and continuous over large areas and range from 50 to several hundred acres in size.

Typically, the Upshur soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsurface layer is yellowish brown, friable silt loam about 4 inches thick. The subsoil is about 40 inches thick. The upper part is yellowish red, firm silty clay loam and silty clay, and the lower part is reddish brown, firm silty clay. The substratum is dark reddish gray and light olive brown, very firm channery silty clay loam about 8 inches thick. Siltstone bedrock is at a depth of about 55 inches. In some areas the surface soil contains more than 15 percent rock fragments. In a few areas the soil is moderately well drained.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 2 inches thick. The subsurface layer is dark yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 21 inches thick. The upper part is yellowish brown, firm channery loam, and the lower part is yellowish brown, firm very channery loam. Sandstone bedrock is at a depth of about 28 inches. In a few areas the depth to bedrock is more than 40 inches. In other areas the soil is moderately well drained.

Included in this unit in mapping are small areas of Guernsey, Rarden, and Steinsburg soils. Guernsey and Rarden soils are moderately well drained. They are in landscape positions similar to those of the Upshur and Gilpin soils. Steinsburg soils are moderately deep. They have more sand and less silt and clay in the subsoil than the Upshur and Gilpin soils. They generally are in the steeper areas. Also included are small areas of soils that have slopes of more than 25 percent and small areas of shallow soils on the steeper parts of the map unit. Included soils make up about 15 percent of the map unit.

Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Available water capacity is moderate in the Upshur soil and low in the Gilpin soil. Runoff is rapid on both soils. The root zone is deep in the Upshur soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the Upshur soil.

Most areas are used as woodland. A few areas are used for pasture or hay.

These soils generally are unsuited to corn, soybeans, and small grain because of a severe hazard of erosion in areas of the Upshur soil and because of the slope of both soils. They are moderately well suited to pasture and poorly suited to hay. The moderately steep slopes may limit the use of equipment in some areas. Erosion is a severe hazard in areas of the Upshur soil if the soils are plowed during pasture renovation. No-till farming or another system of conservation tillage that leaves residue on the surface should be applied when pastures are renovated and reseeded. The Upshur soil is subject to severe compaction if pastures are grazed when the soil is too wet. Limited grazing during wet periods, proper stocking rates, pasture rotation, weed control through mowing, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to woodland. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Upshur soil. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard in areas of the Upshur soil. Building haul roads and skid trails on the contour facilitates the use of equipment. Cutting and filling to a more desirable slope will improve sites for log landings. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. In most areas the bedrock can be ripped with construction equipment. Haul roads and log landings should not be located on active slips.

These soils are poorly suited to buildings. The construction of basements may be hindered by the limited depth to bedrock in areas of the Gilpin soil. The high shrink-swell potential and the hazard of slippage are limitations in areas of the Upshur soil. Widening and backfilling the foundation trench with porous material and reinforcing basement walls and footers help to prevent the structural damage caused by shrinking and swelling. Cutting and filling during construction can increase the hazard of slippage. Land shaping may be necessary in some areas, but it can increase the hazard of slippage. Buildings should be designed so that they conform to the natural slope of the land.

These soils generally are unsuited to septic tank absorption fields because of the slow permeability, the slope, and the depth to bedrock.

The land capability classification is VIe. The woodland ordination symbol is 4R on north- and east-facing slopes and 3R on south- and west-facing slopes in areas of the Upshur soil. It is 4R in areas of the Gilpin soil. The pasture and hayland suitability group is F-5 in areas of the Upshur soil and F-1 in areas of the Gilpin soil.

UgE—Upshur-Gilpin complex, 25 to 50 percent slopes

These deep and moderately deep, steep and very steep, well drained soils are on side slopes. The Upshur soil generally is on the less sloping benches but may be on smooth slopes. The Gilpin soil generally is in the steeper areas above and below the Upshur soil. Most areas are about 45 percent Upshur soil and 35 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and continuous over large areas and range from 50 to several hundred acres in size.

Typically, the Upshur soil has a surface layer of very dark grayish brown, friable silt loam about 4 inches thick. The subsoil is about 44 inches thick. The upper part is strong brown, firm silty clay loam. The next part is dark red, firm silty clay and dark red, mottled, firm silty clay. The lower part is dark red and light gray, mottled silty clay. The substratum is light gray, dark red, and light olive brown, very firm channery silty clay loam. Siltstone bedrock is at a depth of about 53 inches. In some areas the upper part of the soil is not so red. In other areas it has more than 15 percent rock fragments. In a few areas the soil is moderately well drained.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsurface layer is yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 25 inches thick. It is yellowish brown, firm silt loam, channery loam, and very channery loam. Sandstone bedrock is at a depth of about 31 inches. In some areas the depth to bedrock is more than 40 inches. In a few areas the soil is moderately well drained.

Included in this unit in mapping are small areas of Guernsey, Rarden, and Steinsburg soils. Guernsey and Rarden soils are moderately well drained. They are in landscape positions similar to those of the Upshur and Gilpin soils. Steinsburg soils are moderately deep. They have more sand and less silt and clay in the subsoil than the Upshur and Gilpin soils. They generally are in the steeper areas. Also included are small areas of soils that have slopes of more than 40 percent, small areas of bedrock escarpments, and areas of shallow soils. The escarpments generally are on side slopes near the Ohio River. The shallow soils are on the upper part of some slopes. Inclusions make up about 20 percent of the map unit.

Permeability is moderate in the Gilpin soil and slow in the Upshur soil. Available water capacity is moderate in the Upshur soil and low in the Gilpin soil. Runoff is rapid on both soils. The root zone is deep in the Upshur soil and moderately deep in the Gilpin soil. The shrink-swell potential is high in the Upshur soil.

Most areas are used as woodland. Some areas are used as pasture.

These soils generally are unsuited to corn, soybeans, small grain, hay, and pasture because of the slope and a severe hazard of erosion. The steep slope may limit the use of equipment when pastures are renovated. If the vegetative cover is removed by overgrazing, the potential for erosion is high. The Upshur soil is subject to severe compaction if pastures are grazed when the soil is too wet. Proper stocking rates, pasture renovation, limited grazing during wet periods, weed control through mowing, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Upshur soil. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard in areas of the Upshur soil. Building haul roads and skid trails on the contour facilitates the use of equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. In most areas the bedrock can be ripped with construction equipment. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Haul roads and log landings should not be located on active slips.

These soils generally are unsuited to buildings and septic tank absorption fields because of the slope. The Upshur soil is also limited by the hazard of slippage, the high shrink-swell potential, and the slow permeability (fig. 9).

The land capability classification is VIIe. The woodland ordination symbol is 4R on north- and east-facing slopes and 3R on south- and west-facing slopes in areas of the Upshur soil. It is 4R in areas of the Gilpin soil. The pasture and hayland suitability group is F-6 in areas of the Upshur soil and F-2 in areas of the Gilpin soil.

UsD—Upshur-Steinsburg complex, 15 to 25 percent slopes

These deep and moderately deep, moderately steep, well drained soils are on side slopes. The Upshur soil generally is on the less sloping benches but may be on smooth slopes. The Steinsburg soil is in the steeper areas. Most areas are about 50 percent Upshur soil and 30 percent Steinsburg soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and continuous and range from 50 to several hundred acres in size.

Typically, the Upshur soil has a surface layer of dark yellowish brown friable silt loam about 6 inches thick. The subsoil is about 37 inches thick. The upper part is reddish brown, firm silty clay loam. The next part is light red and dark reddish brown, firm silty clay. The lower part is dark red, firm channery silty clay. The substratum is dusky red, firm very channery silty clay loam. Shale bedrock is at a depth of about 51 inches. In some areas the upper part of the soil is not so red. In other areas the upper part of the subsoil has more rock fragments. In a few areas the soil is moderately well drained.

Typically, the Steinsburg soil has a surface layer of very dark grayish brown, friable fine sandy loam about 3 inches thick. The subsoil is brownish yellow and yellowish brown, friable sandy loam about 15 inches thick. The substratum is brownish yellow, friable channery sandy loam. Sandstone bedrock is at a depth of about 32 inches. In some areas, the depth to bedrock is more than 40 inches and the subsoil has more clay.

Included in this unit in mapping are small areas of Gilpin, Guernsey, and Rarden soils. Gilpin soils are moderately deep. They do not have red colors in the subsoil. They have more rock fragments and clay in the subsoil than the Steinsburg soil. They generally are in the steeper areas. Guernsey soils are deep and moderately well drained. They are in the less sloping areas and on benches. Rarden soils are moderately deep and moderately well drained. They generally are on slope breaks and in the less sloping areas.

Figure 9.—Road damage caused by soil slippage in an area of Upshur-Gilpin complex, 25 to 50 percent slopes.

Included soils make up about 20 percent of most areas.

Permeability is slow in the Upshur soil and moderately rapid in the Steinsburg soil. Available water capacity is low in the Steinsburg soil and moderate in the Upshur soil. Runoff is rapid on both soils. The root zone is moderately deep in the Steinsburg soil and deep in the Upshur soil. The shrink-swell potential is high in the Upshur soil.

Most areas are used as woodland. A few areas are used for pasture or hay.

These soils generally are unsuited to corn, soybeans, and small grain because of the slope, a high potential for erosion in areas of the Upshur soil, and the droughtiness of the Steinsburg soil. They are poorly suited to hay and moderately well suited to pasture. The moderately steep slopes may limit the use of mechanized equipment in many areas. Erosion is a severe hazard if the soils are plowed during pasture renovation. A system of conservation tillage that leaves crop residue on the surface helps to control erosion. The Upshur soil is subject to severe compaction if pastures are grazed when the soil is too wet. Proper stocking rates, pasture rotation, deferred grazing during wet periods, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Mulching around seedlings reduces the seedling mortality rate. Planting techniques that spread the roots of seedlings and increase soil-root contact reduce the seedling mortality rate in areas of the Upshur soil. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard in areas of the Upshur soil. Building haul roads and skid trails on the contour facilitates the use of equipment. Cutting and filling to a more desirable slope will improve sites for log landings. The bedrock can be ripped with construction equipment. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Haul roads and log landings should not be located on active slips.

These soils are poorly suited to buildings because of the slope of both soils, the high shrink-swell potential and the hazard of slippage in areas of the Upshur soil, and the limited depth to bedrock in areas of the Steinsburg soil. Reinforcing basement walls and footers and widening and backfilling the foundation trenches with porous material help to prevent the structural damage caused by shrinking and swelling. The construction of basements is limited by the depth to bedrock. Land shaping may be necessary. Land shaping or cutting and filling in areas of the Upshur soil may increase the hazard of slippage. Buildings should be designed so that they conform to the natural slope of the land. Diversions may be needed around building sites to help control wetness and the hazard of slippage.

These soils generally are unsuited to septic tank absorption fields because of the slope, the depth to bedrock in areas of the Steinsburg soil, and the slow permeability and the hazard of slippage in areas of the Upshur soil.

The land capability classification is VIe. The woodland ordination symbol is 4R on north- and east-facing slopes and 3R on south- and west-facing slopes. The pasture and hayland suitability group is F-5 in areas of the Upshur soil and F-1 in areas of the Steinsburg soil.

UsE—Upshur-Steinsburg complex, 25 to 50 percent slopes

These well drained, deep and moderately deep, steep and very steep soils are on side slopes. The Upshur soil generally is on the less sloping benches but may be on smooth slopes. The Steinsburg soil is in the steeper areas. Most areas are about 45 percent Upshur soil and 30 percent Steinsburg soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are long and curved and range from 100 to several hundred acres in size.

Typically, the Upshur soil has a surface layer of dark brown, friable silt loam about 5 inches thick. The subsoil is about 38 inches thick. The upper part is yellowish red, firm silty clay loam. The next part is reddish brown, firm silty clay and clay. The lower part is weak red, firm channery clay. The substratum is dusky red and light olive brown, firm very channery silty clay loam. Siltstone bedrock is at a depth of about 49 inches. In some areas the upper part of the soil is not so red. In other areas the upper part of the subsoil has more rock fragments. In a few areas the soil is moderately well drained.

Typically, the Steinsburg soil has a surface layer of very dark grayish brown, friable fine sandy loam about 2 inches thick. The subsoil is about 15 inches thick. It is dark yellowish brown and brownish yellow, friable sandy loam and channery sandy loam. The substratum is brownish yellow, friable very channery sandy loam. Sandstone bedrock is at a depth of about 29 inches. In some areas, the depth to bedrock is more than 40 inches and the subsoil has more clay.

Included in this unit in mapping are small areas of Gilpin, Guernsey, and Rarden soils. Gilpin soils are moderately deep. They are in the steeper areas. Guernsey soils are moderately well drained. They are on benches and in the less sloping areas. Rarden soils are moderately deep and moderately well drained. They are in the less sloping areas and on slope breaks. Also included are areas of soils that have slopes of more than 40 percent. Included soils make up about 25 percent of the map unit.

Permeability is slow in the Upshur soil and moderately rapid in the Steinsburg soil. Available water capacity is low in the Steinsburg soil and moderate in the Upshur soil. Runoff is very rapid on both soils. The root zone is moderately deep in the Steinsburg soil and deep in the Upshur soil. The shrink-swell potential is high in the Upshur soil.

Most areas are used as woodland. A few areas are used as pasture.

These soils generally are unsuited to corn, soybeans, and small grain because of the slope and a severe hazard of erosion in areas of both soils and the droughtiness of the Steinsburg soil. They generally are unsuited to hay and poorly suited to pasture because of the slope and the severe hazard of erosion. The use of equipment is limited by the steep slope, especially in areas of the Steinsburg soil. Erosion is a severe hazard if pastures are overgrazed or the vegetative cover is removed. The Upshur soil is subject to severe compaction if pastures are grazed when the soil is wet. Proper stocking rates, pasture rotation, deferred grazing during wet periods, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Mulching around seedlings reduces the seedling mortality rate. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate in areas of the Upshur soil. The hazard of erosion can be reduced by locating haul roads and skid trails on the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard in areas of the Upshur soil. Building haul roads and skid trails on the contour facilitates the use of equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. Bedrock can be ripped with construction equipment. Special equipment is needed for site preparation and planting. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Haul roads and log landings should not be located on active slips.

These soils generally are unsuited to buildings and septic tank absorption fields because of the slope of both soils; the high shrink-swell potential, the slow permeability, and the hazard of slippage in areas of the Upshur soil; and the depth to bedrock in areas of the Steinsburg soil.

The land capability subclass is VIIe. The woodland ordination symbol is 4R on north- and east-facing slopes and 3R on south- and west-facing slopes. The pasture and hayland suitability group is F-6 in areas of the Upshur soil and F-2 in areas of the Steinsburg soil.

VaC2—Vandalia silt loam, 8 to 15 percent slopes, eroded

This very deep, well drained, strongly sloping soil is on foot slopes at the base of residual hillslopes. It formed in colluvial material. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are long and narrow and range from 5 to 20 acres in size.

Typically, the surface layer is dark yellowish brown, friable silt loam about 7 inches thick. The subsoil is about 62 inches thick. The upper part is yellowish red, firm silty clay loam. The next part is reddish brown, firm channery silty clay. The lower part is red and reddish brown, very channery silty clay and silty clay loam. The substratum to a depth of about 80 inches is dark reddish brown, firm very channery silty clay loam. In some areas the upper part of the subsoil is not so red.

Included with this soil in mapping are small areas of moderately well drained soils on the lower part of some slopes and small areas of Richland soils. These soils do not have the dominant red colors in the subsoil. Richland soils have less clay in the subsoil than the Vandalia soil. They are in scattered areas throughout the unit. Included soils make up about 15 percent of most areas.

Permeability is moderately slow or slow in the Vandalia soil. Available water capacity is moderate. Runoff is rapid. The seasonal high water table is at a depth of 48 to 72 inches during extended wet periods. The root zone is very deep. The shrink-swell potential is high.

Most areas are used as pasture. Some areas are used as woodland. A few areas are used for cultivated crops.

This soil is moderately well suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface used in conjunction with contour stripcropping or crop rotations will help to control runoff and erosion. In some areas grassed waterways help to remove excess runoff from adjoining, steeper areas. In a few areas large sandstone rocks and boulders may limit the use of equipment.

This soil is well suited to hay and pasture. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. Conservation reseeding practices that leave plant residue on the surface help to control runoff and erosion and increase the rate of water infiltration. In a few areas large sandstone rocks may limit the use of equipment. Pasture rotation, proper stocking rates, deferred grazing during extended wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate. The hazard of erosion can be reduced by locating logging roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings. In some areas large sandstone boulders may limit the use of equipment.

This soil is moderately well suited to buildings. The high shrink-swell potential is the main limitation. Widening and backfilling the foundation trench with porous material help to prevent the structural damage caused by shrinking and swelling. A surface drainage system may be needed in some areas to remove excess runoff from adjoining, steeper slopes.

This soil is poorly suited to septic tank absorption fields because of the slow or moderately slow permeability. Enlarging the absorption area or mounding or elevating the site with a more permeable material improves the capacity of the field to absorb effluent.

The land capability subclass is IIIe. The woodland ordination symbol is 4C. The pasture and hayland suitability group is F-5.

VaD2—Vandalia silt loam, 15 to 25 percent slopes, eroded

This very deep, well drained, moderately steep soil is on foot slopes at the base of moderately steep and steep hillsides. It formed in colluvial material. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are long and narrow and range from 5 to 50 acres in size.

Typically, the surface layer is dark brown, friable silt loam about 6 inches thick. The subsoil is about 57 inches thick. The upper part is reddish brown, firm channery silty clay. The next part is reddish brown, firm very channery silty clay. The lower part is reddish brown, firm very channery silty clay loam. The substratum to a depth of about 80 inches is dark reddish brown, firm very channery silty clay. In some areas the upper part of the subsoil has more sand and less clay and may not have the red colors.

Included with the soil in mapping are small areas of moderately well drained soils on the lower part of slopes. These soils do not have the red colors in the subsoil. They make up about 10 percent of most areas.

Permeability is moderately slow or slow in the Vandalia soil. Available water capacity is moderate. Runoff is rapid. The seasonal high water table is at a depth of 48 to 72 inches during extended wet periods. The root zone is very deep. The shrink-swell potential is high.

Most areas are used as woodland. Some areas have been cleared and are used for pasture or hay. A few areas are used for cultivated crops.

This soil is poorly suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed. No-till farming used in conjunction with contour stripcropping will help to control runoff and erosion. In some areas small slips have resulted in a hummocky surface that may limit the use of equipment. In other areas large sandstone boulders may limit the use of equipment.

This soil is moderately well suited to pasture and poorly suited to hay. The slope, the hummocky surface, and the large boulders limit the use of equipment during haying operations. Erosion is a severe hazard if the soil is plowed during pasture renovation. Conservation reseeding practices help to control runoff and erosion during pasture renovation. Grazing when the soil is too wet causes severe compaction and thus decreases the stand and vigor of the plants and increases the runoff rate and the hazard of erosion. Proper stocking rates, deferred grazing during wet periods, pasture rotation, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate. The hazard of erosion can be reduced by establishing logging roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Harvesting procedures that do not leave the remaining trees widely spaced or isolated reduce the windthrow hazard. Applying gravel or crushed stone on haul roads and log landings improves soil strength. Haul roads and log landings should not be located on active slips. Building haul roads and skid trails on the contour facilitates the use of equipment. Cutting and filling to a more desirable slope will improve sites for log landings. Special equipment is needed for site preparation. In some areas large sandstone boulders may limit the use of equipment.

This soil is poorly suited to buildings because of the slope and the high shrink-swell potential (fig. 10). Buildings should be designed so that they conform to

Figure 10.—Vandalia silt loam, 15 to 25 percent slopes, eroded, is poorly suited to dwellings. The cliffs in the background also present a danger of rockfall.

the natural slope of the land. Reinforcing basement walls and footers and widening and backfilling the foundation trench with porous material help to prevent the structural damage caused by shrinking and swelling. The soil is subject to slippage. Land shaping may be needed; however, it should be kept to a minimum because it may increase the hazard of slippage. Cutting and filling during construction also can increase the hazard of slippage.

This soil generally is unsuited to septic tank absorption fields because of the slope and the moderately slow or slow permeability.

The land capability classification is IVe. The woodland ordination symbol is 4R. The pasture and hayland suitability group is F-5.

VnB2—Vincent silty clay loam, 2 to 6 percent slopes, eroded

This very deep, moderately well drained, gently sloping soil is on terraces. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are irregularly shaped and range from 2 to 20 acres in size.

Typically, the surface layer is dark brown friable silty clay loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part is red clay, and the lower part is red, mottled clay and silty clay. The substratum to a depth of about 80 inches is red, mottled silty clay. In a few areas the soil is well drained.

In some areas the lower part of the subsoil has thin layers of sandy material. In other areas the lower part of the subsoil is not so red.

Included with this soil in mapping are small areas of Gallia, Licking, and Omulga soils. These soils are in landscape positions similar to those of the Vincent soil, although the Gallia soils are often in the stronger sloping areas and near the edges of the map unit. Gallia soils are well drained. They have less clay and more sand in the subsoil than the Vincent soil. Omulga soils have more silt and less clay in the subsoil than the Vincent soil. They also have a fragipan. Licking soils do not have the dominant red colors in the subsoil. Included soils make up about 10 percent of most areas.

Permeability is slow in the Vincent soil. Available water capacity is high. Runoff is medium. The seasonal high water table is at a depth of 24 to 48 inches during extended wet periods. The root zone is very deep. The shrink-swell potential is high.

Most areas are used for pasture or cultivated crops. A few areas are used as woodland.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control runoff and erosion. Crop rotations or contour stripcropping helps to control runoff and erosion. Grassed waterways help to remove excess surface water.

This soil is well suited to hay and pasture. Compaction is a problem if pastures are grazed when the soil is too wet. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled be removing vines and the less desirable trees and shrubs. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate. Applying gravel or crushed stone to haul roads and log landings improves soil strength.

This soil is moderately well suited to buildings. The seasonal high water table and the high shrink-swell potential are the main limitations. Widening and backfilling the foundation trench with porous material help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry. A surface drainage system helps to remove excess water from building sites.

This soil is poorly suited to septic tank absorption fields because of the slow permeability and the seasonal high water table. Perimeter drains help to lower the water table. Mounding or elevating the absorption field with a more permeable material and enlarging the absorption area improve the capacity of the field to absorb effluent.

The land capability subclass is IIe. The woodland ordination symbol is 4C. The pasture and hayland suitability group is A-1.

VnC2—Vincent silty clay loam, 6 to 12 percent slopes, eroded

This very deep, moderately well drained, strongly sloping soil is on terraces. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are irregularly shaped and range from 3 to 15 acres in size.

Typically, the surface layer is dark brown, friable silty clay loam about 8 inches thick. The subsoil is about 55 inches thick. The upper part is yellowish red, firm silty clay, and the lower part is red, mottled, firm clay. The substratum to a depth of about 80 inches is red, mottled, firm silty clay. In a few areas the soil is well drained. In some areas the lower part of the subsoil has thin layers of sandy material. In other areas it is not so red.

Included with this soil in mapping are small areas of Gallia, Licking, and Omulga soils. These soils are in landscape positions similar to those of the Vincent soil, although the Gallia soils generally are in the more sloping areas and near the edges of the map unit. Gallia soils are well drained. They have less clay and more sand in the subsoil than the Vincent soil. Licking soils do not have the dominant red colors in the subsoil. Omulga soils have a fragipan in the subsoil. Included soils make up about 10 percent of most areas.

Permeability is slow in the Vincent soil. Available water capacity is high. Runoff is rapid. The seasonal high water table is at a depth of 24 to 48 inches during extended wet periods. The root zone is very deep. The shrink-swell potential is high.

Most areas are used as pasture. Some areas are used for cultivated crops. A few areas are used as woodland.

This soil is moderately well suited to corn, soybeans, and small grain. Erosion is a severe hazard if the soil is plowed. No-till farming or another system of conservation tillage that leaves crop residue on the surface used in conjunction with crop rotations or contour stripcropping will help to control runoff and erosion. In some areas grassed waterways help to control excess surface water.

This soil is well suited to hay and pasture. Erosion is a severe hazard if the soil is plowed during pasture establishment or renovation. Conservation reseeding practices help to control runoff and erosion and increase the rate of water infiltration. Compaction is a hazard if the pasture is grazed when the soil is too wet. Pasture rotation, deferred grazing during wet periods, proper stocking rates, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Mechanical planting, harvesting, and mowing are easily accomplished. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate. Applying gravel or crushed stone to haul roads and log landings improves soil strength. Cutting and filling to a more desirable slope will improve sites for log landings.

This soil is moderately well suited to buildings. The wetness and the high shrink-swell potential are the main limitations. Widening and backfilling the foundation trench with porous material and reinforcing foundations and basement walls help to prevent the structural damage caused by shrinking and swelling. Installing footer drains and waterproofing basement walls help to keep basements dry. In some areas land shaping may be needed.

This soil is poorly suited to septic tank absorption fields because of the slow permeability and the seasonal high water table. Perimeter drains help to lower the water table. Mounding or elevating the absorption area with a more permeable material and enlarging the absorption area improve the capacity of the field to absorb effluent.

The land capability subclass is IIIe. The woodland ordination symbol is 4C. The pasture and hayland suitability group is A-1.

WgD—Westmoreland-Gilpin complex, 15 to 25 percent slopes

These well drained, moderately deep and very deep, moderately steep soils are on side slopes. Most areas are about 40 percent Westmoreland soil and 35 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are small and irregularly shaped and range from 3 to 10 acres in size.

Typically, the Westmoreland soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsoil is about 34 inches thick. The upper part is dark yellowish brown and yellowish brown, friable and firm silt loam, and the lower part is yellowish brown, firm channery silty clay loam. The substratum is yellowish brown, firm extremely channery loam and very channery silty clay loam. Sandstone bedrock is at a depth of about 51 inches. In a few areas the soil is moderately well drained. In other areas the surface soil and the upper part of the subsoil have more rock fragments.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 5 inches thick. The subsoil is about 27 inches thick. The upper part is yellowish brown, firm silt loam, and the lower part is yellowish brown, friable channery and very channery loam. Sandstone bedrock is at a depth of about 32 inches. In a few areas the soil is moderately well drained. In other areas the surface soil and the upper part of the subsoil contain rock fragments.

Included in this unit in mapping are small areas of Guernsey, Rarden, Steinsburg, and Upshur soils. Guernsey and Rarden soils are moderately well drained. Guernsey, Rarden, and Upshur soils generally are on the less sloping benches. They have more clay and less sand in the subsoil than the Westmoreland and Gilpin soils. Steinsburg soils have more sand and less clay in the subsoil than the Westmoreland and Gilpin soils. They are on the steeper parts of the map unit. Included soils make up about 25 percent of most areas.

Permeability is moderate in the Westmoreland and Gilpin soils. Available water capacity is low. Runoff is rapid. The root zone is deep in the Westmoreland soil and moderately deep in the Gilpin soil.

Most areas are used as woodland. A few areas are pastured.

These soils are poorly suited to corn, soybeans, and small grain because of the slope and a severe hazard of erosion. The moderately steep slope limits the use of equipment in some areas. If the soils are plowed, erosion is a severe hazard. A conservation tillage system that leaves crop residue on the surface used in conjunction with contour stripcropping will help to control runoff and erosion and increase the rate of water infiltration.

These soils are moderately well suited to pasture and moderately well suited or poorly suited to hay. The moderately steep slope limits the use of equipment in many areas. Erosion is a severe hazard if the soils are plowed during pasture establishment or renovation. No-till or conservation reseeding practices should be applied. Proper stocking rates, pasture rotation, applications of lime and fertilizer, and weed control through mowing are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Placing haul roads and skid trails on the contour facilitates the use of equipment. In most areas the bedrock is soft and can be ripped with construction equipment. Cutting and filling to a more desirable slope will improve sites for log landings. Special equipment is needed for site preparation and planting.

These soils are poorly suited to buildings because of the slope. The depth to bedrock is an additional limitation in areas of the Gilpin soil. The construction of basements may be hindered by the moderately deep bedrock. Buildings should be designed so that they conform to the natural slope of the land. In some areas land shaping may be necessary.

These soils generally are unsuited to septic tank absorption fields because of the slope. The moderate depth to bedrock is an additional limitation in areas of the Gilpin soil.

The land capability classification is IVe. The woodland ordination symbol is 4R. The pasture and hayland suitability group is A-2 in areas of the Westmoreland soil and F-1 in areas of the Gilpin soil.

WgE—Westmoreland-Gilpin complex, 25 to 40 percent slopes

These moderately deep and deep, well drained, steep soils are on side slopes. Most areas are about 40 percent Westmoreland soil and 35 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are small and irregularly shaped and range from 3 to 15 acres in size.

Typically, the Westmoreland soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsoil is about 29 inches thick. The upper part is dark yellowish brown and yellowish brown, friable and firm silt loam. The lower part is strong brown, firm channery silty clay loam. The substratum is strong brown, firm very channery silty clay loam. Sandstone bedrock is at a depth of about 42 inches. In a few areas the soil is moderately well drained. In other areas the surface layer and the upper part of the subsoil have more rock fragments.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsoil is about 30 inches thick. The upper part is yellowish brown, firm silt loam and channery loam, and the lower part is brownish yellow, firm very channery loam. Sandstone bedrock is at a depth of about 33 inches. In a few areas the soil is moderately well drained. In other areas the surface soil and the upper part of the subsoil have more rock fragments.

Included in this unit in mapping are small areas of Guernsey, Rarden, Steinsburg, and Upshur soils. Rarden and Guernsey soils are moderately well drained. Guernsey, Rarden, and Upshur soils generally are on the less sloping benches. They have more clay and less sand in the subsoil than the Westmoreland and Gilpin soils. Steinsburg soils have more sand and less clay in the subsoil than the Westmoreland and Gilpin soils. They are on the upper part of some slopes. Inclusions make up about 25 percent of most areas.

Permeability is moderate in the Westmoreland and Gilpin soils. Available water capacity is low. Runoff is rapid. The root zone is deep in the Westmoreland soil and moderately deep in the Gilpin soil.

Most areas are in woodland. A few areas are pastured.

These soils generally are unsuited to corn, soybeans, and small grain because of the slope and a severe hazard of erosion. They are also generally unsuited to hay because of the slope. They are poorly suited to pasture. The steep slope limits the use of equipment during pasture establishment or renovation. Erosion is a severe hazard if the soils are plowed or if the pastures are overgrazed. Proper stocking rates, pasture rotation, mowing for weed control, and applications of lime and fertilizer are good management practices.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of erosion can be reduced by locating haul roads and skid trails on or near the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Placing haul roads and skid trails on the contour facilitates the use of equipment. In most areas the bedrock can be ripped with construction equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. Special equipment is needed for site preparation and planting.

These soils are poorly suited to buildings because of the slope. The depth to bedrock is an additional limitation in areas of the Gilpin soil. The construction of basements may be hindered by the moderately deep bedrock. Buildings should be designed so that they conform to the natural slope of the land. In most areas extensive land shaping may be necessary.

These soils generally are unsuited to septic tank absorption fields because of the slope of both soils and the depth to bedrock in areas of the Gilpin soil.

The land capability classification is VIe. The woodland ordination symbol is 4R. The pasture and hayland suitability group is A-3 in areas of the Westmoreland soil and F-2 in areas of the Gilpin soil.

WgF—Westmoreland-Gilpin complex, 40 to 70 percent slopes

These moderately deep and deep, very steep, well drained soils are on side slopes. Most areas are about 40 percent Westmoreland soil and 35 percent Gilpin soil. The soils occur as areas so intricately mixed or so small in size that it was not practical to map them separately. Most areas are small and irregularly shaped and range from 3 to 15 acres in size.

Typically, the Westmoreland soil has a surface layer of dark brown, friable silt loam about 2 inches thick. The subsoil is about 28 inches thick. The upper part is dark yellowish brown, friable silt loam. The next part is yellowish brown, firm silt loam. The lower part is strong brown, firm channery silty clay loam. The substratum is yellowish brown, firm extremely channery silt loam. Sandstone bedrock is at a depth of about 41 inches. In a few areas the soil is moderately well drained. In other areas the surface soil and the upper part of the subsoil have more rock fragments.

Typically, the Gilpin soil has a surface layer of dark brown, friable silt loam about 2 inches thick. The subsoil is about 29 inches thick. The upper part is yellowish brown, firm silt loam, and the lower part is yellowish brown, firm channery silt loam and channery loam. Sandstone bedrock is at a depth of about 31 inches. In a few areas the soil is moderately well drained. In other areas the surface layer and the upper part of the subsoil have more rock fragments.

Included in this unit in mapping are small areas of Guernsey, Rarden, Steinsburg, and Upshur soils. Guernsey and Rarden soils are moderately well drained. Guernsey, Rarden, and Upshur soils generally are on the less sloping benches. They have more clay and less sand in the subsoil than the Westmoreland and Gilpin soils. Steinsburg soils have more sand and less clay in the subsoil than the Westmoreland and Gilpin soils. They are on the upper part of some slopes. Included soils make up about 25 percent of most areas.

Permeability is moderate in the Westmoreland and Gilpin soils. Available water capacity is low. Runoff is very rapid. The root zone is deep in the Westmoreland soil and moderately deep in the Gilpin soil.

Most areas are used as woodland. A few areas are pastured. These soils generally are unsuited to corn, soybeans, small grain, hay, and pasture because of the slope.

These soils are moderately well suited to trees. North- and east-facing slopes are the best woodland sites because they are not so exposed to the drying effects of the sun and the prevailing winds. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. The hazard of erosion can be reduced by locating haul roads and skid trails on the contour, establishing water bars, establishing vegetative cover, or applying other erosion-control practices. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Placing haul roads and skid trails on the contour facilitates the use of equipment. In most areas the bedrock can be ripped with construction equipment. Less sloping areas, which generally are nearby, should be selected as sites for log landings. Special equipment is needed for site preparation and planting.

These soils generally are unsuited to buildings and septic tank absorption fields because of the slope of both soils and the depth to bedrock in areas of the Gilpin soil.

The land capability classification is VIIe. The woodland ordination symbol is 4R. The pasture and hayland suitability group is H-1.

WoB—Woodsfield silt loam, 2 to 6 percent slopes

This deep and very deep, gently sloping, well drained soil generally is on ridgetops. It is on benches in a few areas. Most areas are irregularly shaped and range from 5 to 15 acres in size.

Typically, the surface layer is dark yellowish brown, friable silt loam about 8 inches thick. The subsoil is about 41 inches thick. The upper part is strong brown, friable silty clay loam, and the lower part is yellowish red and dusky red, firm clay and silty clay. Soft siltstone bedrock is at a depth of about 49 inches.

Included with this soil in mapping are small areas of Upshur soils. These soils have less silt and more clay in the subsoil than the Woodsfield soil. They are in scattered areas throughout the unit. They make up about 5 percent of most areas.

Permeability is moderate in the upper part of the Woodsfield soil and slow in the lower part. Available water capacity is moderate. Runoff is medium. The root zone is deep. The shrink-swell potential is high in the lower part of the subsoil.

Most areas are used for hay or pasture. Some areas are used as woodland or for cultivated crops.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard if the soil is plowed. A conservation tillage system that leaves crop residue on the surface or conventional tillage practices used in conjunction with crop rotations or contour stripcropping will help to control erosion. Grassed waterways help to remove excess surface water.

This soil is well suited to pasture and hayland. Compaction is a hazard if pastures are grazed when the soil is too wet. Proper stocking rates, pasture rotation, deferred grazing during wet periods, applications of lime and fertilizer, and weed control through mowing are good management practices.

This soil is moderately well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting procedures that do not leave the remaining trees isolated or widely spaced reduce the windthrow hazard. Planting techniques that spread the roots of seedlings and increase the soil-root contact reduce the seedling mortality rate. Applying gravel or crushed stone to haul roads and log landings improves soil strength.

This soil is well suited to buildings. Widening and backfilling the foundation trench with porous material and reinforcing footers and basement walls help to prevent the structural damage caused by shrinking and swelling.

This soil is poorly suited to septic tank absorption fields because of the slow permeability in the lower part of the subsoil. Enlarging the absorption area or mounding or elevating the field with a more permeable material improves the capacity of the field to absorb effluent.

The land capability classification is IIe. The woodland ordination symbol is 4C. The pasture and hayland suitability group is A-1.

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 to prevent soil-related failures in land uses.

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

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the 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.

The soils in the survey area are assigned to various interpretive groups at the end of each map unit description and in some of the tables. The groups for each map unit also are shown under the heading "Interpretive Groups," which follows the tables at the back of this survey.

Crops and Pasture

John Rice, county extension agent, Agricultural Extension Service, and Michael R. Duhl, district conservationist, Natural Resources Conservation Service, helped to prepare this section.

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

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

In 1987, about 102,000 acres in Meigs County, or nearly 37 percent of the total acreage, was used as farmland (Carter and Matthews 1988). This acreage included about 26,000 acres of cropland. Of this cropland, 4,600 acres was used for corn, 18,800 acres for hay, and less than 1,000 acres each for wheat, oats, and soybeans. The balance of the cropland was primarily used for the production of fresh vegetables. There are also two fruit orchards in the county.

The major management concerns on cropland and pasture in the county are water erosion, drainage, droughtiness, fertility, and tilth. These concerns are described in the following paragraphs.

Water erosion is the major management concern on most of the cropland and pasture in the county. It can result in the removal of the surface layer of the soil. The surface layer has received most of the residue from the native and cultivated plants that have grown on the soil in the past. The addition of this residue results in a higher organic matter content in the surface layer than in the rest of the soil. The organic matter is responsible for the darker color of the surface layer. Because of its higher organic matter content, the surface layer is capable of storing and releasing more available water and plant nutrients than other layers of the soil. Thus, loss of the surface layer considerably reduces the nutrient-supplying capacity of the soil.

The subsoil of the Upshur, Guernsey, and Aaron soils and of many other soils in the county has a higher clay content than the surface layer. If the surface layer is eroded, the plow layer contains a considerable amount of the more clayey subsoil material. As a result, tillage is difficult, tilth is poor, and a seedbed cannot be easily prepared.

Erosion also reduces the depth to root-restricting layers, thus reducing the volume of soil available for root development. The growth of roots is restricted by a fragipan in the Omulga and Doles soils and by the moderately deep bedrock in the Gilpin, Rarden, and Steinsburg soils.

Erosion-control practices help to maintain the productive capacity of the soil. Conservation tillage systems, stripcropping, crop rotations, crop residue management, and grassed waterways are all effective in reducing soil erosion.

Conservation tillage systems that leave crop residue on the surface are effective in controlling erosion. These systems control erosion by reducing the amount of bare soil subject to raindrop impact and the flow of runoff. They are suited to smooth and irregular slopes. On the wetter soils, such as Taggart soils, a good drainage system may be needed for conservation tillage to be most effective. Contour stripcropping and grassed waterways also can be used in conjunction with conservation tillage systems to further reduce the susceptibility of the soils to erosion.

Contour stripcropping is used in a few areas of the county. It is best suited to areas that have uniform, smooth slopes of less than 25 percent. The alternating strips of cultivated crops and hay reduce the total amount of bare soil, disrupt the flow of runoff, and thus help to control runoff and erosion. The irregular topography of much of Meigs County prevents the application of this system.

Management of crop residue and a crop rotation that includes forage crops are more applicable to the topography of Meigs County. The topography of the county, especially on side slopes, is dominated by a series of less sloping benches separated by steeper slopes. Returning crop residue to the soil helps to control erosion by reducing the impact of raindrops on the surface. Forage crops help to control erosion by reducing the rate of runoff. The applicability of forage as an erosion-control measure depends on a large extent to the type of farming enterprise.

Grassed waterways can be established in areas of less than 12 percent slope where runoff tends to collect and flow, especially if these areas are elongated. Gullies can form in these areas, particularly if the areas are bare. Grassed waterways can be established in these areas to collect and remove excess surface water in a controlled manner, thus reducing soil erosion.

Many acres of pasture in the county are subject to erosion. Many of the pastures are in moderately steep or steep areas where runoff is rapid. Maintenance of a thick sod cover is the key to controlling erosion on these pastures. Overgrazing or grazing when the soils are too wet reduces the extent of the sod cover and increases the rate of runoff and the hazard of erosion. Applying lime and fertilizer and mowing to control weeds increase the density of the stand and thus help to control runoff and erosion. Applying conservation seeding practices when pastures are renovated helps to keep soil loss to a minimum.

Drainage is not a major concern on most of the soils in the county; however, a few soils, such as Taggart, Orrville, and Newark soils, would benefit from a drainage system. Very little oxygen is available in soils saturated with water. Most plant roots do not grow well without oxygen. Also, wet soils remain cold in spring and limit the use of farm machinery. Pastures may be compacted by livestock, reducing plant stand and vigor, if the soils are grazed when they are wet. The wetness may limit the species that can be selected for planting. For example, alfalfa and winter wheat generally do not grow well on wet soils and should not be selected for planting.

Many of the naturally wet soils are highly productive if they have been adequately drained. The natural wetness has inhibited the oxidation of the organic matter, and as a result, the surface layer has a higher nutrient- and water-supplying capacity than many well drained soils.

Each soil in the county is assigned to a drainage class. For example, Wheeling soils are well drained, Guernsey soils are moderately well drained, and Taggart soils are somewhat poorly drained. The drainage classes are based on the frequency and duration of periods of saturation by the seasonal high water table. The classes are determined by the depth to the water table under natural conditions. They do not relate to the adequacy of the drainage system.

The few wet soils in Meigs County are permeable enough that they can be adequately drained by a properly designed and installed subsurface drainage system. In some areas suitable outlets are not available. Doles soils do not lend themselves to a subsurface drainage system because they have a fragipan.

Droughtiness is a concern on Conotton, Lakin, Pinegrove, and Steinsburg soils, which have a low or very low available water capacity. Pinegrove soils generally are not used for cropland or pasture, although a few reclaimed areas of Pinegrove soils are grazed. Lakin and Conotton soils are droughty because they have a high content of sand or sand and gravel; however, they are in the Ohio River valley where irrigation water is generally available. Many of the droughty soils are suited to conservation tillage systems that leave crop residue on the surface. The crop residue conserves moisture by increasing the water-holding capacity of the surface layer, reducing the runoff rate, and increasing the rate of water infiltration.

The effects of drought are more evident in pastured areas than in cultivated areas. Pastures generally are in the more sloping areas, which tend to be drier and where the grasses grow very slowly during the dry part of the year. The growth rates can be increased by renovating the pastures with species that can withstand the droughtiness. These species include orchardgrass, alfalfa, big bluestem, and other varieties of warm-season grasses.

Fertility is affected by the content of plant nutrients, lime, and organic matter in the soil. Measures that help to maintain fertility are needed on all of the soils in the county, regardless of other problems. The productivity of a soil depends on natural fertility, past use and management, and the long-term fertility history. These factors differ widely from farm to farm, even on the same soil. A regular program of soil testing is needed to determine the amount and kind of fertilizer to be applied.

The amount and kind of fertilizer to be applied can differ widely among types of soils. Soils that have a high content of clay or organic matter, such as Upshur or Taggart soils, have a high capacity to store and release plant nutrients. Soils that have a low content of clay and organic matter, such as Lakin soils, have a low capacity to store and release plant nutrients. If the soil is very acid, much of the phosphate fertilizer applied combines with iron and aluminum and is not available to plants. Earthworms, which incorporate plant residue into soils, are more active if soil reaction is near neutral. Their activity results in better soil structure and a higher content of organic matter.

Additions of organic material are very beneficial on most of the soils in the county. Organic matter, which is a very good source of nitrogen, improves soil structure and tilth. It also has a capacity to store and release plant nutrients. As a result, additions of organic matter improve the ability of the soil to provide nutrients to crops. Organic matter is especially effective in restoring the productivity of soils in severely eroded spots.

Tilth is an important factor affecting the germination of seeds and the infiltration of water into soils. Soils that have good tilth are granular and porous.

Most of the soils used as cropland in Meigs County have a surface layer of silt loam. Because of the relatively weak structure and high content of silt, a crust tends to form on the surface of many of the soils after periods of heavy rainfall. This crust, which is hard when dry, reduces the rate of water infiltration, increases the runoff rate, and hinders the emergence of seedlings.

Most of the soils in the county are not suited to plowing in the fall because of the increased susceptibility to erosion and crusting. Leaving crop residue on the surface helps to prevent excessive crusting. Regular additions of crop residue, manure, and other organic material also reduce the susceptibility of the soils to crusting and improve soil structure.

Some soils that have a high content of clay in the surface layer, such as Vincent silty clay loam, are sticky when wet. If these soils are worked when they are wet, soil particles stick together and form into clods. The surface layer of eroded soils generally is more susceptible to clodding because of the higher content of clay. Additions of organic matter help to maintain or improve tilth.

Pasture and Hayland Suitability Groups

Table 5 can be used by farmers, farm managers, conservationists, and extension agents in planning the use of soils for pasture and hay crops. Soils that have a slope of more than 25 percent generally are not suited to pasture or hay.

The soils in the county are assigned to pasture and hayland suitability groups. The suitability groups are based on soil characteristics and limitations that affect the growth of hay and pasture. They are listed in the table and at the end of each detailed soil map unit. Soils that are assigned the same suitability group symbol require the same general management and have about the same potential productivity. Detailed interpretations for each pasture and hayland suitability group in the county are provided in the “Technical Guide,” which is available in the local office of the Natural Resources Conservation Service.

The soils in group A have few limitations affecting the management and growth of climatically adapted plants. Those in group A-1 are deep or very deep and are well drained. They generally have a surface layer of loam, silt loam, or silty clay loam. The available water capacity is moderate or high. Slopes range from 0 to 12 percent.

The soils in group A-2 are deep or very deep and are well drained. They have a surface layer of loam or silt loam. The available water capacity is moderate. Slopes range from 18 to 25 percent. In some areas the moderately steep slopes limit the use of equipment. The hazard of erosion increases on the moderately steep slopes if pastures are overgrazed or cultivated for reseeding. Conservation reseeding practices should be used during pasture establishment and renovation.

The soils in group A-3 are deep or very deep and are well drained or moderately well drained. They have a surface layer of silt loam. The available water capacity is moderate. Slopes range from 25 to 40 percent. The steep slope is a severe limitation affecting the use of equipment. These soils generally are unsuited to hay and poorly suited to pasture.

The soils in group A-5 are very deep and well drained. They are on flood plains and are subject to frequent flooding. The flooding limits the use of these soils during periods of stream overflow, and the deposition of sediment by floodwater lowers the quality of the forage. These soils have a surface layer of silt loam. The available water capacity is high. Slopes are 0 to 2 percent (fig. 11).

The soils in group A-6 are deep or very deep and are well drained or moderately well drained. They are subject to frost action, which can damage legumes

Figure 11.—Chagrin silt loam, frequently flooded, which is assigned to pasture and hayland suitability group A-5, is well suited to pasture and hayland. The house and garage are in an area of Gallipolis silt loam, 2 to 6 percent slopes, and the barn is in an area of Upshur-Gilpin complex, 25 to 50 percent slopes.

Mixing fibrous-rooted grasses with legumes and applying a properly designed grazing system minimize the damage caused by frost action. These soils have a surface layer of silt loam. The available water capacity is moderate or high. Slopes range from 0 to 25 percent.

The soils in group B are limited by droughtiness. Those in group B-1 are very deep and well drained. They have a surface layer of gravelly loam or loamy fine sand and a subsoil that is sandy or sandy skeletal. The available water capacity is low. Slopes range from 0 to 18 percent.

The soils in group B-2 are very deep and well drained. They have a surface layer of gravelly loam or loamy fine sand and a subsoil that is sandy or sandy skeletal. The available water capacity is low. Slopes range from 18 to 40 percent. Areas that have slopes of more than 25 percent generally are unsuited to hay and poorly suited to pasture. The steep slopes limit the use of equipment.

The soils in group C generally are wet because they have a high water table or are saturated during the growing season. Those in group C-1 are very deep and somewhat poorly drained. They have a surface layer of silt loam. The available water capacity is high. The soils in group C-1 respond well to subsurface drainage systems. Slopes range from 0 to 2 percent.

The soils in group C-2 are very deep and somewhat poorly drained. They have a surface layer of silt loam. The available water capacity is low. The effectiveness of subsurface drainage systems is limited by a fragipan in the soils. Slopes range from 0 to 2 percent.

The soils in group C-3 are very deep and somewhat poorly drained. They are subject to frequent flooding. The flooding limits the use of these soils during periods of stream overflow, and the deposition of sediment by floodwater lowers the quality of the forage. These soils have a surface layer of silt loam. The available water capacity is high. Slopes range from 0 to 2 percent.

The soils in group F have a root zone that is only 20 to 40 inches deep. Those in group F-1 are moderately deep and are well drained or moderately well drained. They have a surface layer of silt loam or fine sandy loam. The available water capacity is low or very low. Slopes range from 3 to 25 percent.

The soils in group F-2 are moderately deep and are well drained or moderately well drained. They have a surface layer of silt loam or fine sandy loam. The available water capacity is low or very low. Slopes range from 25 to 50 percent. The steep slopes limit the use of equipment. These soils generally are unsuited to hay and poorly suited to pasture.

The soils in group F-3 are moderately deep and moderately well drained. The root zone is restricted by a fragipan. They have a surface layer of silt loam. The available water capacity is low. Slopes range from 2 to 12 percent.

The soils in group F-5 are deep or very deep and are well drained. Rooting depth is restricted because the soils have a high content of clay or high bulk density in the subsoil. These soils have a surface layer of silt loam. The available water capacity is moderate. Slopes range from 2 to 25 percent.

The soils in group F-6 are deep or very deep and are well drained. Rooting depth is restricted because the soils have a high content of clay or high bulk density in the subsoil. These soils have a surface layer of silt loam. The available water capacity is moderate. Slopes range from 25 to 50 percent. The steep slopes limit the use of equipment. These soils generally are unsuited to hay and poorly suited to pasture.

The soils in group G have unfavorable chemical properties that affect many of the climatically adapted plants. Those in group G-1 are well drained. They are shallow to toxic spoil from surface mine operations. They have a surface layer of silty clay loam. The available water capacity is low. Slopes range from 0 to 25 percent.

The soils in group H are not suited to pasture and hay. Those in group H-1 are toxic or are on slopes of more than 40 percent.

Vegetable Production

Growing vegetables for the fresh pick market is the second leading agricultural enterprise in Meigs County. Vegetables are grown commercially throughout the county, but most are grown on the outwash terraces along the Ohio River or on a few large Teays-age terrace remnants near the Ohio River. Most are grown in areas of the Cidermill, Conotton, Lakin, Gallipolis, and Omulga soils.

A wide variety of soils are used for vegetable crops. The most desirable soils for growing vegetables are well drained, deep, and fertile; have the proper pH and good soil structure; and are subject to minimal crusting. Soils that have good structure permit maximum penetration of roots, water, and air. Crusting is a serious problem in some areas of the county. Sandy or loamy soils that have a good content of organic matter generally are the best soils for vegetable production. The content of organic matter in mineral soils should range from 3 to 5 percent if the soils are to have good structure, readily available nutrients, and an enhanced water-holding capacity.

Fields should be adequately drained if they are selected for the production of vegetables. Applications of lime and fertilizer should be applied according to the results of soil tests. If compaction is a problem, planting a deep-rooted legume or sod crop may be necessary. If perennial and annual weeds have been a problem in the fields in the past, measures should be taken to control or prevent the growth of weeds prior to planting the vegetable crops.

Cover crops planted after harvest help to protect the soils against erosion. They generally are turned under in the following spring. Applications of nitrogen may be necessary to hasten the decomposition of the cover crops, especially if rye is planted. Rye should be plowed under before the plants are 18 inches tall.

Different cover crops frequently require special soil conditions for optimum growth. For example, alfalfa grows best when planted in areas of well drained soils, while ladino clover grows best when planted in areas of poorly drained soils. Some crops, such as rye, have a fibrous root system, whereas other crops, such as sweet clover, have a large taproot that can penetrate the soil to a considerable depth. Planting a combination of these crops results in more organic matter to be plowed under.

Before investing in an irrigation system, consideration should be given to a number of factors. Good tilth, availability of organic matter, and weed control are necessary for vegetables to benefit from irrigation (fig. 12). Crops grown on sandy soils generally show greater response to irrigation than crops grown on medium textured or fine textured soils that hold moisture.

Good drainage is very important for successful irrigation. Tile and surface drainage should be installed before the irrigation system is installed to avoid crop damage. Generally, a well yield or stream flow of 6 to 15 gallons per minute per acre is required for irrigation.

Where a farm pond is the water source, 1.0 to 1.5 acre-feet of water should be stored for each acre to be irrigated. When an irrigation well is to be drilled, the ODNR Division of Water, Fountain Square,

Figure 12.—An irrigated area of Cidermill silt loam, 0 to 2 percent slopes, used for tomatoes.

Columbus, Ohio, should be contacted to determine if an adequate supply of ground water is available.

Irrigation is not a substitute for other cultural practices. The water must be applied in the right amount, at the right time, and at the proper rate. There are many management decisions involved in irrigation, including soil texture, soil structure, crop rotation patterns, and the amount of water needed by different crops.

Trickle irrigation is combined with the use of plastic mulch for several reasons: economy of water use, less energy required for pumping, less wetting of the leaf surface, a uniform supply of moisture, and application of fertilizers and certain insecticides and fungicides.

Either clear plastic or black plastic is used for plastic mulch. Clear plastic is used to warm the soil, primarily for early crop production, but it does not control weeds. Black plastic provides weed control and is used with several warm-season crops. An advantage of plastic mulch is that it provides an even supply of moisture.

Yields per Acre

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

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

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

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

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

Land Capability Classification

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

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA 1961). Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by 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 hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

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

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

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture (U.S. Congress 1978). It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 36,512 acres in the survey area, or nearly 13 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are on the outwash terraces along the Ohio River. The rest of the areas generally are on terraces or flood plains, but a few areas are on ridgetops.

A recent trend in land use in some parts of the survey area, particularly on bottoms along the Ohio River, has been the irreversible loss of some prime farmland to industrial uses, most notably to sand and gravel operations. The loss of prime farmland to these uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 8. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Use and Management of Disturbed Lands

By 1989, about 5,742 acres of land in Meigs County had been affected by surface mining. The vast majority of this land was mined prior to the 1972 Ohio reclamation law. It generally consists of graded and ungraded ridges and spoil piles in areas where no soil material has been replaced. The soils in these areas are mapped as Pinegrove soils.

The legislation enacted in 1972 required the restoration of all land mined in the future. The land must be restored to the approximate original contour and blanketed with topsoil and subsoil from natural soils. Each soil type in the county is assigned a suitability rating as a source for borrow material for use in reclamation of these mined areas. The rating system is described in the engineering section of this survey report, and the suitability for use of each soil is given in table 17. The Pinegrove silty clay loams were reclaimed by this technique. They make up about 1,371 acres in Meigs County. They are better suited to agricultural production than unreclaimed mined land, but they still have severe limitations that need to be overcome.

The current law requires that soils identified as prime farmland be replaced in a natural sequence to a depth of as much as 48 inches. Most soils in surface mined areas do not meet the requirements for prime farmland. As a result, most of the mined land is being reclaimed with a minimum of 6 inches of soil material overlying the spoil.

Soil properties should be considered in managing these soils. The organic matter content is considerably lower in surface mined soils than in natural soils. In some cases, the use of heavy machinery during reclamation may cause high bulk density in the reclaimed soil. The high bulk density is most often caused by excessive handling of stockpiled soil material, reclamation activities undertaken during unfavorable moisture conditions, and the use of heavy, rubber-tired equipment. It reduces the water-holding capacity and retards plant growth. In Meigs County the spoil material is generally sandy and not so susceptible to compaction; however, the resoiling material is often moderately fine textured and is very susceptible to compaction.

Typically, the content of rock fragments in the Pinegrove soils is not high enough to limit rooting depth or available water capacity. The sandy textures of the spoil are less susceptible to compaction; however, they also decrease the available water capacity. Reaction is extremely acid in the Pinegrove soils. The extremely acid spoil and the low water-holding capacity are the major limitations to plant growth on these soils.

Planting suitable forage species increases the organic matter content, improves soil structure, reduces bulk density, and increases the water infiltration rate, pore space, and root growth in formerly mined soils. Forage species are better soil-building crops than row crops. They are also more effective in reducing runoff and erosion. Conservation reseeding practices that leave plant residue on the surface reduce the runoff rate and help to control erosion during pasture renovation.

The majority of soils in reclaimed areas in Meigs County have a surface layer of silty clay loam. This surface layer is subject to compaction if pastures are grazed when the soils are wet. The hazard of erosion is severe in these areas if pastures are overgrazed. Deferment of grazing when the soils are wet and a controlled grazing system help to overcome these limitations.

The extremely acid nature of the Pinegrove soils requires frequent applications of lime to help maintain plant stand and vigor. Applications of fertilizer should be frequent and light because the soils have a low nutrient-holding capacity. Large applications of fertilizers are inefficient because most of the nutrients would be lost through runoff.

Woodland

Woodland is an important land use in Meigs County. In 1979, about 157,800 acres, or nearly 57 percent of the county was wooded (USDA 1984). The woodland acreage consists mainly of privately owned woodlots. Shade River State Forest, which is in the northeastern part of the county, has 2,475 acres of woodland. Most of the forest land is on slopes of 8 to 50 percent in areas of the Upshur and Gilpin soils (fig. 13), but it is on all soil types and in all landform positions in the county.

Meigs County is located in the central hardwood forest region. The dominant tree species are oak, hickory, ash, sugar maple, black cherry, beech, and native conifers. Pine plantations are also common. In recent years the acreage of forest land has grown as abandoned farmland slowly reverts back to woodland.

In places the woodland shows the results of mismanagement from poor harvesting practices, grazing by livestock, and fire. High grading has removed many of the best trees and left less desirable, damaged, and diseased trees, which take up valuable space on excellent woodland soils. Grazing livestock can cause severe long-term erosion in forests as leaf litter and understory vegetation are destroyed. Grazing also causes soil compaction and damages root systems. The resulting loss of ground cover coupled with increased soil compaction increases runoff and erosion. In most wooded areas good management practices, such as removing grapevines and fencing out livestock, can restore the woodland to a higher level of production.

Soils differ greatly in their productivity as woodland (Carmean 1967). The factors that influence the growth of trees are almost the same as those that influence the production of crops and forages. The major difference is tree roots extend deeper into the soil, especially around rock fragments in the lower part of the soil. The direction of exposure, or aspect, and the position of the soil on the landscape are also important. Other factors to consider are slope, erosion, acidity, and the fertility level.

Aspect is the direction a slope faces. Trees grow better on east- and north-facing aspects because they are not so exposed to the prevailing winds and the sun and because soil moisture is more abundant. South- and west-facing aspects are less suited to woodland because of the higher soil temperatures resulting from

Figure 13.—A small landslip in a wooded area of Upshur-Gilpin complex, 25 to 50 percent slopes.

more direct sunlight, a high rate of evaporation, earlier snowmelt, and a greater degree of freezing and thawing.

The position of the soil on the landscape is important in determining the moisture supply. The supply of soil moisture increases as elevation decreases partly because of downslope seepage. Also, the soils on the lower parts of the slopes tend to be deeper than those on the upper parts, lose less moisture through evaporation, and have a somewhat lower temperature.

The slope is an important factor in woodland management. Steep and very steep slopes are serious limitations affecting the use of equipment. As the slope increases, the rate of water infiltration decreases and the rate of runoff and the hazard of erosion increase.

Erosion reduces the volume of soil available for water storage. Severe erosion removes the surface layer and exposes the subsoil. Because the subsoil is usually less porous, the runoff rate increases and the rate of water infiltration decreases. Both tree growth and natural reseeding are adversely affected.

Soil fertility and reaction have the same effect on woodland as they do on any other crop. Tree growth is better on soils that have a favorable degree of reaction and a high level of natural fertility.

Woodland Management and Productivity

Table 9 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

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

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

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

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

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

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

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

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

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

Trees to plant are those that are suitable for commercial wood production.

Woodland Harvesting and Regeneration Activities

Table 10 gives the degree and kinds of limitations that affect the operation of equipment used in tree harvesting and in the regeneration of woodland. Ratings are given for haul roads, log landings, skid trails and logging areas, and site preparation and planting. The limitations are considered *slight* if the physical site characteristics impose little or no limitations on the kind of equipment or the time of operation; *moderate* if the physical site characteristics impose some limitations on the kind of equipment or the time of operation, or both; and *severe* if the physical site conditions are such that special equipment or special logging techniques are needed or the time of efficient operation is very limited.

Haul roads are access roads leading from log landings to primary or surfaced roads. Generally, these are unpaved roads that have not been graveled. The ratings are based on soil properties, site features, and observed performance of the soils. Wetness, rockiness, depth to hard bedrock, stoniness, soil strength, slope, soil texture, and flooding should be considered when selecting routes for haul roads. Wetness and flooding affect the duration of use. Rock outcrops, stones, and boulders, which are difficult to move, hinder the construction when cutting and filling are needed. Soil strength, as inferred from the AASHTO group index and AASHTO group, is a measure of the traffic-supporting capacity of the soil. Slope affects the use of equipment and the cutting and filling requirements of the site.

Log landings are areas where logs are assembled for transportation. The best sites for landings require little or no surface preparation, which consists of cutting or filling. Considerable soil compaction can be expected in these areas. The ratings are based on the soil properties, site features, and observed performance of the soils. Wetness, flooding, rockiness, stoniness, slope, depth to hard bedrock, soil strength, soil texture, and content of rock fragments should be considered when selecting sites for log landings. Wetness and flooding affect the duration of use. Rock outcrops, stones, and boulders, which are difficult to move, limit the use of equipment and affect the configuration and location of landings. Depth to hard bedrock is a problem where cutting and filling are required. Slope affects the use of equipment and the cutting and filling requirements of the site. Soil texture affects trafficability. Soil strength, as inferred from the AASHTO group index and AASHTO group, is a measure of the traffic-supporting capacity of the soil.

Skid trails and logging areas include the areas from the stumps to the log landings that are partially or completely logged with rubber-tired equipment. Other types of log-moving equipment can sometimes be used to minimize or overcome the site limitations. The ratings are based on the soil properties, site features, and observed performance of the soils. The seasonal high water table, flooding, rockiness, stoniness, texture, and slope affect the use of logging equipment. Deferring logging activities during periods when the soil is saturated at or near the surface helps to minimize environmental damage. Special equipment is usually required during these periods. Soils that are subject to flooding of long duration should not be logged because logging activities can damage the equipment or the environment, or both. Surface stones, boulders, and rock outcrops limit the safe and efficient use of equipment. As slope gradients increase, traction problems worsen. Traction is a problem on clayey soils during wet periods and on sandy soils during dry periods. Unless frozen, organic soils are severely damaged by the use of rubber-tired or tracked equipment.

Site preparation and planting are mechanized operations. The ratings are based on the limitations affecting the efficient use of equipment and on the damage that can result on the site when equipment is used. It is assumed that operating techniques used do not displace or remove topsoil from the site or create channels in which storm runoff can concentrate. Wetness, flooding, rockiness, stoniness, the content of rock fragments, depth to hard bedrock, texture, and slope affect the use of site preparation and planting equipment. Deferring site preparation and planting during periods when the soil is saturated at or near the surface helps to minimize environmental damage. Special equipment is usually required during these periods. Equipment should not be used on soils that are subject to flooding of long duration. Operating equipment on these soils can result in equipment damage or environmental damage, or both. Surface stones, boulders, and rock outcrops limit the safe and efficient use of equipment. Rock fragments and hard bedrock at very shallow depths can interfere with the equipment used in site preparation and planting. As slope gradients increase, traction problems worsen. Traction is a problem on clayey soils during wet periods and on sandy soils during dry periods.

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.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

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 ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 11 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the table 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 the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

Recreation

Several recreational facilities are in the county. Forked Run State Park offers opportunities for camping, hiking, and picnicking and for fishing in Forked Run Lake. There are several nature study trails in the park. Several boat ramps on the Ohio River provide access for fishing or pleasure boat activities. Camping and outdoor recreational activities are also available at private campgrounds and lakes in the county. There is one public golf course in the county.

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, 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 a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 15 and interpretations for dwellings without basements and for local roads and streets in table 14.

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

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 13, 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 (Allan and others 1963). 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 flooding. 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, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, 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 flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are foxtail, mullen, barnyardgrass, fall panicum, and ragweed.

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

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are duckweed, wild millet, cattail, willow, lespedeza, 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 shallow ponds.

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

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

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

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

Engineering

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. Ratings are given for building site development, sanitary facilities, construction materials, soil material for reconstruction of strip-mined land, 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 should be considered in planning, in site selection, and in design.

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

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

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

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

Building Site Development

Table 14 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

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

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings (fig. 14). A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

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

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

Sanitary Facilities

Table 15 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. 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

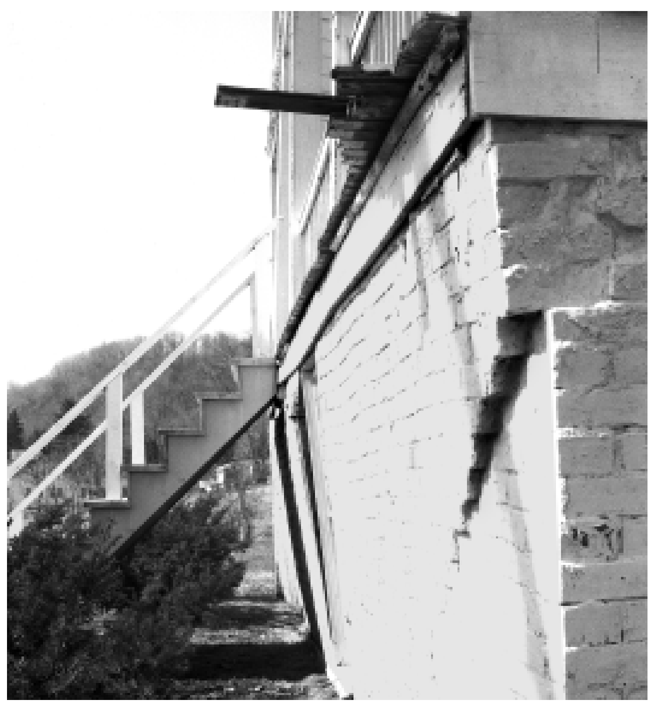

Figure 14.—Damage to the foundation of a home built in an area of Vandalia silt loam, 15 to 25 percent slopes, eroded. The damage was caused by shrinking and swelling of the soil.

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.

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

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

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

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

The ratings in the table 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 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 sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

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

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the 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 16 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

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

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of 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. They are used in many kinds of construction. Specifications for each use vary widely. In the table, 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 (fig. 15). 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 high 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.

Figure 15.—An area of Cidermill silt loam, 0 to 2 percent slopes. This soil is a good source of sand and gravel and also is well suited to vegetable production.

Soil Material for Reconstruction of Strip-Mined Land

Table 17 gives information about the soils as a source of material for reclaiming areas drastically disturbed by surface mining. The surface layer, subsoil, and substratum of the soils are rated *good, fair,* or *poor,* according to their erodibility and stability and their suitability as a medium for plant growth. The ratings only apply to the part of the soil within a depth of about 5 feet.

The interpretations in table 17 cannot be used for quarry, pit, dredge, or surface mine operations that require an offsite source of soil reconstruction material. The interpretations for daily cover for landfill in table 15 should be used to evaluate the material used in restoration of these operations.

A rating of *good* in table 17 means that vegetation is relatively easy to establish and maintain, the surface is stable and resists erosion, and the reconstructed soil has good potential productivity. Material rated *fair* can be vegetated and stabilized by modifying one or more properties. Topdressing with better material or applying soil amendments help to ensure satisfactory performance. Material rated *poor* has such severe problems that revegetation and stabilization are very difficult and costly. Topdressing with better material is necessary to establish and maintain vegetation.

Soil texture and coarse fragments influence soil structure and consistence, the water intake rate, runoff, fertility, and the workability and trafficability of the soil. They also influence a soil's available water capacity and erodibility by wind or water. Loamy and silty soils that are free of coarse fragments are the best sources of reconstruction material. Clayey soils are sticky or cloddy and are difficult to spread, and sandy soils are droughty and subject to soil blowing.

Rock fragments influence the ease of excavation, stockpiling, respreading, and suitability for the final use of the land. A certain amount of rock fragments can be tolerated, depending upon the size of the fragments and the intended use of the reclaimed area. If the size of the rock fragments exceeds 10 inches, the problems are more severe.

Vegetation is difficult to establish on soils that are extremely acid or alkaline. Materials that are extremely acid or have the potential of becoming extremely acid upon oxidation are difficult and expensive to vegetate, and they contribute to poor quality of water, both in runoff and in ground water. Materials high in pyrite and marcasite without offsetting bases have high potential acidity. Laboratory tests may be need to properly identify those materials.

Excessive amounts of substances that restrict plant growth, such as sodium, salt, sulfur, copper, and nickel, create problems in establishing vegetation and thereby influence erosion and the stability of the surface. Other substances, such as selenium, boron, and arsenic, get into the food chain and are toxic to animals that eat the vegetation. Of all these substances, only sodium and salt were considered in the ratings. Soil horizons relatively high in toxic substances are rated poor. Laboratory tests are needed to properly identify toxic substances.

The interpretations in table 17 do not cover all the soil features required in planning soil reconstruction, for example, slope, thickness of material, ease of excavation, potential slippage hazard, and soil moisture regime. Slope of the original soil may influence the method of stripping and stockpiling of reconstruction material but may have little effect on the final contour and, therefore, on the stability and productivity of the reconstructed soil. Consequently, slope was not a criterion in making the interpretations.

The thickness of material suitable for reconstruction and the ease of excavation are important criteria in planning soil reconstruction operations. They are so dependent on the method of mining operations, however, that they were not used as criteria in developing the interpretations. Potential slippage hazard is related to soil texture, slope, differential permeability between layers, rainfall, and other factors that were not considered. Soil moisture regime, climate, and weather influence the kind of vegetation to plant and the rate of revegetative growth. They were not used as criteria because the relative rating does not change with variable moisture regimes; that is, the best soil in a moist environment is also the best soil in a dry environment. Furthermore, the soil may be irrigated to establish vegetation.

Water Management

Table 18 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, 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.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

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 the potential for 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, and sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion 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 and 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 to characterize key soils.

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

Engineering Index Properties

Table 19 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 the heading "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 (fig. 16). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

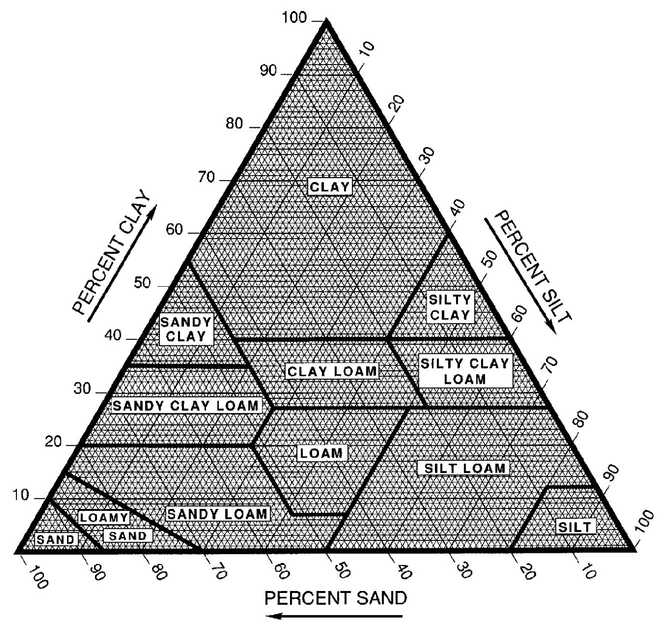

Figure 16.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Classification of the soils is determined according to the Unified soil classification system (ASTM 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 1986).

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

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

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

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

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

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

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

Physical and Chemical Properties

Table 20 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

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

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 the basis of 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 classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

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 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

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

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

Soil and Water Features

Table 21 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, 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 high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides (fig. 17). Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in

Figure 17.—Flooding in an area of Orrville silt loam, frequently flooded.

any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

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 little or no horizon development.

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 estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched, apparent, or artesian;

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 the table.

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

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

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

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

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. 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.

Physical and Chemical Analyses of Selected Soils

Samples of many of the soils in Meigs County were analyzed by the Soil Characterization Laboratory, School of Natural Resources, Ohio State University, Columbus, Ohio. The data obtained includes particle-size distribution, reaction, calcium carbonate equivalent, coarse fragment content, and organic carbon content. The data from these procedures were used to classify and evaluate the behavior of the soils under various land uses.

Four of the pedons sampled were selected as representative of their respective soil series. They are described in the section “Soil Series and Their Morphology.” These series and their laboratory identification numbers are Conotton (Mg-1), Upshur (Mg-2), Vincent (Mg-4), and Woodsfield (Mg-3).

In addition to the Meigs County data, laboratory data are also available from surrounding counties that have many of the same soils. All of these data are on file at the School of Natural Resources, Ohio State University, Columbus, Ohio; the Ohio Department of Natural Resources, Division of Soil and Water Conservation, Columbus, Ohio; and the Natural Resources Conservation Service, State Office, Columbus, Ohio.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA 1975). 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 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is 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; type of saturation; 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 subgroup 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 taxonomic class. 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. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, nonacid, mesic Typic Fluvaquents.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each 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” (USDA 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (USDA 1975) and in “Keys to Soil Taxonomy” (USDA 1992). Unless otherwise indicated, 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.”

Aaron Series

The Aaron series consists of deep, moderately well drained soils on upland ridgetops. These soils formed in residuum from shale and siltstone. Permeability is slow. Slope ranges from 8 to 15 percent.

Aaron soils commonly are adjacent to Gilpin, Rarden, and Upshur soils. Gilpin and Rarden soils are moderately deep to bedrock. Upshur soils are well drained. Gilpin, Rarden, and Upshur soils are in landscape positions similar to those of the Aaron soils.

Typical pedon of Aaron silt loam, in an area of Aaron-Gilpin complex, 8 to 15 percent slopes, in Salem Township; about 1,600 feet south and 1,450 feet east of the northwest corner of sec. 36, T. 7 N., R. 15 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure parting to moderate medium and fine granular; friable; many fine roots; few sandstone fragments; medium acid; clear wavy boundary.

Bt1—8 to 17 inches; yellowish brown (10YR 5/6) silty clay loam; common medium prominent yellowish red (5YR 5/6), few fine prominent black (10YR 2/1), and common medium prominent brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; many fine roots; few distinct yellowish brown (10YR 5/6) and brown (10YR 5/3) clay films on faces of peds; few sandstone fragments; strongly acid; gradual wavy boundary.

Bt2—17 to 25 inches; yellowish brown (10YR 5/4) silty clay loam; many medium and coarse prominent grayish brown (10YR 5/2), common medium distinct brown (10YR 5/3), and common fine prominent yellowish red (5YR 5/8) mottles; moderate medium and fine subangular blocky structure; firm; common fine roots; dark brown (10YR 3/3) fillings in root channels; many prominent brown (10YR 5/3) and grayish brown (10YR 5/2) clay films on faces of peds; common fine black (10YR 2/1) stains of iron or manganese; few siltstone fragments; strongly acid; clear wavy boundary.

Bt3—25 to 31 inches; yellowish brown (10YR 5/4) silty clay; common medium and fine prominent yellowish red (5YR 5/8), few fine prominent strong brown (7.5YR 5/8), and many medium distinct grayish brown (10YR 5/2) mottles; strong medium and coarse subangular blocky structure; firm; few fine roots; few distinct yellowish brown (10YR 5/4) and grayish brown (10YR 5/2) slickensides; many distinct dark grayish brown (10YR 4/2), yellowish brown (10YR 5/4), and brown (10YR 5/3) clay films on faces of peds; few siltstone fragments; medium acid; clear smooth boundary.

Bt4—31 to 42 inches; light olive brown (2.5Y 5/6) silty clay; many medium and coarse prominent grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) and few medium prominent reddish gray (5YR 5/2) and yellowish red (5YR 5/6) mottles; weak coarse prismatic structure parting to strong medium and coarse subangular blocky; firm; few fine roots; very dark grayish brown (10YR 3/2) fillings in old root channels; common distinct light olive brown (2.5YR 5/6) and grayish brown (10YR 5/2) pressure faces and slickensides; common distinct light olive brown (2.5YR 5/6) and grayish brown (10YR 5/2) clay films on faces of peds; 5 percent siltstone fragments; neutral; gradual smooth boundary.

BC—42 to 50 inches; yellowish brown (10YR 5/4) silty clay loam; many medium and coarse prominent grayish brown (10YR 5/2), yellowish brown (10YR 5/8), and yellowish red (5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; firm; few faint grayish brown (10YR 5/2) clay films on faces of peds; many medium and coarse black (10YR 2/1) stains of iron and manganese oxide; few medium distinct light brownish gray (10YR 6/2) calcareous nodules; 10 percent siltstone fragments; slight effervescence; neutral; clear smooth boundary.

Cr—50 to 55 inches; light olive brown (2.5Y 5/4), soft, weathered siltstone bedrock.

The thickness of the solum ranges from 30 to 50 inches. The depth to bedrock ranges from 40 to 60 inches. The content of rock fragments ranges from 0 to 14 percent in the Ap and Bt horizons and from 5 to 35 percent in the BC and C horizons.

The Ap horizon has chroma of 2 or 3. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is silty clay or silty clay loam. The BC and C horizons have colors similar to those of the Bt horizon. They are silty clay loam, silty clay, or the channery analogs of those textures.

Chagrin Series

The Chagrin series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in recent alluvium. Slope ranges from 0 to 2 percent.

Chagrin soils are similar to Nolin soils. They commonly are adjacent to Elkinsville, Gallipolis, Moshannon, Nolin, and Newark soils. Elkinsville soils are on stream terraces. They have less sand and more silt in the subsoil than the Chagrin soils. Gallipolis soils are moderately well drained. Moshannon and Nolin soils have more silt and less sand in the subsoil than the Chagrin soils. Newark soils are somewhat poorly drained. They are in depressions and old channels. Elkinsville, Gallipolis, and Richland soils are not subject to frequent flooding.

Typical pedon of Chagrin silt loam, frequently flooded, 3.5 miles northwest of Burlingham in Scipio

Township; about 1,700 feet north and 800 feet west of the southeast corner of sec. 6, T. 7 N., R. 14 W.

Ap—0 to 12 inches; brown (10YR 4/3) silt loam, brown (7.5YR 5/4) dry; moderate medium subangular blocky structure parting to moderate medium and coarse granular; friable; common fine and few medium roots; many coarse faint brown (10YR 4/3) organic stains on faces of peds; few rock fragments; neutral; gradual smooth boundary.

Bw1—12 to 26 inches; dark brown (7.5YR 4/4) silt loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; few fine and medium roots; neutral; gradual smooth boundary.

Bw2—26 to 29 inches; dark brown (7.5YR 4/4) sandy loam; few coarse distinct strong brown (7.5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; very few fine roots; few pockets of dark brown (7.5YR 4/4) loamy sand; neutral; clear smooth boundary.

Bw3—29 to 38 inches; dark brown (7.5YR 4/4) loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; neutral; gradual smooth boundary.

Bw4—38 to 47 inches; dark brown (7.5YR 4/4) silt loam; few fine distinct brown (10YR 5/3) and strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; friable; few fine black (10YR 2/1) stains of iron and manganese oxide; neutral; gradual smooth boundary.

C1—47 to 53 inches; dark brown (7.5YR 4/4) silt loam; common medium distinct brown (10YR 5/3) mottles; massive; friable; common fine black (10YR 2/1) stains of iron and manganese oxide; slightly acid; gradual smooth boundary.

C2—53 to 80 inches; dark grayish brown (10YR 4/2), stratified fine sand and silt loam; common medium prominent dark brown (7.5YR 4/4) mottles; massive; very friable; organic material, including leaves, roots, bark, and wood, 5 inches in diameter; medium acid.

The thickness of the solum ranges from 24 to 48 inches. The content of rock fragments ranges from 0 to 10 percent in the A and Ap horizons and from 0 to 15 percent in the Bw and C horizons.

The Ap horizon has hue of 10YR or 7.5YR and chroma of 2 to 4. It is dominantly silt loam but is loam in some pedons. The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or loam with strata of sandy loam or fine sandy loam. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 6. It is commonly stratified silt loam, loam, sandy loam, fine sand, or loamy fine sand.

Cidermill Series

The Cidermill series consists of very deep, well drained soils on terraces. These soils formed in silty and loamy alluvium. They are underlain by sand and gravel. Permeability is moderate in the subsoil and rapid in the substratum. Slope ranges from 0 to 6 percent.

Cidermill soils are similar to Elkinsville soils. They commonly are adjacent to Conotton, Gallipolis, and Lakin soils. Elkinsville soils have less gravel in the underlying material than the Cidermill soils. They are on low terraces along small streams. Conotton soils have more gravel throughout the solum than the Cidermill soils. Gallipolis soils are moderately well drained. Lakin soils have more sand in the subsoil than the Cidermill soils. They do not contain gravel. Conotton, Gallipolis, and Lakin soils are in landscape positions similar to those of the Cidermill soils.

Typical pedon of Cidermill silt loam, 0 to 2 percent slopes, south of Portland, in Lebanon Township; about 620 feet north of the intersection of State Route 124 and New Portland Road, along State Route 124, about 131 feet east.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam, brown (10YR 6/3) dry; moderate fine and medium subangular blocky structure parting to moderate medium and fine granular; friable; many fine and few medium roots; few pebbles; many medium and fine tubular pores; slightly acid; abrupt smooth boundary.

Bt1—9 to 18 inches; yellowish brown (10YR 5/6) silt loam; 10 percent dark yellowish brown (10YR 4/4) Ap material; moderate medium subangular blocky structure; friable; few fine and medium roots; many distinct yellowish brown (10YR 5/4 and 5/6) clay films on faces of peds and in pores; common medium tubular pores; slightly acid; clear smooth boundary.

Bt2—18 to 24 inches; yellowish brown (10YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; firm; very few fine and medium roots; many distinct yellowish brown (10YR 5/4) clay films on faces of peds; common faint yellowish brown (10YR 5/4) fillings in root channels; slightly acid; clear smooth boundary.

Bt3—24 to 40 inches; brown (7.5YR 4/4) silt loam; moderate medium and coarse subangular blocky structure; firm; very few fine and medium roots; common distinct brown (7.5YR 4/4) clay films and silt coatings on faces of peds; few faint brown (7.5YR 4/4) fillings in root channels; common fine prominent black (10YR 2/1) stains; strongly acid; abrupt smooth boundary.

2Bt4—40 to 46 inches; brown (7.5YR 4/4) gravelly sandy loam; weak medium and coarse subangular blocky structure; friable; very few fine and medium roots; many fine and medium distinct brown (7.5YR 4/4) clay films on faces of peds and bridging sand grains; few fine faint brown (7.5YR 4/4) fillings in old root channels; 25 percent gravel; strongly acid; abrupt smooth boundary.

2C—46 to 80 inches; brown (7.5YR 4/4) very gravelly loamy coarse sand; single grain; loose; very few fine and medium roots; 60 percent pebbles, which increase in size with increasing depth; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The content of rock fragments ranges from 0 to 25 percent in the solum.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bt and 2Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The Bt horizon is silt loam or silty clay loam. The 2Bt horizon is loam, sandy loam, or gravelly sandy loam. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is very fine sandy loam, very gravelly sand, or very gravelly loamy coarse sand.

Conotton Series

The Conotton series consists of very deep, well drained soils on terraces along the Ohio River. These soils formed in stratified sandy and gravelly outwash material. Permeability is rapid. Slope ranges from 0 to 40 percent.

The Conotton soils in this county have a lower base saturation at a depth of about 59 inches than is definitive for the series. This difference, however, does not affect the use and management of the soils.

Conotton soils commonly are adjacent to Lakin and Wheeling soils. Wheeling soils have less gravel in the surface layer and subsoil and more clay in the subsoil than the Conotton soils. Lakin soils do not have gravel in the surface layer or subsoil. They have more sand in the subsoil than the Conotton soils. Lakin and Wheeling soils are on terraces.

Typical pedon of Conotton gravelly loam, 0 to 2 percent slopes, 1.8 miles southwest of Portland in Lebanon Township; about 220 feet south and 1,200 feet west of the northeast corner of fractional sec. 170, T. 2 N., R. 11 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) gravelly loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine roots; about 30 percent sandstone, siltstone, and granitic gravel; strongly acid; abrupt smooth boundary.

Bt1—9 to 21 inches; yellowish brown (10YR 5/6) very gravelly loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; few fine roots; few faint clay bridges between sand grains and coarse fragments; about 35 percent sandstone, siltstone, and granitic gravel; few fine distinct dark brown (10YR 3/3) organic stains on faces of peds; neutral; clear smooth boundary.

Bt2—21 to 27 inches; dark brown (7.5YR 4/4) very gravelly coarse sandy loam; weak fine and medium subangular blocky structure; very friable; very few fine roots; common faint clay bridges between sand grains and coarse fragments; about 55 percent sandstone, siltstone, and granitic gravel; neutral; gradual smooth boundary.

BC1—27 to 37 inches; dark brown (7.5YR 4/4) very gravelly loamy coarse sand; pockets of very gravelly coarse sandy loam; weak fine and coarse subangular blocky structure; very friable; common faint dark brown (7.5YR 4/4) clay bridges between sand grains and coarse fragments; about 55 percent sandstone, siltstone, and granitic gravel; strongly acid; gradual smooth boundary.

BC2—37 to 53 inches; dark brown (7.5YR 4/4) extremely gravelly loamy coarse sand; a few pockets of extremely gravelly sandy loam; weak medium and coarse subangular blocky structure; friable; few faint dark brown (7.5YR 4/4) clay bridges between sand grains and coarse fragments; about 70 percent sandstone, siltstone, and granitic gravel; strongly acid; gradual smooth boundary.

C—53 to 80 inches; dark brown (7.5YR 4/4) extremely gravelly coarse sand; single grain; loose; about 70 percent sandstone, siltstone, and granitic gravel; medium acid.

The thickness of the solum ranges from 40 to 80 inches. The content of rock fragments ranges from 10 to 35 percent in the Ap horizon, from 35 to 60 percent in the Bt horizon, and from 35 to 70 percent in the BC and C horizons.

The Ap horizon has hue of 10YR or 7.5YR and value of 3 to 5. It is dominantly gravelly loam but is gravelly sandy loam in some pedons. The Bt horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 3 to 6. It is very gravelly loam or very gravelly coarse sandy loam with thin layers of very gravelly sandy clay loam and very gravelly clay loam. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is the very gravelly or extremely gravelly analogs of loamy sand, loamy coarse sand, sand, or coarse sand.

Doles Series

The Doles series consists of very deep, somewhat poorly drained soils. These soils formed in old alluvium in wide preglacial valleys. Permeability is moderate above the fragipan and slow in the fragipan. Slope ranges from 0 to 2 percent.

Doles soils commonly are adjacent to Gilpin, Licking, Newark, Omulga, and Upshur soils. Gilpin and Upshur soils are well drained. They are on adjacent side slopes. Licking and Omulga soils are in landscape positions similar to those of the Doles soils. They are moderately well drained. Newark soils do not have a fragipan. They are on flood plains.

Typical pedon of Doles silt loam, 0 to 2 percent slopes, in Salem Township; about 1,200 feet north and 2,400 feet west of the southeast corner of sec. 34, T. 8 N., R. 15 W.

Ap—0 to 9 inches; brown (10YR 5/3) silt loam, light gray (10YR 7/2) dry; weak medium and fine subangular blocky structure parting to moderate medium and fine granular; friable; many fine roots; strongly acid; abrupt smooth boundary.

BE—9 to 13 inches; light yellowish brown (10YR 6/4) silt loam; few fine distinct yellowish brown (10YR 5/8) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; common fine roots; strongly acid; clear smooth boundary.

Bt1—13 to 20 inches; yellowish brown (10YR 5/4) silt loam; many medium and coarse prominent light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; common fine roots; many light brownish gray (10YR 6/2) silt coatings; common distinct light brownish gray (10YR 6/2) clay films on faces of peds; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; gradual wavy boundary.

Bt2—20 to 27 inches; yellowish brown (10YR 5/4) silt loam; many medium and coarse prominent light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; very firm; few fine roots; many distinct light brownish gray (10YR 6/2) clay films on faces of peds; common fine black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; clear smooth boundary.

Btx1—27 to 34 inches; yellowish brown (10YR 5/6) silt loam; few medium distinct yellowish brown (10YR 5/8) and many coarse prominent light brownish gray (10YR 6/2) mottles; moderate coarse prismatic structure parting to strong coarse subangular blocky; extremely firm; very few fine roots; many prominent light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) clay films on vertical faces of peds; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; gradual smooth boundary.

Btx2—34 to 56 inches; strong brown (7.5YR 4/6) silty clay loam; many medium and coarse prominent grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) mottles; strong coarse prismatic structure parting to strong coarse subangular blocky; extremely firm; many prominent grayish brown (10YR 5/2) clay films on vertical faces of peds; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; clear smooth boundary.

Btx3—56 to 72 inches; yellowish brown (10YR 5/6) silty clay loam; many medium and coarse prominent light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) mottles; strong coarse prismatic structure parting to moderate medium and coarse platy; extremely firm; many prominent light brownish gray (10YR 6/2) clay films on vertical faces of peds; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; gradual smooth boundary.

2C1—72 to 76 inches; strong brown (7.5YR 5/6) silty clay loam; many medium and coarse prominent grayish brown (10YR 5/2), light olive brown (2.5Y 5/4), and reddish yellow (5YR 6/6) mottles; massive; firm; many coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; common soft shale and sandstone fragments; strongly acid; abrupt smooth boundary.

2C2—76 to 80 inches; yellowish brown (10YR 5/6), stratified silt loam, sandy loam, and silty clay loam; few medium grayish brown (10YR 5/2) and light olive brown (2.5Y 5/4) mottles; massive; firm; common medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid.

The thickness of the solum ranges from 52 to more than 95 inches. These soils generally do not contain rock fragments.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is silt loam or silty clay loam. The Btx horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 6. It is silt loam or silty clay loam. The 2C horizon has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 1 to 6. It is generally silty clay loam, silt loam, loam, or sandy loam.

Duncannon Series

The Duncannon series consists of very deep, well drained soils on terraces along the Ohio River valley. These soils formed in thick deposits of silty windblown material. Permeability is moderate. Slope ranges from 6 to 12 percent.

Duncannon soils commonly are adjacent to Cidermill, Gallipolis, Gilpin, Lakin, and Upshur soils. Cidermill and Gallipolis soils are on the lower terraces. Cidermill soils have more sand in the subsoil than the Duncannon soils. Gallipolis soils are moderately well drained. Lakin soils are on the adjacent terraces. They are dominantly sandy material throughout the profile. Gilpin and Upshur soils are on the adjacent side slopes. Upshur soils have more clay throughout than the Duncannon soils. Gilpin soils are moderately deep to bedrock.

Typical pedon of Duncannon silt loam, 6 to 12 percent slopes, in Olive Township; about 2,500 feet north and 260 feet east of the southwest corner of fractional sec. 134, T. 3 N., R. 11 W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; 10 percent yellowish brown (10YR 5/6) BE material, pale brown (10YR 6/3) dry; weak medium and fine subangular blocky structure parting to moderate medium granular; friable; many fine roots; many distinct dark brown (10YR 3/3) krotovinas; neutral; clear smooth boundary.

BE—8 to 14 inches; yellowish brown (10YR 5/6) silt loam; moderate medium and fine subangular blocky structure; friable; common fine roots; many prominent dark brown (10YR 3/3) and dark yellowish brown (10YR 4/4) krotovinas; very few faint yellowish brown (10YR 5/6) clay films on faces of peds; few faint dark yellowish brown (10YR 4/4) coatings on faces of peds; strongly acid; gradual smooth boundary.

Bt1—14 to 25 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots; common faint yellowish brown (7.5YR 4/4) clay films on faces of peds; few prominent dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) krotovinas; common fine prominent black (10YR 2/1) stains of iron and manganese oxide; strongly acid; gradual smooth boundary.

Bt2—25 to 33 inches; yellowish brown (10YR 5/6) silt loam; few fine distinct brown (10YR 5/3) and few fine prominent yellowish red (5YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; common distinct yellowish brown (7.5YR 5/6) clay films on faces of peds; common fine faint dark yellowish brown (7.5YR 4/4) coatings on vertical faces of peds; common fine prominent black (10YR 2/1) stains of iron and manganese oxide; few distinct yellowish brown (7.5YR 5/6) worm channels and krotovinas; strongly acid; gradual smooth boundary.

BC—33 to 43 inches; yellowish brown (10YR 5/6) silt loam; few fine prominent yellowish red (5YR 5/8) and light olive brown (2.5YR 5/4) mottles; weak medium and fine prismatic structure parting to moderate medium and coarse subangular blocky; firm; very few fine roots; common medium and coarse prominent black (10YR 2/1) stains of iron and manganese oxide; very few faint yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; gradual smooth boundary.

C1—43 to 51 inches; dark yellowish brown (10YR 4/6) silt loam; few fine prominent yellowish red (5YR 5/8) and light olive brown (2.5Y 5/4) and common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure; firm; very few fine roots; common medium and coarse prominent black (10YR 2/1) stains of iron and manganese oxide; strongly acid; gradual wavy boundary.

C2—51 to 65 inches; yellowish brown (10YR 5/6) silt loam; common medium and coarse distinct yellowish red (5YR 5/8) and common medium distinct light olive brown (2.5YR 5/4), pale brown (10YR 6/3), and light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure; firm; black (10YR 2/1) stains of iron and manganese oxide; few distinct dark yellowish brown (10YR 4/6) decayed roots and worm channels; strongly acid; gradual wavy boundary.

C3—65 to 70 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct and prominent yellowish red (5YR 5/8) and light olive brown (2.5YR 5/4) and few fine distinct light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure; firm; few distinct dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/8) decayed roots and worm channels; common medium and coarse distinct yellowish brown (10YR 5/4), pale brown (10YR 6/3), and light olive brown (2.5Y 5/4) silt coatings on faces of peds;

common medium prominent black (10YR 2/1) stains of iron and manganese oxide; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 5 feet.

The Ap horizon has value of 3 to 5 and chroma of 2 to 4. It typically is silt loam but is very fine sandy loam in some pedons. The Bt and C horizons have value of 4 or 5 and chroma of 4 to 6. They are silt loam or very fine sandy loam.

Elkinsville Series

The Elkinsville series consists of very deep, well drained soils on low terraces. These soils formed in silty alluvium over loamy alluvium. Permeability is moderate. Slope ranges from 0 to 2 percent.

Elkinsville soils are similar to Cidermill and Gallipolis soils. They commonly are adjacent to Chagrin, Richland, and Taggart soils. Cidermill soils are underlain by sand and gravel. Gallipolis soils are moderately well drained. Chagrin soils are on nearby flood plains. They have more sand in the subsoil than the Elkinsville soils. Richland soils are on nearby alluvial fans. They have more sand and coarse fragments in the subsoil than the Elkinsville soils. Taggart soils are somewhat poorly drained. Taggart and Gallipolis soils are in landscape positions similar to those of the Elkinsville soils.

Typical pedon of Elkinsville silt loam, 0 to 2 percent slopes, in Rutland Township; about 300 feet south and 2,100 feet west of the northeast corner of fractional sec. 19, T. 6 N., R. 14 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; 5 percent yellowish brown (10YR 5/6) silty clay loam from the Bt horizon; weak medium subangular blocky structure parting to moderate medium granular; friable; few fine roots; strongly acid; abrupt smooth boundary.

Bt1—9 to 15 inches; strong brown (7.5YR 5/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine roots; common distinct yellowish brown (10YR 5/4) clay films on faces of peds; many prominent dark yellowish brown (10YR 4/4) krotovinas; very strongly acid; gradual smooth boundary.

Bt2—15 to 26 inches; strong brown (7.5YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; very few fine roots; many distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) clay films on faces of peds; many prominent dark yellowish brown (10YR 4/4) krotovinas; very strongly acid; clear smooth boundary.

Bt3—26 to 34 inches; strong brown (7.5YR 5/4) silt loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium and coarse subangular blocky structure; firm; very few fine roots; common distinct strong brown (7.5YR 5/6), dark brown (7.5YR 4/4), and yellowish brown (10YR 5/4) clay films on faces of peds; common distinct dark brown (7.5YR 4/4) krotovinas; very strongly acid; clear smooth boundary.

2Bt4—34 to 41 inches; strong brown (7.5YR 5/4), stratified silt loam and loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; friable; very few fine roots; few distinct strong brown (7.5YR 5/6) and dark yellowish brown (10YR 4/6) clay films on faces of peds; few distinct dark brown (7.5YR 4/4) krotovinas; strongly acid; gradual smooth boundary.

2BC—41 to 51 inches; strong brown (7.5YR 5/4) silt loam; weak coarse subangular blocky structure; friable; thin strata of fine sandy loam; strongly acid; gradual smooth boundary.

2C—51 to 80 inches; brown (7.5YR 5/4) and light yellowish brown (10YR 6/4), stratified silt loam, loam, and fine sandy loam; few fine prominent light brownish gray (10YR 6/2) mottles; massive; friable; strongly acid.

The thickness of the solum ranges from 40 to 70 inches. The content of rock fragments ranges from 0 to 5 percent in the 2Bt and 2C horizons.

The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The Bt and 2Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. They are silt loam, silty clay loam, or stratified silt loam and loam. The 2C horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 to 6. It is stratified silt loam, loam, and fine sandy loam.

Gallia Series

The Gallia series consists of very deep, well drained soils. These soils formed in old alluvium in wide preglacial valleys. Permeability is moderate. Slope ranges from 6 to 18 percent.

Gallia soils commonly are adjacent to Licking, Omulga, and Vincent soils. Licking, Omulga, and Vincent soils are in landscape positions similar to those of the Gallia soils. Licking and Omulga soils are moderately well drained. Omulga soils have a fragipan. Vincent soils have more clay and less sand and rock fragments in the subsoil than the Gallia soils.

Typical pedon of Gallia loam, 6 to 12 percent slopes, in Orange Township; about 200 feet north and

1,400 feet west of the southeast corner of fractional sec. 24, T. 4 N., R. 12 W.

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) loam, pale brown (10YR 6/3) dry; 5 percent yellowish brown (10YR 5/6) Bt material; weak moderate subangular blocky structure parting to moderate fine subangular blocky; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—12 to 18 inches; strong brown (7.5YR 5/6) loam; 10 percent dark yellowish brown (10YR 4/4) Ap material; weak medium subangular blocky structure; friable; common fine roots; few faint yellowish brown (10YR 5/4) clay films on faces of peds; common medium prominent dark yellowish brown (10YR 4/4) decayed roots and krotovinas; slightly acid; clear smooth boundary.

Bt2—18 to 27 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; common fine roots; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) clay films on faces of peds; few medium prominent dark brown (10YR 3/3) krotovinas and fillings in root channels; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; slightly acid; clear wavy boundary.

Bt3—27 to 36 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; firm; few fine roots; many prominent reddish brown (5YR 5/4) and yellowish red (5YR 5/6) clay films on faces of peds; common light olive brown (2.5Y 5/4 and 5/6) and brownish yellow (10YR 6/6), highly weathered, soft remnants of siltstone and sandstone; very strongly acid; clear wavy boundary.

Bt4—36 to 48 inches; yellowish red (5YR 5/6) sandy loam; weak coarse platy structure parting to weak medium and coarse subangular blocky; friable; very few fine roots; many medium distinct yellowish red (5YR 5/6) clay films on faces of peds; common light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6), highly weathered, soft remnants of siltstone and sandstone; few distinct very pale brown (10YR 7/3) uncoated sand grains; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; 5 percent sandstone, quartzite, and siltstone gravel; very strongly acid; clear wavy boundary.

BE—48 to 67 inches; yellowish red (5YR 5/6) gravelly sandy loam; weak medium and coarse subangular blocky structure; friable; few faint yellowish red (5YR 5/6) clay films on coarse fragments; many light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6), highly weathered, soft remnants of siltstone and sandstone; many prominent very pale brown (10YR 7/3) uncoated sand grains; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; 20 percent granite, quartzite, sandstone, and siltstone gravel; strongly acid; clear smooth boundary.

E—67 to 81 inches; strong brown (7.5YR 5/4) gravelly loamy sand; few medium prominent strong brown (7.5YR 5/8) mottles; single grain; loose; many light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6), highly weathered, soft remnants of siltstone and sandstone; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; many prominent very pale brown (10YR 7/3) uncoated sand grains; 30 percent quartzite, granite, siltstone, and sandstone gravel; strongly acid; abrupt wavy boundary.

B´t—81 to 86 inches; strong brown (7.5YR 4/6) loam; common medium prominent reddish brown (2.5YR 4/4), light olive brown (2.5YR 5/4), and grayish brown (2.5Y 5/2) mottles; weak coarse subangular block structure; friable; few faint yellowish brown (10YR 5/6) clay films on faces of peds; few fine prominent black (10YR 2/1) stains of iron and manganese oxide; 5 percent sandstone, quartzite, siltstone, and granite gravel; strongly acid.

The thickness of the solum ranges from 60 to 108 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 5 percent in the A horizon, from 0 to 25 percent in the B horizon, and from 0 to 35 percent in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It typically is loam but is silt loam in some pedons. The Bt horizon dominantly has hue of 5YR. In many pedons subhorizons in the upper part of the Bt horizon have hue of 7.5YR or 10YR. The Bt horizon has value of 3 to 5 and chroma of 4 to 8. It dominantly is loam, sandy loam, sandy clay loam, or the gravelly analogs of those textures. Some pedons have thin subhorizons of clay loam, silty clay loam, silt loam, or the gravelly analogs of those textures. The C horizon, if it occurs, has hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 4 to 6. It dominantly is loamy sand or gravelly loamy sand, but in some pedons it contains thin subhorizons of sandy clay loam, loam, or the gravelly analogs of those textures.

Gallipolis Series

The Gallipolis series consists of very deep, moderately well drained soils on terraces. These soils formed in silty old alluvium. Permeability is moderately slow. Slope ranges from 0 to 6 percent.

Gallipolis soils are similar to Elkinsville soils. They commonly are adjacent to Cidermill, Licking, Nolin, and Taggart soils. Cidermill and Elkinsville soils are well drained. Cidermill soils are underlain by sand and gravel. Elkinsville soils have more sand in the lower part of the subsoil than the Gallipolis soils. Taggart soils are somewhat poorly drained. Elkinsville and Taggart soils are on terraces in landscape positions similar to those of the Gallipolis soils. Taggart soils generally are in the lowest positions on the terraces. Licking soils have more clay and less silt in the subsoil than the Gallipolis soils. They are on the higher terraces. Nolin soils are well drained. They are on nearby flood plains.

Typical pedon of Gallipolis silt loam, 2 to 6 percent slopes, in Salisbury Township; about 150 feet west and 1,200 feet north of the southeast corner of fractional sec. 328, T. 5 N., R. 13 W.

Ap—0 to 11 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; 5 percent yellowish brown (10YR 5/4) Bt material; weak medium and fine subangular blocky structure parting to moderate medium granular; friable; many fine and few medium roots; 1 percent sandstone fragments; medium acid; clear smooth boundary.

Bt1—11 to 17 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; firm; common fine and few medium roots; common distinct brown (10YR 5/3) clay films on faces of peds; common fine and medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid; clear smooth boundary.

Bt2—17 to 25 inches; yellowish brown (10YR 5/4) silty clay loam; common coarse distinct dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; very few medium and few fine roots; many prominent brown (10YR 5/3) clay films on faces of peds; many fine and medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid; clear smooth boundary.

Bt3—25 to 37 inches; yellowish brown (10YR 5/4) silty clay loam; many medium and coarse distinct dark brown (7.5YR 4/4) and common medium prominent light brownish gray (10YR 6/2) mottles; moderate medium and coarse subangular blocky structure; firm; few fine roots; many prominent light brownish gray (10YR 6/2) clay films on faces of peds; many fine and medium black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid; clear wavy boundary.

Bt4—37 to 45 inches; yellowish brown (10YR 5/4) silty clay loam; common medium prominent light brownish gray (10YR 6/2) and many coarse distinct dark brown (7.5YR 4/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; very few fine roots; common prominent light brownish gray (10YR 6/2) clay films on faces of peds; common medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid; clear wavy boundary.

Bt5—45 to 61 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct dark yellowish brown (10YR 4/6) and yellowish brown (10YR 5/8) and many coarse prominent gray (10YR 6/1) mottles; weak medium and coarse prismatic structure parting to strong medium subangular blocky; very firm; common prominent brown (10YR 5/3) and light brownish gray (10YR 6/2) clay films on faces of peds; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; gradual smooth boundary.

BC—61 to 73 inches; dark yellowish brown (10YR 4/4) silt loam; many coarse distinct dark yellowish brown (10YR 4/6) and common medium prominent gray (10YR 6/1) mottles; weak coarse prismatic structure; firm; few prominent brown (10YR 5/3) and gray (10YR 6/1) clay films; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid; gradual smooth boundary.

C—73 to 80 inches; dark yellowish brown (10YR 4/4) silt loam; many coarse distinct dark yellowish brown (10YR 4/6) and common medium prominent gray (10YR 6/1) mottles; massive; firm; many medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid.

The thickness of the solum ranges from 48 to 80 inches. These soils generally do not contain rock fragments; however, in some pedons the content of rock fragments ranges from 0 to 2 percent in the Ap horizon and from 0 to 5 percent in the Bt and C horizons.

The Ap has a value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils on side slopes and narrow ridgetops.

These soils formed in residuum from siltstone or sandstone. Permeability is moderate. Slope ranges from 3 to 70 percent.

Gilpin soils are similar to Westmoreland soils. They commonly are adjacent to Aaron, Guernsey, Rarden, Steinsburg, Upshur, and Vandalia soils. Aaron, Guernsey, and Rarden soils are moderately well drained. In addition, Aaron and Guernsey soils are deep or very deep to bedrock. Aaron soils are on ridgetops, and Guernsey soils are on side slopes and ridgetops. Rarden soils are on ridgetops and side slopes. Steinsburg soils have more sand and less clay in the subsoil than the Gilpin soils. They are on the steeper side slopes. Upshur soils are deep or very deep to bedrock. They have more clay in the subsoil than the Gilpin soils. They are on side slopes and ridgetops. Vandalia soils are on colluvial toe slopes. They have more clay in the subsoil than the Gilpin soils. Upshur and Vandalia soils have dominant red colors in the subsoil.

Typical pedon of Gilpin silt loam, in an area of Gilpin-Rarden complex, 25 to 40 percent slopes, in Salem Township; about 1,400 feet north and 660 feet west of the southeast corner of sec. 36, T. 7 N., R. 15 W.

A—0 to 3 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; many fine and few medium roots; about 5 percent sandstone fragments; strongly acid; abrupt wavy boundary.

BE—3 to 9 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine and medium and few coarse roots; very few faint yellowish brown (10YR 5/4) clay films on faces of peds; 10 percent sandstone channers; strongly acid; clear wavy boundary.

Bt1—9 to 18 inches; yellowish brown (7.5YR 5/6) channery silt loam; moderate medium subangular blocky structure; firm; common fine and common medium roots; few faint yellowish brown (7.5YR 4/4) clay films; 20 percent sandstone channers; strongly acid; clear wavy boundary.

Bt2—18 to 26 inches; yellowish brown (7.5YR 5/4) channery loam; weak medium and fine subangular blocky structure; firm; few fine roots; few faint yellowish brown (7.5YR 4/4) clay films; 30 percent sandstone channers; strongly acid; abrupt wavy boundary.

BC—26 to 31 inches; yellowish brown (10YR 5/4) very channery loam; weak fine subangular blocky structure; firm; few fine roots; few faint yellowish brown (10YR 5/6) clay films on faces of peds and on faces of rocks; 40 percent sandstone channers; strongly acid; abrupt smooth boundary.

R—31 inches; light olive brown (2.5Y 5/6), weakly cemented sandstone bedrock.

The thickness of the solum ranges from 18 to 36 inches. The depth to rippable bedrock ranges from 20 to 40 inches. The content of rock fragments ranges from 30 to 90 percent in the C horizon, if it occurs, and from 5 to 40 percent in many of the other individual horizons. The fragments in the C horizon typically are thin, flat, coarse channers or flagstones of shale, siltstone, or fine grained sandstone.

The A horizon has value of 3 to 5 and chroma of 4 to 8. It is silt loam, loam, or the channery analogs of those textures. The B horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is silt loam, loam, silty clay loam, or the channery analogs of those textures. The content of rock fragments in the B horizon increases with increasing depth. Some pedons have a C horizon. This horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is silt loam, loam, silty clay loam, or the channery or very channery analogs of those textures.

Guernsey Series

The Guernsey series consists of deep and very deep, moderately well drained soils on side slopes. These soils formed in colluvium and in the underlying residuum of siltstone and shale. Permeability is moderately slow or slow. Slope ranges from 15 to 40 percent.

Guernsey soils commonly are adjacent to Gilpin, Rarden, Steinsburg, and Upshur soils. Gilpin, Rarden, and Steinsburg soils are on side slopes. They are moderately deep to bedrock. Gilpin, Steinsburg, and Upshur soils are well drained. Upshur soils are dominantly red in color.

Typical pedon of Guernsey silt loam, in an area of Guernsey-Gilpin complex, 15 to 25 percent slopes, in Scipio Township; about 1,400 feet east and 700 feet south of the northwest corner of sec. 24, T. 7 N., R. 14 W.

Ap—0 to 6 inches; dark brown (10YR 3/3) silt loam, light brownish gray (10YR 6/2) dry; moderate medium subangular blocky structure; friable; many fine and common medium roots; 5 percent sandstone fragments; slightly acid; abrupt smooth boundary.

Bt1—6 to 11 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; many fine and few medium roots; few faint yellowish brown (10YR 5/6) clay films on faces of peds; 10 percent sandstone fragments; common dark brown (10YR 3/3) krotovinas; neutral; clear smooth boundary.

Bt2—11 to 14 inches; strong brown (7.5YR 5/4) silty clay loam; few fine distinct (5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine and few medium roots; common distinct (7.5YR 5/4) clay films on faces of peds; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; 10 percent sandstone fragments; strongly acid; clear smooth boundary.

Bt3—14 to 24 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct and prominent gray (10YR 6/1) and yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; many prominent brown (10YR 5/3) and yellowish brown (10YR 5/4) clay films on faces of peds; common fine black (10YR 2/1) stains and concretions of iron and manganese oxide; 10 percent sandstone and siltstone fragments; strongly acid; clear wavy boundary.

2Bt4—24 to 34 inches; yellowish brown (10YR 5/4) silty clay; many medium and coarse prominent gray (10YR 6/1) and yellowish brown (10YR 5/8) mottles; moderate medium and coarse subangular blocky structure; firm; few fine roots; few faint gray (10YR 6/1) and brown (10YR 5/3) slickensides; many prominent gray (10YR 6/1) and brown (10YR 5/3) clay films on faces of peds; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; 5 percent siltstone fragments; slightly acid; clear wavy boundary.

2Bt5—34 to 46 inches; light olive brown (2.5Y 5/4) silty clay; many medium and coarse prominent gray (10YR 6/1) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few fine roots; few prominent gray (10YR 6/1) clay films on faces of peds; common medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; 5 percent siltstone fragments; slight effervescence; mildly alkaline; gradual wavy boundary.

2Bt6—46 to 51 inches; light brownish gray (2.5Y 6/2) silty clay; few and common medium and coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate coarse subangular blocky structure; firm; very few fine roots; common prominent gray (10YR 5/1) slickensides; common prominent gray (10YR 5/1) clay films on faces of peds; common medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; 5 percent siltstone fragments; strong effervescence; mildly alkaline; gradual wavy boundary.

2BC—51 to 60 inches; brown (10YR 5/3) silty clay loam; common medium and coarse distinct and prominent gray (10YR 5/1), yellowish brown (10YR 5/6), and grayish brown (2.5YR 5/2) mottles; weak coarse subangular blocky structure; firm; very few fine roots; many prominent gray (10YR 5/1) slickensides; few distinct gray (10YR 5/1) clay films on faces of peds; common medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; 2 percent siltstone fragments; many soft fragments; strong effervescence; moderately alkaline; abrupt wavy boundary.

2C—60 to 72 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium and coarse prominent dark gray (10YR 4/1), brownish yellow (10YR 6/8), and gray (10YR 6/1) mottles; massive; very firm; common medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; 2 percent siltstone fragments; many soft fragments; strong effervescence; mildly alkaline; abrupt smooth boundary.

2Cr—72 inches; gray (N 5/0), weathered siltstone bedrock.

The thickness of the solum ranges from 36 to 60 inches. The depth to bedrock is more than 50 inches. The content of rock fragments ranges from 2 to 15 percent in the Ap and Bt horizons, from 2 to 25 percent in the 2Bt horizon, and from 2 to 35 percent in the 2C horizon.

The Ap horizon has value of 3 to 5 and chroma of 2 to 4. It is dominantly silt loam but is silty clay loam in some pedons. The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is generally silt loam, silty clay loam, or the channery analogs of those textures. The 2Bt horizon has hue of 2.5Y, 10YR, or 7.5YR, value of 4 to 6, and chroma of 1 to 6. It is generally silty clay loam, silty clay, clay, or the channery analogs of those textures. The 2C horizon has hue of 2.5Y, 10YR, 7.5YR, or 5Y or is neutral. It has value of 4 to 6 and chroma of 0 to 6. It is silty clay loam, silty clay, clay, or the channery or very channery analogs of those textures.

Keene Series

The Keene series consists of deep and very deep, moderately well drained soils on ridgetops. These soils formed in loess and residuum. Permeability is moderate or moderately slow in the upper part of the subsoil and slow or moderately slow in the lower part. Slope ranges from 2 to 12 percent.

Keene soils commonly are adjacent to Aaron, Gilpin, Rarden, and Upshur soils. Aaron, Gilpin, Rarden, and Upshur soils are in landscape positions similar to those of the Keene soils. Aaron soils have more clay in the subsoil than the Keene soils. Gilpin and Rarden soils are moderately deep to bedrock. Gilpin soils are well drained. Rarden soils have red colors in the subsoil. Upshur soils are well drained and are red in the subsoil. They have more clay in the subsoil than the Keene soils.

Typical pedon of Keene silt loam, 2 to 6 percent slopes, in Columbia Township; about 1,000 feet east and 1,200 feet south of the northwest corner of sec. 12, T. 9 N., R. 15 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; 5 percent yellowish brown (10YR 5/6) B material; weak medium and coarse subangular blocky structure parting to moderate medium granular; friable; many fine and few medium roots; strongly acid; abrupt smooth boundary.

Bt1—8 to 16 inches; yellowish brown (10YR 5/6) silt loam; 10 percent dark yellowish brown (10YR 4/4) A material; moderate medium subangular blocky structure; friable; many fine and few medium roots; common distinct yellowish brown (10YR 5/4) clay films on faces of peds; many coarse prominent dark yellowish brown (10YR 4/4) krotovinas; strongly acid; clear smooth boundary.

Bt2—16 to 26 inches; yellowish brown (10YR 5/6) silt loam; common medium and coarse distinct brown (10YR 5/3 and 7.5YR 5/4) and few fine prominent gray (10YR 5/1) mottles; moderate medium subangular blocky structure; friable; common fine and few medium roots; many distinct brown (10YR 5/3) and yellowish brown (10YR 5/4) clay films on faces of peds; common fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; few prominent dark yellowish brown (10YR 4/4) krotovinas; strongly acid; clear smooth boundary.

2Bt3—26 to 35 inches; yellowish brown (10YR 5/6) silty clay loam; common medium and coarse prominent gray (10YR 6/1) and brown (7.5YR 5/4) mottles; weak very coarse prismatic structure parting to weak medium platy; firm; few fine and very few medium roots; many prominent brown (10YR 5/3) and gray (10YR 6/1) clay films on faces of peds; few fine and medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; 5 percent sandstone fragments; very strongly acid; clear smooth boundary.

2Bt4—35 to 48 inches; yellowish brown (10YR 5/6) silty clay loam; many coarse prominent gray (10YR 5/1) and few fine distinct brown (7.5YR 5/4) mottles; weak medium and coarse prismatic structure parting to weak medium platy and weak medium subangular blocky; very firm; few fine roots; common prominent brown (10YR 5/3) and gray (10YR 6/1) clay films on faces of peds; common coarse prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; 10 percent sandstone fragments; very strongly acid; gradual wavy boundary.

2Cr—48 to 67 inches; yellowish brown (10YR 5/4) and dark brown (10YR 4/3), weathered siltstone and sandstone bedrock.

The thickness of the solum ranges from 30 to 60 inches. The depth to bedrock ranges from 40 to 84 inches. The content of rock fragments ranges from 0 to 5 percent in the A and B horizons, from 5 to 15 percent in the 2Bt horizon, and from 5 to 35 percent in the 2BC and 2C horizons, if they occur.

The Ap horizon has chroma of 2 or 3. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1 to 6. It is silty clay loam or silty clay.

Kyger Series

The Kyger series consists of very deep, very poorly drained soils on flood plains. These soils formed in more than 40 inches of stratified sandy and loamy overwash from areas of surface mine spoil. Permeability is moderate or moderately rapid. Slope ranges from 0 to 2 percent.

Kyger soils commonly are adjacent to Orrville and Taggart soils. Orrville soils are on flood plains. Taggart soils are on adjoining terraces. Orrville and Taggart soils are somewhat poorly drained.

Typical pedon of Kyger loamy sand, frequently flooded, in Scipio Township; about 1,700 feet south and 400 feet east of the northwest corner of fractional sec. 5, T. 7 N., R. 14 W.

C—0 to 19 inches; strong brown (7.5YR 5/4) loamy sand, light yellowish brown (10YR 6/4) dry; few thin strata of silt loam and medium sand; single grain; loose; 10 percent coal fragments; very strongly acid; abrupt smooth boundary.

Cg1—19 to 34 inches; dark gray (10YR 4/1) silt loam that has thin strata of sandy loam; massive; friable;

2 percent coal fragments; neutral; abrupt smooth boundary.

Cg2—34 to 42 inches; dark grayish brown (10YR 4/2) loam; massive; friable; slightly acid; abrupt smooth boundary.

C´1—42 to 74 inches; dark yellowish brown (10YR 4/6) loamy sand; single grain; loose; medium acid; gradual smooth boundary.

C´2—74 to 80 inches; dark yellowish brown (10YR 4/6) sandy loam that has thin strata of loam and silt loam; few fine distinct yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) mottles; massive; friable; slightly acid.

The recent overwash is more than 40 inches thick. The content of rock fragments ranges from 0 to 15 percent throughout the profile. The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 8. It is sandy loam, loamy sand, loam, silt loam, or sand.

Lakin Series

The Lakin series consists of very deep, excessively well drained soils on terraces along the Ohio River valley. These soils formed in thick deposits of sandy windblown material. Permeability is rapid. Slope ranges from 1 to 40 percent.

Lakin soils commonly are adjacent to Cidermill, Conotton, and Duncannon soils. Cidermill soils have more clay in the subsoil than the Lakin soils. They are underlain by thick deposits of sand and gravel. Conotton soils contain more rock fragments throughout than the Lakin soils. Cidermill and Conotton soils are on the lower, adjacent terraces. Duncannon soils have more silt and less sand in the subsoil than the Lakin soils. They are higher on the terraces or are in landscape positions similar to those of the Lakin soils.

Typical pedon of Lakin loamy fine sand, 6 to 12 percent slopes, in Lebanon Township; about 1,580 feet north and 1,660 feet east of the southwest corner of sec. 8, T. 2 N., R. 11 W.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) loamy fine sand, pale brown (10YR 6/3) dry; weak fine subangular blocky and granular structure; very friable; many fine roots; 1 percent sandstone fragments; slightly acid; abrupt smooth boundary.

E1—9 to 22 inches; yellowish brown (10YR 5/6) loamy fine sand; single grain; loose; few fine roots; very few distinct strong brown (7.5YR 5/6) thin discontinuous lamellae; medium acid; gradual wavy boundary.

E2—22 to 43 inches; yellowish brown (10YR 5/4) loamy fine sand; single grain; loose; very few fine and medium roots; few distinct strong brown (7.5YR 5/6) thin and medium discontinuous lamellae; slightly acid; gradual wavy boundary.

E and Bt1—43 to 56 inches; yellowish brown (10YR 5/6) loamy fine sand; weak coarse subangular blocky structure parting to weak fine subangular blocky and single grain; very friable and loose; very few fine roots; common distinct strong brown (7.5YR 5/6) thin and medium lamellae; slightly acid; gradual wavy boundary.

E and Bt2—56 to 64 inches; dark brown (7.5YR 4/4) loamy fine sand; many medium and coarse prominent brown (10YR 5/3) mottles; weak coarse subangular blocky structure parting to weak fine subangular blocky and single grain; very friable and loose; few distinct strong brown (7.5YR 5/6) and few prominent yellowish red (5YR 4/6) medium and thick discontinuous lamellae; few fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; slightly acid; clear smooth boundary.

E and Bt3—64 to 72 inches; dark brown (7.5YR 4/4) loamy fine sand that has thin lenses of sand; many medium and coarse distinct strong brown (7.5YR 5/6) and prominent pale brown (10YR 6/3) mottles; weak coarse subangular blocky structure parting to weak fine subangular blocky and single grain; loose and very friable; many fine reddish brown (5YR 4/4) accumulations of clay; few fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; slightly acid; gradual wavy boundary.

C—72 to 80 inches; dark brown (7.5YR 4/4) fine sand; common medium distinct and prominent brown (7.5YR 5/4) and pale brown (10YR 6/3) mottles; single grain; loose; slightly acid.

The thickness of the solum ranges from 40 to more than 80 inches. The content of rock fragments ranges from 0 to 3 percent in the A and B horizons. The B and C horizons do not contain rock fragments.

The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The E horizon has chroma of 4 to 6. The E and Bt horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy fine sand or fine sand. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is fine sand.

Licking Series

The Licking series consists of very deep, moderately well drained soils on terraces. These soils formed in a silty mantle and in the underlying fine textured lacustrine material. Permeability is slow. Slope ranges from 1 to 18 percent.

Licking soils commonly are adjacent to Chagrin, Doles, Gallipolis, Taggart, and Vincent soils. Chagrin soils are well drained. They are on nearby flood plains. Doles and Taggart soils are somewhat poorly drained. They are in the lower lying areas of the terraces. They have less clay in the subsoil than the Licking soils. Doles soils have a fragipan. Gallipolis soils are moderately well drained. They are on the lower, adjacent terraces. They have more silt and less clay in the subsoil than the Licking soils. Vincent soils are on adjacent terraces. They have red colors throughout the subsoil.

Typical pedon of Licking silt loam, 1 to 6 percent slopes, in Rutland Township; about 900 feet south and 650 feet east of the northwest corner of fractional sec. 25, T. 6 N., R. 14 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; moderate medium subangular blocky structure parting to moderate medium granular; friable; many fine and few medium roots; medium acid; abrupt smooth boundary.

Bt1—10 to 15 inches; yellowish brown (10YR 5/6) silt loam; 5 percent brown (10YR 4/3) Ap material; common fine distinct strong brown (7.5YR 5/8) and common medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; few fine and very few medium roots; common distinct brown (10YR 5/3) and light olive brown (2.5YR 5/4) clay films on faces of peds; common distinct light olive brown (2.5YR 5/4) silt coatings; few fine black (10YR 2/1) concretions and stains of iron and manganese oxide; very strongly acid; clear smooth boundary.

Bt2—15 to 20 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct brown (10YR 5/3) and strong brown (7.5YR 5/8) and common medium prominent light brownish gray (2.5Y 6/2) mottles; very weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine and very few medium roots; many distinct brown (10YR 5/3) and light brownish gray (2.5Y 6/2) clay films on faces of peds; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid; gradual smooth boundary.

2Bt3—20 to 36 inches; yellowish brown (10YR 5/6) silty clay; common medium distinct brown (10YR 5/3) and strong brown (7.5YR 5/8), common medium and coarse prominent light brownish gray (2.5Y 6.2), and few fine prominent yellowish red (5YR 5/8) mottles; moderate coarse and medium subangular blocky structure; firm; very few fine roots; common distinct brown (10YR 5/3) and light brownish gray (2.5Y 6/2) clay films on faces of peds; common distinct light grayish brown (10YR 6/2) clay films in old root channels; strongly acid; clear wavy boundary.

2Bt4—36 to 49 inches; brown (7.5YR 5/4) silty clay; many medium distinct pinkish gray (7.5YR 6/2) and many medium prominent gray (10YR 6/1) and light brownish gray (2.5Y 6/2) mottles; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; common distinct light brownish gray (2.5Y 6/2) and pinkish gray (7.5YR 6/2) pressure faces and slickensides; few distinct light brownish gray (2.5Y 6/2) and pinkish gray (7.5YR 6/2) clay films on faces of peds; many fine black (10YR 2/1) concretions of iron and manganese oxide; strongly acid; gradual wavy boundary.

2BC—49 to 66 inches; dark yellowish brown (10YR 4/6) silty clay; common medium and coarse prominent light brownish gray (10YR 6/2) and pinkish gray (7.5YR 6/2) and common fine distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to moderate coarse subangular blocky; very firm; few faint light brownish gray (2.5Y 6/2) and pinkish gray (7.5YR 6/2) pressure faces and slickensides; few faint light brownish gray (2.5Y 6/2) and pinkish gray (7.5YR 6/2) clay films on faces of peds; 10 percent sandstone and siltstone gravel; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; medium acid; clear wavy boundary.

2C—66 to 80 inches; yellowish brown (10YR 5/6) silty clay; common medium and coarse prominent light gray (10YR 7/1) and pinkish gray (7.5YR 6/2) and common medium distinct strong brown (7.5YR 5/8) mottles; massive; firm; common distinct light olive brown (2.5YR 5/4) pressure faces and slickensides; few prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; common prominent gray (5YR 6/1) fillings in root channels; slightly acid.

The thickness of the solum ranges from 36 to 70 inches. The Ap horizon has value of 4 or 5 and chroma of 2 to 4. It is dominantly silt loam but is silty clay loam in some severely eroded pedons. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam. The 2Bt horizon has value of 4 or 5 and chroma of 3 to 6. It is silty clay or clay. The 2C horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 3 to 5, and chroma of 4 to 6. It is silty clay, clay, or silty clay loam.

Moshannon Series

The Moshannon series consists of very deep, well drained soils on flood plains. These soils formed in recent alluvium. Permeability is moderate. Slope ranges from 0 to 2 percent.

Moshannon soils commonly are adjacent to Chagrin, Elkinsville, Nolin, and Orrville soils. Chagrin, Elkinsville, and Nolin soils are not so red in the subsoil. Orrville soils are somewhat poorly drained. Chagrin, Nolin, and Orrville soils are on flood plains. Elkinsville soils are on low stream terraces.

Typical pedon of Moshannon silt loam, frequently flooded, in Lebanon Township; about 2,440 feet north and 1,180 feet east of the southwest corner of sec. 17, T. 2 N., R. 11 W.

Ap—0 to 7 inches; dark reddish brown (5YR 3/4) silt loam, reddish brown (5YR 5/3) dry; weak medium subangular blocky structure parting to weak medium granular; friable; many fine and common medium roots; neutral; clear smooth boundary.

Bw1—7 to 15 inches; reddish brown (5YR 4/4) silt loam; weak medium subangular blocky structure; friable; many fine and few medium roots; 1 percent black (10YR 2/1) coal fragments; slightly acid; gradual smooth boundary.

Bw2—15 to 25 inches; reddish brown (5YR 4/4) silt loam; weak medium and coarse subangular blocky structure; friable; common fine roots; slightly acid; gradual smooth boundary.

Bw3—25 to 40 inches; reddish brown (5YR 4/4) silt loam; weak coarse subangular blocky structure parting to weak medium subangular blocky; friable; common fine roots; medium acid; clear smooth boundary.

C1—40 to 58 inches; reddish brown (5YR 4/3) silt loam; massive; friable; few fine roots; 1 percent black (10YR 2/1) coal fragments; slightly acid; gradual smooth boundary.

C2—58 to 80 inches; reddish brown (5YR 4/3), stratified loam, silt loam, and sandy loam; common coarse prominent dark grayish brown (10YR 4/2) mottles; very friable; slightly acid.

The thickness of the solum ranges from 32 to 48 inches. The Ap horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. The Bw horizon has hue of 5YR or 2.5YR and value and chroma of 3 to 6. It is commonly silty clay loam or silt loam but has thin strata of loam in some pedons. The C horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 2 to 4.

Newark Series

The Newark series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in recent silty alluvium. Permeability is moderate. Slope ranges from 0 to 2 percent.

Newark soils are similar to Orrville soils. They commonly are adjacent to Gallipolis, Licking, Nolin, Omulga, and Richland soils. Gallipolis, Licking, and Omulga soils are moderately well drained. They are on nearby terraces. Licking soils have more clay in the subsoil than the Newark soils. Omulga soils have a fragipan in the subsoil. Nolin and Richland soils are well drained. Nolin soils are on flood plains. Richland soils have more sand and coarse fragments in the subsoil than the Newark soils. They are on nearby fans.

Typical pedon of Newark silt loam, frequently flooded, in Salem Township; about 900 feet north and 900 feet west of the southeast corner of sec. 36, T. 7 N., R. 15 W.

Ap—0 to 9 inches; brown (10YR 5/3) silt loam, light brownish yellow (10YR 6/4) dry; many coarse distinct dark yellowish brown (10YR 4/4) and prominent yellowish red (5YR 4/6) and few medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure parting to weak fine subangular blocky; friable; common medium and many fine roots; common fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; 1 percent sandstone gravel; medium acid; abrupt smooth boundary.

Bw—9 to 18 inches; light olive brown (2.5Y 5/4) silt loam; common medium distinct and prominent light brownish gray (2.5Y 6/2), reddish yellow (7.5YR 6/8), and yellowish red (5YR 4/6) and many coarse prominent brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; common fine and few medium roots; few distinct brown (10YR 5/3) silt coatings; common prominent very dark grayish brown (10YR 3/2) organic stains and fillings in root channels; few medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; gradual smooth boundary.

Bg1—18 to 29 inches; light brownish gray (10YR 6/2) silt loam; many medium and coarse prominent light olive brown (2.5Y 5/4) and few medium prominent reddish yellow (7.5YR 6/8) mottles; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings and fillings in old root channels; common distinct and prominent light brownish gray (10YR 6/2) and yellowish red (5YR 4/6) silt coatings; common fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; gradual wavy boundary.

Bg2—29 to 39 inches; grayish brown (10YR 5/2) silt loam; common medium prominent reddish yellow (7.5YR 6/8) mottles; weak medium prismatic structure; firm; very few fine roots; few distinct grayish brown (10YR 5/2) silt coatings; common fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; thin discontinuous lenses of light brownish gray (10YR 6/2) loam and sandy loam; slightly acid; clear wavy boundary.

C—39 to 57 inches; light olive brown (2.5Y 5/4) silt loam; many medium and coarse prominent yellowish red (7.5YR 6/8) and light brownish gray (10YR 6/2) mottles; massive; firm; few fine distinct black (10YR 2/1) stains and concretions of iron and manganese oxide; medium acid; gradual wavy boundary.

Cg—57 to 80 inches; grayish brown (2.5Y 5/2) silt loam; many medium and coarse prominent grayish brown (10YR 5/2) and yellowish red (7.5YR 6/8) and distinct light olive brown (2.5Y 5/4) mottles; massive; firm; small pockets of dark grayish brown (10YR 4/2) decomposing organic matter; common medium and fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; thin strata of loam; medium acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 60 inches. The content of rock fragments, mainly gravel, ranges from 0 to 5 percent in the A horizon. The B and C horizons generally do not contain rock fragments.

The Ap horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is dominantly silt loam but is loam or silty clay loam in some pedons. The Bw horizon has value of 4 or 5 and chroma of 2 to 4. It is silt loam or silty clay loam. The Bg horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 4 to 7 and chroma of 0 to 2. It is silt loam or silty clay loam. The C horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 to 4. It is dominantly silt loam or silty clay loam but is stratified with loam or fine sandy loam in some pedons.

Nolin Series

The Nolin series consists of very deep, well drained soils on flood plains. These soils formed in recent alluvium. Permeability is moderate. Slope ranges from 0 to 2 percent.

Nolin soils are similar to Chagrin soils. They are adjacent to Chagrin, Gallipolis, and Moshannon soils. Chagrin and Moshannon soils are on flood plains. Moshannon soils are redder and Chagrin soils have more sand in the subsoil than the Nolin soils. Gallipolis soils are moderately well drained. They are on low terraces adjacent to the flood plains.

Typical pedon of Nolin silt loam, frequently flooded, in Orange Township; about 2,162 feet south and 76 feet west of the northeast corner of sec. 23, T. 4 N., R. 12 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak medium and coarse subangular blocky structure parting to moderate medium and fine subangular blocky; friable; many fine roots; common medium faint dark brown (10YR 3/3) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bw1—9 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; very few medium and few fine roots; common faint dark brown (10YR 3/3) organic coatings on faces of peds; medium acid; gradual smooth boundary.

Bw2—15 to 26 inches; dark yellowish brown (10YR 4/4) silt loam; weak coarse and moderate medium subangular blocky structure; friable; few fine roots; common faint dark brown (10YR 3/3) organic coatings on faces of peds; medium acid; gradual smooth boundary.

Bw3—26 to 40 inches; dark yellowish brown (10YR 4/4) silt loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; friable; very few fine roots; common faint dark brown (10YR 3/3) organic coatings on faces of peds; medium acid; clear smooth boundary.

C1—40 to 52 inches; dark yellowish brown (10YR 4/4) loam; few fine faint brown (10YR 5/3) mottles; massive; friable; medium acid; clear smooth boundary.

C2—52 to 65 inches; dark yellowish brown (10YR 4/4) loam; common medium faint brown (10YR 5/3) and few fine distinct dark grayish brown (10YR 4/2) and light grayish brown (10YR 6/2) mottles; massive; friable; medium acid; clear smooth boundary.

C3—65 to 80 inches; dark yellowish brown (10YR 4/4), stratified sandy loam and loam; common medium faint brown (10YR 5/3) and common medium distinct dark grayish brown (10YR 4/2) and light grayish brown (10YR 6/2) mottles; massive; very friable; medium acid.

The thickness of the solum is more than 40 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 5 percent in the A and B horizons and from 0 to 35 percent in the C horizon.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. In some pedons mottles that have chroma of 2 are below a depth of 24 inches in this horizon. The C horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam, loam, fine sandy loam, or sandy loam; is stratified with these textures; or is the gravelly analogs of these textures.

Omulga Series

The Omulga series consists of very deep, moderately well drained soils in wide preglacial valleys. These soils formed in loess, old alluvium, and valley fill. Permeability is moderate above the fragipan and slow in the fragipan. Slope ranges from 2 to 12 percent.

Omulga soils commonly are adjacent to Gallia, Gilpin, Upshur, and Vincent soils. Gallia, Gilpin, Upshur, and Vincent soils do not have a fragipan. Gallia soils have more sand and rock fragments in the subsoil than the Omulga soils. They are in landscape positions similar to those of the Omulga soils. Gilpin soils are moderately deep to bedrock. They are on side slopes and uplands. Upshur soils are well drained and have red colors in the subsoil. They are on uplands. Vincent soils have red colors and more clay in the subsoil than the Omulga soils. They are on adjacent lacustrine terraces.

Typical pedon of Omulga silt loam, 2 to 6 percent slopes, in Orange Township; about 2,178 feet west and 90 feet south of the northeast corner of sec. 5, T. 4 N., R. 12 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium subangular blocky structure; friable; many fine roots; few fine prominent black (10YR 2/1) soft accumulations of iron and manganese oxide; few specks of brown (10YR 5/3) and yellowish brown (10YR 5/4) subsoil material mixed throughout; medium acid; clear smooth boundary.

Bt1—9 to 18 inches; yellowish brown (10YR 5/4) silt loam; few medium faint brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; many faint light yellowish brown (10YR 6/4) silt coatings; few dark yellowish brown (10YR 4/4) krotovinas; very few faint yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—18 to 23 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct brown (10YR 5/3) and yellowish brown (10YR 5/4) clay films on faces of peds; common fine and medium black (10YR 2/1) concretions of iron and manganese oxide; strongly acid; abrupt smooth boundary.

Btx1—23 to 32 inches; yellowish brown (10YR 5/6) silt loam; many coarse prominent light brownish gray (10YR 6/2) and common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky and prismatic; extremely firm and brittle; very few fine roots along faces of prisms; many fine black (10YR 2/1) soft accumulations of iron and manganese oxide; many coarse prominent light brownish gray (10YR 6/2) and many distinct yellowish brown (10YR 5/4) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btx2—32 to 49 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct yellowish brown (10YR 5/4), many medium prominent dark grayish brown (10YR 4/2), and many medium distinct brown (7.5YR 5/4) and reddish brown (5YR 4/4) mottles; weak coarse and very coarse prismatic structure parting to moderate medium subangular blocky; extremely firm and brittle; very few fine roots; very few fine black (10YR 2/1) soft accumulations of iron and manganese oxide; many distinct strong brown (7.5YR 5/6), yellowish brown (10YR 5/4), and dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid; clear smooth boundary.

B´t—49 to 59 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct strong brown (7.5YR 5/6), many medium faint yellowish brown (10YR 5/4), and many medium prominent dark grayish brown (10YR 4/2) mottles; strong medium subangular blocky structure; very firm; many distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/6) clay films on faces of peds; common distinct reddish brown (5YR 4/4) clay films and silt coatings in old root channels; strongly acid; gradual smooth boundary.

BC—59 to 67 inches; yellowish brown (10YR 5/6) silt loam; common medium and coarse distinct and prominent pale brown (10YR 6/3), reddish brown (5YR 5/4), and light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; firm; few faint brown (10YR 5/3) and light brownish gray (10YR 6/2) clay films on faces of peds; few fine faint reddish brown (5YR 5/4) clay films and silt coatings in old root channels; strongly acid; abrupt wavy boundary.

2C—67 to 80 inches; reddish brown (5YR 5/4) silty clay; many medium prominent yellowish red (5YR 5/8), reddish yellow (7.5YR 6/8), and reddish gray (5YR 5/2) mottles; massive with some very weak structural breaks; firm; very few fine distinct yellowish brown (10YR 5/6) and dark grayish brown (10YR 4/2) silt coatings in old root channels; reddish brown (5YR 5/4) and strong brown (7.5YR 5/6) pressure faces; few very thin strata of fine sand; strongly acid.

The thickness of the solum ranges from 40 to 100 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 5 percent in the Bt horizon, from 0 to 10 percent in the Btx, B´t, and BC horizons, and from 0 to 15 percent in the C horizon.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. It is silt loam or silty clay loam. The Btx and B´t horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6.They are silt loam or silty clay loam. The 2C horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 2 to 6.

Orrville Series

The Orrville series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in recent loamy alluvium. Permeability is moderate. Slope ranges from 0 to 2 percent.

Orrville soils are similar to Newark soils. They commonly are adjacent to Chagrin, Kyger, Licking, Omulga, and Taggart soils. Chagrin and Newark soils are on flood plains. Chagrin soils are well drained. Newark soils have less sand in the subsoil than the Orrville soils. Kyger soils are poorly drained. They are on flood plains near areas of abandoned strip mines. Omulga and Licking soils are moderately well drained. They are on nearby high terraces. Taggart soils are somewhat poorly drained. They are on low stream terraces.

Typical pedon of Orrville silt loam, frequently flooded, in Rutland Township; about 2,100 feet south and 400 feet west of the northeast corner of sec. 13, T. 6 N., R. 14 W.

A—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, brown (10YR 5/3) dry; many fine distinct grayish brown (10YR 5/2) mottles; moderate medium granular structure; friable; many fine and common medium roots; few coal fragments; slightly acid; clear smooth boundary.

Bw—4 to 12 inches; yellowish brown (10YR 5/4) silt loam; many medium and coarse distinct and prominent dark grayish brown (10YR 4/2) and dark brown (7.5YR 3/4) mottles; moderate medium subangular blocky structure; firm; common fine and medium roots; few distinct grayish brown (10YR 5/2) coatings on vertical faces of peds; few fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; few coarse fragments of coal, sandstone, and siltstone; slightly acid; clear wavy boundary.

Bg—12 to 24 inches; grayish brown (10YR 5/2) silt loam; many medium and coarse faint brown (10YR 5/3) and prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine and medium roots; few prominent grayish brown (10YR 5/2) coatings on vertical faces of peds; many fine and medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; few coarse sandstone fragments; slightly acid; clear wavy boundary.

B´w1—24 to 35 inches; dark yellowish brown (10YR 4/4) loam; few medium faint yellowish brown (10YR 5/4) and common coarse distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; very few fine roots; common faint dark grayish brown (10YR 4/2) coatings on vertical faces of peds; many fine and medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; 10 percent sandstone and siltstone fragments; slightly acid; clear smooth boundary.

B´w2—35 to 42 inches; dark yellowish brown (10YR 4/4), stratified silt loam, loam, and sandy loam; common medium and coarse distinct yellowish brown (10YR 5/4) and prominent grayish brown (10YR 5/2) mottles; weak medium and coarse subangular blocky structure; firm; very few fine roots; many coarse prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; medium acid; abrupt smooth boundary.

C—42 to 47 inches; dark yellowish brown (10YR 4/6), stratified loam and loamy sand; common medium distinct grayish brown (10YR 5/2) and prominent strong brown (7.5YR 5/8) mottles; massive; very friable; many medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; slightly acid; abrupt smooth boundary.

Cg1—47 to 56 inches; grayish brown (10YR 5/2), stratified silt loam and loam; common medium prominent yellowish brown (10YR 5/6) mottles; massive; friable; common medium and fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; slightly acid; clear smooth boundary.

Cg2—56 to 70 inches; dark grayish brown (10YR 4/2), stratified silt loam and loam; few medium prominent dark yellowish brown (10YR 4/6) mottles; massive; friable; few fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; slightly acid; abrupt smooth boundary.

C—70 to 80 inches; brown (10YR 5/3), stratified loam and silty clay loam; few medium prominent light olive brown (2.5Y 5/4) and common medium and coarse distinct brown (7.5YR 5/2) and prominent olive gray (5Y 5/2) mottles; massive; friable; few fine and medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; neutral.

The thickness of the solum ranges from 24 to 50 inches. The content of rock fragments ranges from 0 to 5 percent in the A horizon, from 0 to 15 percent in the B horizon, and from 0 to 25 percent in the C horizon.

The A or Ap horizon has hue of 10YR or 2.5Y and value of 3 or 4. It is dominantly silt loam but is loam in some pedons. The Bw horizon has hue of 10YR, 2.5Y, or 5Y and value and chroma of 3 to 6. It is silt loam, loam, silty clay loam, or sandy loam. The Bg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 6. It is silt loam or loam. The C horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7, and chroma of 1 to 6. It generally is silt loam, loam, or sandy loam or in some pedons is the gravelly analogs of those textures and has thin strata of loamy sand.

Pinegrove Series

The Pinegrove series consists of very deep, well drained soils on ridgetops and side slopes in surface mined areas. These soils formed in a mixture of fine earth and fragments of sandstone, siltstone, and shale from surface mining operations. Permeability is rapid. Slope ranges from 0 to 70 percent.

Pinegrove soils commonly are adjacent to Gilpin, Guernsey, Steinsburg, and Upshur soils. Gilpin, Guernsey, Steinsburg, and Upshur soils are in areas that have not been disturbed by mining operations. Upshur soils have more clay in the surface layer and subsoil than the Pinegrove soils. Guernsey soils are moderately well drained. Gilpin and Steinsburg soils are moderately deep to bedrock.

Typical pedon of Pinegrove coarse sandy loam, 0 to 8 percent slopes, 3.5 miles southwest of Rutland in Rutland Township; about 300 feet north and 1,000 feet east of the southwest corner of sec. 24, T. 5 N., R. 14 W.

A—0 to 2 inches; brown (10YR 5/3) coarse sandy loam, light yellowish brown (10YR 6/4) dry; very friable; 10 percent coal, sandstone, and shale channers; extremely acid; gradual wavy boundary.

C1—2 to 12 inches; yellowish brown (10YR 5/6) channery loamy coarse sand that has very small pockets of loam; massive; very friable in place, loose when disturbed; total of 25 percent coal, sandstone, and shale fragments; extremely acid; clear wavy boundary.

C2—12 to 27 inches; strong brown (7.5YR 5/6) channery loamy coarse sand; very small pockets of loam where shale fragments have disintegrated; massive; very friable, loose when disturbed; total of 20 percent coal, sandstone, and shale fragments; extremely acid; gradual wavy boundary.

C3—27 to 80 inches; yellowish brown (10YR 5/4) channery loamy coarse sand; massive; loose; boulder-sized fragments of soft, weak sandstone at a depth of 40 inches; cuts easily with spade; 15 percent rock fragments; extremely acid.

The content of rock fragments is less than 35 percent, by volume. The rock fragments typically are weakly cemented and weather rapidly.

The A horizon has hue of 10YR to 2.5Y, value of 3 to 6, and chroma of 2 to 6. It is coarse sandy loam, sandy loam, or the channery or gravelly analogs of those textures. The Ap horizon, if it occurs, has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 2 to 6. It is silty clay loam, clay loam, silt loam, or silty clay. The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 8, and chroma of 2 to 8. It generally is loamy coarse sand, loamy sand, or the channery analogs of those textures. It has thin subhorizons of sandy loam in some pedons.

Rarden Series

The Rarden series consists of moderately deep, moderately well drained soils on ridgetops and side slopes. These soils formed in residuum from interbedded shale and siltstone. Permeability is slow. Slope ranges from 8 to 40 percent.

Rarden soils commonly are adjacent to Aaron, Gilpin, Guernsey, Upshur, and Woodsfield soils. Aaron and Woodsfield soils are on ridgetops. They are deep to bedrock. Guernsey soils are deep and very deep. They are on side slopes. Gilpin and Upshur soils are well drained. They are in landscape positions similar to those of the Rarden soils.

Typical pedon of Rarden silt loam, 8 to 15 percent slopes, eroded, in Scipio Township; about 400 feet south and 550 feet east of the northwest corner of sec. 4, T. 7 N., R. 14 W.

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure parting to moderate fine granular; friable; common fine and medium and few large roots; 15 percent strong brown (7.5YR 5/6) BE material; strongly acid; clear smooth boundary.

BE—6 to 11 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine and medium roots; common distinct dark yellowish brown (10YR 4/4) and few distinct brown (7.5YR 5/4) and strong brown (7.5YR 5/6) clay films on faces of peds; few distinct dark yellowish brown (10YR 4/4) fillings in root channels and wormcasts; strongly acid; clear smooth boundary.

Bt1—11 to 16 inches; yellowish red (5YR 5/6) silty clay loam; common medium prominent grayish brown (10YR 5/2) and brown (10YR 5/3) mottles; moderate medium and fine subangular blocky structure; firm; few fine and medium roots; few distinct dark yellowish brown (10YR 4/4) fillings in root channels and wormcasts; common distinct brown (10YR 5/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—16 to 24 inches; reddish brown (2.5YR 4/4) silty clay; common medium prominent yellowish brown (10YR 5/4) and few medium prominent light brownish gray (10YR 6/2) mottles; moderate medium and coarse subangular blocky structure; firm; few fine and medium roots; common distinct reddish brown (5YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—24 to 32 inches; strong brown (7.5YR 5/6) channery clay; many medium and coarse prominent gray (10YR 6/1), yellowish brown (10YR 5/6), and red (2.5YR 5/6) mottles; moderate coarse subangular blocky structure; firm; few fine and medium roots; common distinct gray (10YR 6/1) clay films on faces of peds; 20 percent siltstone channers; very strongly acid; clear wavy boundary.

Cr—32 to 35 inches; light yellowish brown (10YR 6/4), highly weathered siltstone bedrock.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The content of rock fragments ranges from 0 to 30 percent in the subhorizon directly above the paralithic contact and from 0 to 15 percent in the rest of the Bt horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is dominantly silt loam but is silty clay loam in some pedons. The BE and Bt horizons have hue of 7.5YR to 2.5YR, value of 3 to 7, and chroma of 4 to 8. They are dominantly silty clay or clay in the fine-earth fraction. In some pedons, however, the upper part of the Bt horizon has thin strata of silty clay loam.

Richland Series

The Richland series consists of very deep, well drained soils on alluvial fans. Permeability is moderate. Slope ranges from 2 to 6 percent.

Richland soils commonly are adjacent to Chagrin, Elkinsville, Gallipolis, Newark, and Orrville soils. Chagrin, Orrville, and Newark soils formed in recent alluvium. They are on nearby flood plains. Elkinsville and Gallipolis soils are on nearby terraces. They have more silt, less sand, and fewer rock fragments in the subsoil than the Richland soils.

Typical pedon of Richland silt loam, 2 to 6 percent slopes, in Rutland Township; about 2,500 feet east and 1,100 feet north of the southwest corner of sec. 18, R. 14 W., T. 8 N.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate medium granular; friable; many fine roots; 5 percent sandstone fragments; medium acid; abrupt smooth boundary.

Bt1—10 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct brown (10YR 5/3) clay films on faces of peds; common medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; 5 percent sandstone fragments; strongly acid; clear smooth boundary.

Bt2—23 to 29 inches; strong brown (7.5YR 5/6) loam; many medium faint strong brown (7.5YR 5/8) and distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; few fine roots; many prominent yellowish brown (10YR 5/4) clay films on faces of peds; many medium prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; 10 percent sandstone fragments; strongly acid; clear smooth boundary.

Bt3—29 to 37 inches; brown (10YR 5/3) gravelly loam; many coarse prominent dark brown (7.5YR 4/4) mottles; weak medium and fine subangular blocky structure; very friable; very few fine roots; common distinct brown (10YR 5/3) clay films on faces of peds; common fine prominent black (10YR 2/1) stains and concretions of iron and manganese oxide; 30 percent sandstone and siltstone fragments; medium acid; clear smooth boundary.

Bt4—37 to 44 inches; strong brown (7.5YR 5/6) loam; many coarse distinct brown (10YR 5/3) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; very few fine roots; common distinct brown (10YR 5/3) clay films on faces of peds; 5 percent sandstone fragments; medium acid; clear smooth boundary.

BC—44 to 54 inches; dark brown (7.5YR 4/4) gravelly loam; few fine prominent light brownish gray (10YR 6/2) mottles; weak medium and fine subangular blocky structure; very friable; few faint brown (10YR 5/3) clay films on faces of peds; 30 percent sandstone and siltstone fragments; medium acid; clear smooth boundary.

C1—54 to 67 inches; dark yellowish brown (10YR 4/4) very gravelly loam; common medium distinct strong brown (7.5YR 4/6 and 5/8) mottles; massive; very friable; 55 percent sandstone and siltstone fragments; medium acid; clear smooth boundary.

C2—67 to 80 inches; brown (7.5YR 5/4) loam; common fine and medium prominent brownish yellow (10YR 6/6) and light gray (10YR 7/2) mottles; massive; friable; 10 percent sandstone and siltstone fragments; medium acid.

The thickness of the solum ranges from 44 to 60 inches. The content of rock fragments ranges from 5 to 20 percent in the A horizon, from 5 to 35 percent in the Bt horizon, and from 10 to 55 percent in the C horizon.

The A horizon has chroma of 2 to 4. It is dominantly silt loam but is loam or the gravelly or channery analogs of silt loam and loam in some pedons. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. It is silt loam, loam, silty clay loam, clay loam, sandy clay loam, or the gravelly analogs of those textures. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loam, clay loam, silty clay loam, or the gravelly or very gravelly analogs of those textures.

Steinsburg Series

The Steinsburg series consists of moderately deep, well drained soils on side slopes. These soils formed in weakly cemented sandstone. Permeability is moderately rapid. Slope ranges from 15 to 70 percent.

Steinsburg soils commonly are adjacent to Gilpin, Guernsey, Upshur, and Vandalia soils. Gilpin soils have more clay and less sand in the subsoil than the Steinsburg soils. Guernsey, Upshur, and Vandalia soils are deep or very deep to bedrock. Gilpin and Upshur soils are on side slopes and ridgetops. Guernsey soils are on side slopes. Vandalia soils are on colluvial foot slopes.

Typical pedon of Steinsburg fine sandy loam, 40 to 70 percent slopes, in Scipio Township; about 1,500 feet north and 3,700 feet east of the southwest corner of fractional sec. 1, T. 9 N., R. 14 W.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; very friable; many fine and few medium roots; 5 percent sandstone fragments; very strongly acid; clear smooth boundary.

Bw1—3 to 12 inches; yellowish brown (10YR 5/6) fine sandy loam; 5 percent brown (10YR 4/3) mixed and stained material; weak medium subangular blocky structure parting to moderate fine subangular blocky; very friable; many fine and common medium roots; 5 percent sandstone channers less than 3 inches in length; common soft sandstone fragments; very strongly acid; gradual smooth boundary.

Bw2—12 to 18 inches; yellowish brown (10YR 5/6) fine sandy loam; weak coarse subangular blocky structure parting to weak and moderate medium and fine subangular blocky; very friable; few fine and few medium roots; 10 percent sandstone channers, some more than 3 inches in length; common soft sandstone fragments; few fine faint light olive brown (2.5Y 5/6) silt coatings on faces of some fragments and some peds; few fine distinct black (10YR 2/1) concretions of iron and manganese; very strongly acid; clear smooth boundary.

C—18 to 26 inches; yellowish brown (10YR 5/6) channery fine sandy loam; massive; very friable; very few fine and medium roots; 15 percent sandstone channers; many soft sandstone fragments; few fine distinct black (10YR 2/1) concretions of iron and manganese; very strongly acid; abrupt wavy boundary.

Cr—26 to 36 inches; weakly cemented, light olive brown (2.5Y 5/6) sandstone bedrock; many white noncalcareous flakes that are not micas.

The thickness of the solum ranges from 12 to 20 inches. The depth to bedrock ranges from 24 to 40 inches. The content of rock fragments generally increases with increasing depth. It ranges from 5 to 20 percent in the solum and from 15 to 30 percent in the C horizon.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. The Bw horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is loam, sandy loam, or fine sandy loam in the fine-earth fraction. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is the channery analogs of sandy loam, fine sandy loam, or loamy sand.

Taggart Series

The Taggart series consists of very deep, somewhat poorly drained soils on terraces. These soils formed in silty old alluvium. Permeability is slow. Slope ranges from 0 to 2 percent.

Taggart soils commonly are adjacent to Chagrin, Elkinsville, Gallipolis, Licking, and Nolin soils. Chagrin and Nolin soils are well drained. They are on nearby flood plains. Elkinsville and Gallipolis soils are on terraces. They commonly are in the slightly higher areas. Elkinsville soils are well drained. They have more sand in the subsoil than the Taggart soils. Gallipolis and Licking soils are moderately well drained. Licking soils generally are on the adjacent, higher terraces.

Typical pedon of Taggart silt loam, 0 to 2 percent slopes, in Salisbury Township; about 2,800 feet north and 500 feet east of the southwest corner of fractional sec. 314, T. 5 N., R. 13 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak medium and coarse subangular blocky structure parting to moderate medium and coarse granular; friable; many fine and few medium roots; 5 percent mixed areas of yellowish brown (10YR 5/4) silt loam from the BE horizon; medium acid; abrupt smooth boundary.

BE—8 to 11 inches; brown (10YR 5/3) silt loam; many medium and coarse faint grayish brown (10YR 5/2) and few fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine and few medium roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many prominent grayish brown (10YR 5/2) silt coatings; few distinct dark brown (10YR 3/3) organic coatings on faces of peds; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; many prominent grayish brown (10YR 5/2) crawfish channels; strongly acid; clear smooth boundary.

Bt1—11 to 19 inches; brown (10YR 5/3) silty clay loam; many medium faint light brownish gray (10YR 6/2) and prominent reddish yellow (7.5YR 6/8) and common fine distinct strong brown (7.5YR 5/6) mottles; weak medium and coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine and very few medium roots; many prominent light brownish gray (2.5Y 6/2) clay films on faces of peds; few distinct light brownish gray (2.5Y 6/2) silt coatings; many prominent grayish brown (10YR 5/2) crawfish channels; common medium and fine black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; clear wavy boundary.

Bt2—19 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; many medium and coarse distinct light brownish gray (10YR 6/2) and prominent reddish yellow (7.5YR 6/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many prominent light brownish gray (2.5Y 6/2) clay films on faces of peds; many prominent grayish brown (10YR 5/2) crawfish channels; common medium and fine black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid; gradual wavy boundary.

Bt3—29 to 41 inches; yellowish brown (10YR 5/4) silty clay loam; many medium and coarse distinct light brownish gray (10YR 6/2) and common medium and coarse prominent reddish yellow (7.5YR 6/8) mottles; weak coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; very few fine roots; common prominent light brownish gray (2.5Y 6/2) clay films on faces of peds; common prominent grayish brown (10YR 5/2) crawfish channels; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; very strongly acid; gradual wavy boundary.

Bt4—41 to 55 inches; yellowish brown (10YR 5/4) silty clay loam; common medium and coarse prominent reddish yellow (7.5YR 6/8) and light brownish gray (2.5Y 6/2) mottles; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; common prominent light brownish gray (2.5YR 6/2) clay films on faces of peds; common prominent grayish brown (10YR 5/2) crawfish channels; common medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; gradual wavy boundary.

BC—55 to 72 inches; yellowish brown (10YR 5/4) silty clay loam; common medium and coarse prominent reddish yellow (7.5YR 6/8) and light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure; firm; few distinct light brownish gray (2.5Y 6/2) clay films on faces of peds; few prominent grayish brown (10YR 5/2) crawfish channels; common medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; strongly acid; clear wavy boundary.

C—72 to 80 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium prominent reddish yellow (7.5YR 6/8) and common medium and coarse light brownish gray (2.5Y 6/2) mottles; massive; firm; common coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; medium acid.

The thickness of the solum ranges from 40 to 72 inches. The depth to bedrock is more than 5 feet.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. The Bt horizon has value of 5 or 6 and chroma of 1 to 4. It is silt loam or silty clay loam. The C horizon has value of 4 to 6 and chroma of 2 to 6. It is laminated or stratified in some pedons.

Upshur Series

The Upshur series consists of deep and very deep, well drained soils on ridgetops and side slopes. These soils formed in residuum from red shale. Permeability is slow. Slope ranges from 8 to 50 percent.

Upshur soils are similar to Vandalia soils. They commonly are adjacent to Aaron, Gilpin, Guernsey, and Steinsburg soils. Vandalia soils are on foot slopes. They have more sand and sandstone fragments in the subsoil than the Upshur soils. Gilpin and Steinsburg soils are moderately deep to bedrock. Aaron and Guernsey soils are moderately well drained. Aaron soils are on ridgetops. Gilpin soils are in landscape positions similar to those of the Upshur soils. Guernsey and Steinsburg soils are on side slopes.

Typical pedon of Upshur silt loam, 8 to 15 percent slopes, about 1.2 miles west of Portland, in Lebanon Township; about 1,100 feet south of the intersection of Baldknob-Stiversville Road and Stiversville Road, along Stiversville Road, about 3,580 feet east.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam, very pale brown (10YR 7/3) dry; moderate medium and fine granular structure; friable; many fine and medium roots; 20 percent mixed areas of strong brown (7.5YR 5/6) silt loam from the BE horizon; extremely acid; clear smooth boundary.

BE—1 to 8 inches; strong brown (7.5YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; many fine and medium roots; 15 percent mixed areas of very dark grayish brown (10YR 3/2) silt loam from the A horizon; very few faint brown (7.5YR 5/4) silt coatings; extremely acid; abrupt wavy boundary.

Bt1—8 to 16 inches; reddish brown (2.5YR 4/4) silty clay; moderate and strong medium subangular blocky structure; firm; many fine and few medium roots; few faint reddish brown (2.5YR 4/4) pressure faces; many distinct reddish brown (2.5YR 4/4) clay films on faces of peds; extremely acid; clear wavy boundary.

Bt2—16 to 24 inches; dark red (2.5YR 3/6) silty clay; weak coarse subangular blocky structure parting to moderate medium subangular blocky; firm; common fine and few medium roots; common distinct dark red (2.5YR 3/6) pressure faces; many distinct dark red (2.5YR 3/6) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—24 to 42 inches; weak red (10R 4/4) silty clay; weak medium prismatic parting to strong medium and coarse subangular blocky; firm; few fine and medium roots; many distinct weak red (10R 4/4) pressure faces and slickensides; many distinct weak red (10R 4/4) clay films on faces of peds; 5 percent soft shale fragments; very strongly acid; clear wavy boundary.

BC—42 to 54 inches; red (10R 4/6) silty clay loam; many medium prominent dark reddish gray (10R 4/1) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct weak red (10R 4/4) pressure faces and slickensides; few faint weak red (10R 4/4) clay films on faces of peds; 10 percent soft shale fragments; very strongly acid; gradual wavy boundary.

C—54 to 60 inches; variegated dark red (10R 3/6), dark reddish gray (10R 4/1), black (10YR 2/1), and grayish brown (2.5Y 5/2) channery silty clay loam; massive; firm; common medium faint dark red (10R 3/6) pressure faces and slickensides; 30 percent shale fragments; medium acid; gradual smooth boundary.

Cr—60 to 80 inches; variegated dark red (10R 3/6), dark reddish gray (10R 4/1), light olive brown (2.5Y 5/4), and white (N 8/0), soft shale bedrock.

The thickness of the solum ranges from 26 to 56 inches. The depth to bedrock is more than 40 inches. The content of rock fragments ranges from 0 to 15 percent in the A horizon and the upper part of the Bt horizon, from 0 to 25 percent in the lower part of the Bt horizon, and from 5 to 75 percent in the C horizon.

The A horizon has hue of 10YR to 2.5YR and value and chroma of 2 to 4. It typically is silt loam but is silty clay loam or silty clay in some pedons. The Bt horizon has hue of 5YR to 10R, value of 3 to 5, and chroma of 3 to 6. It is silty clay or clay. The C horizon generally has colors similar to those of the B horizon, but in some pedons it has variegated colors of yellow and olive. It is silty clay loam to clay or the channery and very channery analogs of the textures within that range.

Vandalia Series

The Vandalia series consists of deep, well drained soils on colluvial foot slopes. These soils formed in colluvium from red shale and small amounts of siltstone and sandstone. Permeability is moderately slow or slow. Slope ranges from 8 to 25 percent.

Vandalia soils are similar to Upshur soils. They commonly are adjacent to Gilpin, Upshur, and Steinsburg soils. Upshur soils are on hillslopes and ridgetops. They do not have fragments of sandstone and siltstone in the upper part of the subsoil. Gilpin and Steinsburg soils are on adjacent hillslopes. They are moderately deep to bedrock.

Typical pedon of Vandalia silt loam, 15 to 25 percent slopes, eroded, in Sutton Township; about 400 feet east and 200 feet north of the southwest corner of fractional sec. 290, T. 2 N., R. 12 W.

Ap—0 to 6 inches; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine and few medium roots; few distinct reddish brown (5YR 4/4) coatings on faces of peds; 10 percent sandstone and siltstone fragments; 5 percent reddish brown (5YR 4/4) Bt1 material; medium acid; abrupt smooth boundary.

Bt1—6 to 12 inches; reddish brown (5YR 4/4) channery silty clay; strong medium subangular blocky structure; firm; common fine and few medium roots; common distinct dark reddish brown (5YR 3/4) clay films on faces of peds; common prominent dark brown (10YR 4/3) silt coatings; 15 percent sandstone and siltstone fragments; medium acid; clear wavy boundary.

Bt2—12 to 29 inches; reddish brown (5YR 4/4) channery silty clay; moderate medium and coarse subangular blocky structure; firm; few fine and medium roots; many distinct reddish brown (5YR 5/4) clay films on faces of peds; very few faint yellowish brown (10YR 5/4) silt coatings; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; 25 percent sandstone and siltstone fragments; strongly acid; gradual wavy boundary.

Bt3—29 to 42 inches; reddish brown (5YR 4/4) channery silty clay; moderate medium subangular blocky structure; firm; very few fine and medium roots; common distinct reddish brown (5YR 4/4) clay films on faces of peds; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; 20 percent sandstone and siltstone fragments; strongly acid; clear wavy boundary.

Bt4—42 to 56 inches; reddish brown (5YR 4/4) very channery silty clay; weak coarse subangular blocky structure parting to moderate fine subangular blocky; firm; very few fine roots; few faint reddish brown (5YR 4/4) clay films on faces of peds; few fine black (10YR 2/1) stains and concretions of iron and manganese oxide; 40 percent sandstone and siltstone fragments; very strongly acid; gradual wavy boundary.

BC—56 to 63 inches; reddish brown (5YR 4/3) very channery silty clay loam; few fine and medium prominent yellowish brown (10YR 5/4) and red (10R 4/8) mottles; moderate fine subangular blocky structure; firm; very few fine roots; very few faint reddish brown (5YR 4/4) clay films on faces of peds; common fine and medium black (10YR 2/1) stains and concretions of iron and manganese oxide; 45 percent sandstone and siltstone fragments; strongly acid; gradual wavy boundary.

C—63 to 80 inches; dark reddish brown (5YR 3/3) very channery silty clay; few and common medium and fine prominent yellowish brown (10YR 5/4), light olive brown (2.5Y 5/4), and red (2.5YR 5/8) mottles; massive; firm; very few fine roots; many medium and coarse black (10YR 2/1) stains and concretions of iron and manganese oxide; 50 percent sandstone and siltstone fragments; medium acid.

The thickness of the solum ranges from 40 to 80 inches. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 5 to 40 percent in the Bt horizon and from 5 to 50 percent in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. It is dominantly silt loam but is silty clay loam in some pedons. The upper part of the Bt horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6. The lower part has hue of 10YR to 5YR, value of 3 or 4, and chroma of 3 to 6. The upper part generally is silty clay loam, silty clay, or clay loam, and the lower part generally is silty clay loam, silty clay, or clay. The C horizon has hue of 10R to 7.5YR and value and chroma of 3 to 6. It is silty clay loam, silty clay, clay, and the channery and very channery analogs of those textures.

Vincent Series

The Vincent series consists of very deep, well drained and moderately well drained soils on terraces in preglacial valleys. These soils formed in a thin silty mantle and in the underlying fine textured lacustrine material. Permeability is slow. Slope ranges from 2 to 12 percent.

The Vincent soils in this county have more clay in the subsoil than is definitive for the series. This difference, however, does not affect the use and management of the soils.

Vincent soils commonly are adjacent to Licking and Omulga soils. Omulga soils have a fragipan. Licking soils do not have red colors in the subsoil. Omulga and Licking soils are on adjacent terraces.

Typical pedon of Vincent silty clay loam, 2 to 6 percent slopes, eroded, in Chester Township; about 700 feet south and 100 feet west of the northeast corner of sec. 33, T. 3 N., R. 12 W.

Ap—0 to 8 inches; dark brown (7.5YR 4/4) silty clay loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure parting to moderate medium granular; friable; many fine roots; 5 percent mixed areas of red (2.5YR 4/6) silty clay from the Bt horizon; slightly acid; abrupt smooth boundary.

Bt1—8 to 16 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct yellowish red (5YR 4/6) clay films and silt coatings on faces of peds; very strongly acid; clear wavy boundary.

Bt2—16 to 22 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; few fine roots; many distinct yellowish red (5YR 4/6) clay films on faces of peds; few faint yellowish red (5YR 4/6) silt coatings; very strongly acid; gradual wavy boundary.

Bt3—22 to 34 inches; red (2.5YR 4/6) clay; common fine and medium prominent light gray (10YR 7/1) and few medium prominent brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure parting to moderate medium subangular blocky; many prominent yellowish red (5YR 4/6) clay films on faces of peds; common prominent yellowish red (5YR 5/6) pressure faces and slickensides; buried root or limb, 1 1/2 inches in diameter, at a depth of 30 inches; very strongly acid; clear wavy boundary.

Bt4—34 to 44 inches; red (2.5YR 4/6) clay; common medium and coarse prominent gray (10YR 6/1) and few fine and medium prominent yellowish brown (10YR 5/4) mottles; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; many prominent yellowish red (5YR 4/6) pressure faces and slickensides; many distinct yellowish red (5YR 4/6) clay films on faces of peds; few coarse prominent black (10YR 2/1) and olive yellow (2.5Y 6/6) fillings in old root channels; very strongly acid; clear wavy boundary.

BC—44 to 60 inches; red (2.5YR 4/6) silty clay; common coarse prominent light olive brown (2.5Y 5/6) mottles; weak coarse blocky structure with varving visible in the interior of the peds; very firm; many prominent reddish brown (5YR 4/4) pressure faces and slickensides; many prominent black (10YR 2/1) and olive yellow (2.5Y 6/6) fillings in old root channels; many medium and coarse prominent black (10YR 2/1) stains of iron and manganese oxide; two bands of black (10YR 2/1) concentrations of iron and manganese oxide at depths of 55 and 60 inches; platy structure in these bands, plates surrounded by yellowish brown (10YR 5/8) silt loam; medium acid; abrupt smooth boundary.

C—60 to 80 inches; red (2.5YR 4/6) silty clay; common medium prominent reddish yellow (7.5YR 6/8) mottles; massive with very evident varving; very firm; common prominent light brown (7.5YR 6/4) silt coatings between varve layers; common medium and coarse prominent black (10YR 2/1) stains of iron and manganese oxide; few prominent dark brown (7.5YR 4/4) fillings in root channels; neutral.

The thickness of the solum ranges from 40 to 70 inches. The depth to bedrock is more than 60 inches. The loess mantle is as much as 20 inches thick.

The Ap horizon has hue of 10YR or 7.5YR and value and chroma of 3 or 4. It is dominantly silty clay loam but is silt loam in some pedons. The Bt horizon has hue of 7.5YR, 5YR, or 2.5YR, value of 3 to 5, and chroma of 3 to 6. It is silty clay, silty clay loam, or clay. The C horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 3 to 6. It is silty clay, clay, or silty clay loam.

Westmoreland Series

The Westmoreland series consists of deep and very deep, well drained soils on side slopes. These soils formed in residuum from siltstone and fine grained sandstone. Permeability is moderate. Slope ranges from 15 to 70 percent.

Westmoreland soils are similar to Gilpin soils. They commonly are adjacent to Gilpin, Guernsey, Rarden, Steinsburg, and Upshur soils. Gilpin, Guernsey, Rarden, Steinsburg, and Upshur soils are in landscape positions similar to those of the Westmoreland soils; however, Guernsey, Rarden, and Upshur soils are generally on the less sloping benches on side slopes. Gilpin, Rarden, and Steinsburg soils are moderately deep to bedrock. Guernsey soils are moderately well drained. Upshur soils have more clay and less sand in the subsoil than the Westmoreland soils.

Typical pedon of Westmoreland silt loam, in an area of Westmoreland-Gilpin complex, 25 to 40 percent slopes, in Orange Township; about 1,600 feet east and 200 feet south of the northwest corner of sec. 12, R. 12 W., T. 4 N.

A—0 to 3 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; very friable; many fine and medium coarse roots; 2 percent sandstone fragments; medium acid; clear smooth boundary.

BE—3 to 6 inches; dark yellowish brown (10YR 4/6) silt loam; moderate medium and fine subangular blocky structure; friable; many fine and medium and few coarse roots; 2 percent sandstone fragments; strongly acid; gradual smooth boundary.

Bt1—6 to 12 inches; dark yellowish brown (10YR 4/6) silt loam; weak medium subangular blocky structure; firm; many fine, common medium, and very few coarse roots; few faint dark yellowish brown (10YR 4/6) clay films on faces of peds; 2 percent sandstone fragments; medium acid; gradual wavy boundary.

Bt2—12 to 20 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; firm; common fine and very few coarse roots; common distinct yellowish brown (10YR 5/4) clay films on faces of peds; 10 percent sandstone fragments; strongly acid; clear wavy boundary.

Bt3—20 to 32 inches; strong brown (7.5YR 5/6) channery silty clay loam; moderate medium and coarse subangular blocky structure; firm; few fine roots; many prominent strong brown (7.5YR 5/6) clay films on faces of peds; 25 percent sandstone fragments; very strongly acid; clear smooth boundary.

C—32 to 42 inches; strong brown (7.5YR 5/6) very channery silty clay loam; few medium distinct yellowish red (5YR 5/6) mottles; weak medium and coarse subangular blocky structure; firm; few fine roots; few distinct yellowish red (5YR 5/6) clay films on faces of rocks and on faces between rock fragments; 50 percent sandstone fragments; strongly acid; abrupt smooth boundary.

R—42 inches; yellowish brown (10YR 6/6) sandstone bedrock.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock ranges from 40 to 72 inches. The content of rock fragments ranges from 2 to 30 percent in the A and B horizons and from 45 to 90 percent in the C horizon.

The A horizon has value of 3 or 4 and chroma of 2 or 3. It is dominantly silt loam but is loam or silty clay loam in some pedons. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loam to silty clay loam or the channery analogs within that range. The C horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loam to silty clay loam in the fine-earth fraction.

Woodsfield Series

The Woodsfield series consists of deep and very deep, well drained soils on ridgetops. These soils formed in loess and residuum from bedrock. Permeability is moderate in the upper part of the subsoil and slow in the lower part. Slope ranges from 2 to 6 percent.

Woodsfield soils commonly are adjacent to Aaron, Gilpin, Rarden, Upshur, and Vandalia soils. Aaron and Rarden soils are moderately well drained. Gilpin soils are moderately deep to bedrock. Upshur soils have less than 14 inches of brown silt loam over red clay subsoil material. Aaron, Gilpin, Rarden, and Upshur soils are in landscape positions similar to those of the Woodsfield soils; however, they generally are in the more sloping areas. Vandalia soils contain sandstone fragments. They are on colluvial slopes.

Typical pedon of Woodsfield silt loam, 2 to 6 percent slopes, in Orange Township; about 1,300 feet south and 2,000 feet west of the northeast corner of sec. 12, T. 4 N., R. 12 W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) silt loam, very pale brown (10YR 7/3) dry; weak fine and medium subangular blocky structure; friable; many fine and common medium roots;

10 percent strong brown (7.5YR 5/6) BE material; few distinct very dark grayish brown (10YR 3/2) stains near decaying roots; very strongly acid; abrupt smooth boundary.

Bt1—8 to 14 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; common fine and few medium roots; common distinct yellowish brown (10YR 5/4) silt coatings; common faint strong brown (7.5YR 5/6) clay films on faces of peds; few distinct dark yellowish brown (10YR 4/4) fillings in root channels; 5 percent dark yellowish brown (10YR 4/4) Ap material; very strongly acid; clear smooth boundary.

2Bt2—14 to 17 inches; yellowish red (5YR 5/6) silty clay; moderate medium subangular blocky structure; friable; few fine roots; common prominent reddish brown (5YR 4/4) clay films on faces of peds; few distinct yellowish brown (10YR 5/4) silt coatings; very strongly acid; abrupt wavy boundary.

2Bt3—17 to 25 inches; yellowish red (5YR 4/6) clay; weak medium prismatic structure parting to strong medium subangular blocky; firm; common distinct yellowish red (5YR 4/6) slickensides; many distinct yellowish red (5YR 4/6) clay films on faces of peds; few distinct brown (10YR 5/3) silt coatings; very strongly acid; abrupt smooth boundary.

2Bt4—25 to 31 inches; yellowish red (5YR 4/6) clay; few medium prominent dusky red (10R 3/3) and few medium prominent light olive brown (2.5Y 5/6) mottles; moderate coarse prismatic structure parting to strong medium subangular blocky; firm; common distinct yellowish red (5YR 4/6) pressure faces and slickensides; many distinct yellowish red (5Y 4/6) clay films on faces of peds; few distinct brown (10YR 5/3) silt coatings; very strongly acid; abrupt smooth boundary.

2Bt5—31 to 38 inches; dusky red (10R 3/3) clay; few medium and coarse prominent light olive brown (2.5Y 5/6) mottles; moderate coarse prismatic structure parting to strong medium subangular blocky; firm; few dusky red (10R 3/3) pressure faces and slickensides; common distinct dusky red (10R 3/3) clay films on faces of peds; few faint brown (10YR 5/3) silt coatings; common black (10YR 2/1) stains; very strongly acid; clear wavy boundary.

2BC—38 to 49 inches; dusky red (10R 3/2) clay; many coarse distinct weak red (5Y 5/3) mottles; weak coarse subangular structure; firm; few faint very dark grayish brown (10YR 3/2) clay films in pores; 5 percent siltstone gravel; strongly acid; abrupt wavy boundary.

2Cr—49 to 60 inches; olive (5Y 5/3), weathered siltstone bedrock.

The thickness of the solum and the depth to carbonates range from 40 to 60 inches. The loess mantle is 14 to 26 inches thick. The depth to bedrock ranges from 40 to 72 inches. The content of rock fragments is less than 15 percent in the subsoil.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The Bt horizon has hue of 10YR, 7.5YR, and 5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. The 2Bt horizon has hue of 10R to 5YR, value of 3 to 5, and chroma of 3 to 6.

Formation of the Soils

This section describes how the major factors of soil formation have affected the soils in Meigs County and explains some of the processes of soil formation.

Factors of Soil Formation

Soils form through processes that act on deposited or accumulated geologic material. The major factors in soil formation are parent material, climate, relief, living organisms, and time.

Climate and living organisms are the active forces in soil formation. Their effect on the parent material is modified by relief and by the length of time that the parent material has been acted upon. The relative importance of each factor differs from place to place. In some areas one factor determines most of the soil properties. Normally, however, the interaction of all five factors determines what kind of soil forms in any given place.

Parent Material

The soils in Meigs County formed dominantly in residuum, colluvium, outwash, lacustrine, or alluvium. In many areas there is also a thin veneer of loess on the geologic surfaces.

Bedrock residuum is the most extensive kind of parent material in the county. The soils on the ridgetops and the side slopes formed in residuum (fig. 18). Shale residuum is moderately fine textured or fine textured. Soils that formed in shale residuum are fine textured in the subsoil. Examples of these soils are the Aaron and Upshur soils. In a few areas of the county, there are a few thin layers of limestone. Soils that formed in limestone residuum generally are fine textured in the subsoil. Only a very small amount of limestone is in the county. None of the soils mapped in the county formed in limestone residuum. Soils that formed in material weathered from siltstone and fine grained sandstone are medium textured or moderately fine textured in the subsoil. Examples of these soils are the Gilpin, Westmoreland, and Keene soils. Soils that formed in material weathered from medium textured and coarse textured sandstone are coarse textured in the subsoil. Steinsburg soils are an example of such soils.

Colluvium is weathered bedrock or soil material that has moved downhill. It is generally at the base of the steeper hillslopes. This material generally has been moved downhill by gravity, but water action, frost action, and the activity of animals have also contributed to the downslope movement over time. Vandalia soils formed in colluvium.

Even though Meigs County was not glaciated, glaciers have made a substantial impact on the parent material in the county. The glacial outwash and lacustrine sediment are directly related to the glaciers that were to the north and to the west of the county.

Glacial outwash was deposited in the Ohio River valley. As the glaciers melted, sand and gravel were carried along by the meltwater and were deposited in large terraces along the Ohio River. This thick, well sorted, sandy and gravelly outwash material was subsequently covered with loamy outwash or silty sediment. Cidermill and Conotton soils formed in this parent material (fig. 19).

When the glaciers to the north and to the west blocked the natural drainageways in the area, a series of large lakes formed. Silty and clayey sediments were deposited on the bottom of these lakes. The lacustrine terraces and old valley fills along major streams and several large valley fills not associated with the major streams are in scattered areas throughout the county. Omulga, Doles, and Vandalia soils formed in this silty and clayey material.

Recent alluvium, which is on flood plains, is the youngest parent material in the county. It is generally silty or loamy and is still accumulating because fresh sediment is periodically deposited during the overflow of streams. Chagrin, Nolin, and Orrville soils formed in recent alluvium.

A thin layer of loess overlies most of the soils in the county. Generally, this loess cap is about 6 to 24 inches thick and is underlain by residuum. The upper part of the Woodsfield and Keene soils formed in loess. The silt loam in the surface layer of most soils in the county, especially those on uplands, is a result of the loess cap.

Coal has been mined in Meigs County since the 1860's. Most of the mined areas have not been reclaimed because most of the surface mining was

Figure 18.—An exposure of interbedded shale and siltstone bedrock beginning the journey from rock to soil via weathering.

done before the passage of the 1972 Ohio reclamation law. Pinegrove soils formed in a mixture of partly weathered fine earth and fragments of bedrock from surface mining operations.

Climate

The climate in Meigs County is so uniform that it has not greatly differentiated the soils within the county. It has favored physical changes and chemical weathering in the parent material and the activity of living organisms.

The amount of rainfall in the county is adequate enough and is spread evenly throughout the year to cause a net downward movement of soil water. This action results in leaching and movement of carbonates, soluble minerals, and clay. The removal of carbonates has resulted in the subsoil of the soils becoming dominantly strongly acid to extremely acid. The natural wetting and drying cycles have resulted in the translocation of clay and other soluble materials from the A horizon to the B horizon and in the formation of soil structure.

The range in temperature has favored both physical changes and chemical weathering of the parent material. Freezing and thawing aided the formation of soil structure and the physical breakdown of rock. Warm temperatures in summer favored chemical reactions that helped to weather parent material and to increase biological activity.

Relief

Relief affects the natural drainage of soils. It influences the amount of runoff and the depth to the seasonal high water table. Water that runs off sloping

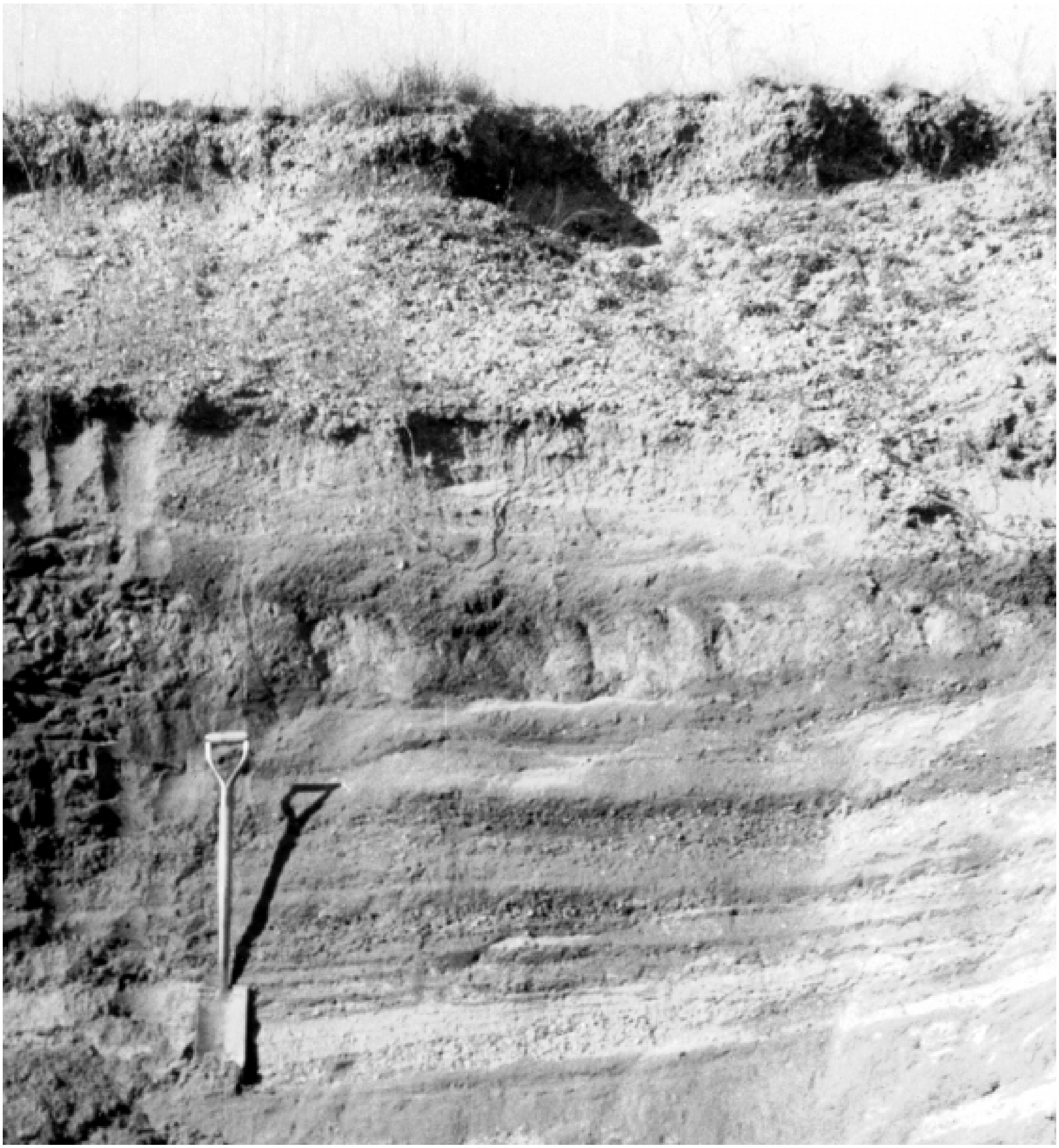

Figure 19.—Stratified outwash in an old gravel pit in an area of Conotton gravelly loam, 0 to 2 percent slopes.

soils collects in depressions or is removed through a drainage system. Therefore, from an equal amount of rainfall, the sloping soils receive less total water and the depressional soils more total water than the nearly level soils. Soil formation on steep slopes tends to be inhibited by the limited amount of water that penetrates the surface and by erosion. Soils in nearly level areas that are not subject to flooding tend to show the most development.

Relief can account for the formation of different soils from the same kind of parent material. For example, Gallipolis and Taggart soils both formed in silty lacustrine sediment. Gallipolis soils, which are in the higher, more sloping, better drained areas, are moderately well drained and have a seasonal high water table at a depth of 2.0 to 3.5 feet, whereas Taggart soils, which are in the lower, less sloping areas and depressions, are somewhat poorly drained and have a seasonal high water table at a depth of 1.0 to 3.0 feet.

Living Organisms

Plants, animals, microbes, and other living organisms directly impact soil formation. The native plant community in the county is mixed hardwood forest. The soils that formed in these forested areas tend to be acid and have a medium or low level of natural fertility and a low content of organic matter.

The activity of small burrowing animals, worms, and insects tends to increase soil permeability, thereby increasing the rate of water infiltration. Water is very essential in both the chemical and physical weathering of parent material. Animals also mix the soils and add organic matter. The biotic activity is evidenced by the worm channels in the surface layer, the trails left by ground moles, and the crawfish castles in poorly drained and somewhat poorly drained soils.

Plants are important in soil formation. Not only do the plants add organic material, but their roots aid in developing soil structure, which is vital in the movement of air and water through soil.

Human activities also affect soil formation. Examples of these activities are tillage, mining operations, land shaping, irrigation, drainage, and applications of lime and fertilizer.

Time

Time is required for the other processes of soil formation to produce their effects on the parent material. Since Meigs County was not glaciated in the past, the soils in the county are quite old and the soil profiles are well developed. The differences in the amount of soil development among soils is more often related to parent material or relief, or both, than to climate, vegetation, or time. These last three factors have been relatively the same for all soils in the county. Soils on flood plains show little soil profile development because new parent material is constantly being added. They may be as old as the soils on the slopes around them, but they generally show less development.

Processes of Soil Formation

Most of the soils in Meigs County have strongly expressed profiles. The processes of soil formation have resulted in very distinct changes in the soils. The strongest development is evident in the soils on ridgetops and side slopes in the uplands, in the colluvial soils on foot slopes, and in the soils that formed in lacustrine and old valley fill material on terraces and in Teays River sediment. In contrast, the soils on flood plains and in strip mined areas have been only slightly modified by the processes of soil formation.

All the factors of soil formation interact in the processes of soil formation. These processes are additions, removals, transfers, and transformations (Simonson 1959). Some of these processes result in the differences among the surface layer, subsoil, and substratum, but others may retard horizon differentiation or obliterate existing differences.

The addition of the thin layer of organic material to the surface is very important in the soils of this county. In areas dominated by woody vegetation, the accumulation of organic matter generally is slow. When an area is cleared and cultivated, this thin organic layer is mixed with the mineral fraction of the soils. If the soils are subject to severe erosion, most of this beneficial organic material can be quickly lost. Organic matter is vital in the formation of soil structure, the exchange of nutrients, and the capacity of the soils to hold water. It also helps to increase the rate of water infiltration.

Leaching is a transfer process where material is moved downward through the soil profile by soil water. Generally, carbonates are leached first, followed by other less soluble minerals in smaller quantities and by clay. The removal of carbonates increases the acidity of the soil and the water-holding capacity of the soil. This acid soil water then begins chemical and physical weathering of other minerals in the soil. These changes, especially the oxidation/reduction of iron, affect the color of the subsoil. In areas of well drained soils, the oxidized iron produces brown and red colors. In areas where the soils have a fluctuating water table, some iron is reduced and grayish mottles are produced. In areas of saturated soils, the iron is reduced and often leached out of the soil, producing gray colors with brownish or black mottles.

Seasonal cycles of wetting and drying in the soil are largely responsible for the transfer of clay from the surface layer to the subsoil. The fine clay particles are suspended in the water percolating downward through the surface layer and then are deposited in the subsoil. When the water movement stops or the clay concentration increases, clay is deposited on the faces of peds and in pores. This transfer accounts for the clay films on faces of peds in the subsoil of most soils in the county.

The transformation of mineral compounds occurs in most soils. The results of this process are most apparent if the formation of layers is not affected by rapid erosion or by the accumulation of material at the surface. When the primary silicate minerals are weathered chemically, other secondary minerals, mainly layer lattice silicate clays, are produced. Most of the layer lattice clays remain in the subsoil.

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Glossary

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

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

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

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

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

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

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and 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.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

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

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

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

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

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

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

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

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

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

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

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas 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 or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

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.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

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

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

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

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

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 wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

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 human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

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.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

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

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

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the 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.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. 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.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A 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.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

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 capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;*

size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 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. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Perimeter drain. An artificial drain installed around the perimeter of a septic tank absorption field to lower the water table; also called a curtain drain.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

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, such as slope, stoniness, and flooding.

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.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

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. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

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.

Slack-water deposit (geologic). Material that was deposited in still water and was subsequently exposed when the water level was lowered as when the elevation of the land was raised.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. 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 if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

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 that provide vegetative barriers to wind erosion 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 grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the 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."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

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 that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1963-87 at Carpenter, Ohio)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In	In	In
January---	38.5	18.7	28.6	68	14	11	2.37	1.25	3.35	6	7.0
February--	42.1	20.6	31.4	70	14	0	2.20	.97	3.24	5	6.6
March-----	55.6	30.6	43.1	82	5	41	3.29	1.64	4.71	7	2.6
April-----	66.6	40.1	53.4	85	17	148	3.51	2.06	4.81	8	1.0
May-------	75.5	48.8	62.2	90	26	383	4.33	2.28	6.12	8	.0
June------	82.4	56.7	69.6	92	38	588	3.77	2.08	5.25	7	.0
July------	85.1	60.7	72.9	96	45	710	4.56	2.75	6.17	8	.0
August----	83.8	59.5	71.7	94	42	673	3.81	1.95	5.43	7	.0
September-	78.3	52.4	65.4	92	31	462	3.47	1.75	4.96	6	.0
October---	67.5	40.2	53.9	85	18	205	2.59	1.12	3.82	6	.2
November--	55.3	33.0	44.2	78	9	35	3.05	1.58	4.32	7	1.0
December--	44.6	26.0	35.3	71	1	21	2.86	1.68	3.90	7	2.1
Yearly:											
Average--	64.6	40.6	52.6	---	---	---	---	---	---	---	---
Extreme--	---	---	---	96	1	---	---	---	---	---	---
Total----	---	---	---	---	---	3,277	39.81	35.74	44.36	82	20.5

* 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 (50 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1963-87 at Carpenter, Ohio)

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--	Apr. 25	May 13	May 23
2 years in 10 later than--	Apr. 20	May 7	May 17
5 years in 10 later than--	Apr. 8	Apr. 25	May 5
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 5	Sep. 28	Sep. 19
2 years in 10 earlier than--	Oct. 13	Oct. 5	Sep. 25
5 years in 10 earlier than--	Oct. 27	Oct. 19	Oct. 5

Table 3.--Growing Season

(Recorded in the period 1963-87 at Carpenter, Ohio)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	174	147	133
8 years in 10	183	157	139
5 years in 10	201	176	152
2 years in 10	221	196	165
1 year in 10	232	208	174

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AgC	Aaron-Gilpin complex, 8 to 15 percent slopes	2,442	0.9
AuC2	Aaron-Upshur complex, 8 to 15 percent slopes, eroded	1,490	0.5
Cg	Chagrin silt loam, frequently flooded	10,518	3.8
CkA	Cidermill silt loam, 0 to 2 percent slopes	3,160	1.1
CkB	Cidermill silt loam, 2 to 6 percent slopes	1,528	0.6
CnA	Conotton gravelly loam, 0 to 2 percent slopes	746	0.3
CnC	Conotton gravelly loam, 6 to 12 percent slopes	153	0.1
CnE	Conotton gravelly loam, 18 to 40 percent slopes	278	0.1
DoA	Doles silt loam, 0 to 2 percent slopes	290	0.1
Dp	Dumps, mine	292	0.1
DuC	Duncannon silt loam, 6 to 12 percent slopes	227	0.1
EkA	Elkinsville silt loam, 0 to 2 percent slopes	261	0.1
GaC	Gallia loam, 6 to 12 percent slopes	802	0.3
GaD	Gallia loam, 12 to 18 percent slopes	255	0.1
GbA	Gallipolis silt loam, 0 to 2 percent slopes	1,493	0.5
GbB	Gallipolis silt loam, 2 to 6 percent slopes	1,192	0.4
GhB	Gilpin silt loam, 3 to 8 percent slopes	63	*
GhC2	Gilpin silt loam, 8 to 15 percent slopes, eroded	3,598	1.3
GkD2	Gilpin-Rarden complex, 15 to 25 percent slopes, eroded	2,758	1.0
GkE	Gilpin-Rarden complex, 25 to 40 percent slopes	9,398	3.4
GuC	Gilpin-Upshur complex, 8 to 15 percent slopes	50	*
GuD	Gilpin-Upshur complex, 15 to 25 percent slopes	250	0.1
GuE	Gilpin-Upshur complex, 25 to 50 percent slopes	336	0.1
GwD	Guernsey-Gilpin complex, 15 to 25 percent slopes	718	0.3
GwE	Guernsey-Gilpin complex, 25 to 40 percent slopes	231	0.1
KeB	Keene silt loam, 2 to 6 percent slopes	846	0.3
KeC	Keene silt loam, 6 to 12 percent slopes	365	0.1
Ky	Kyger loamy sand, frequently flooded	482	0.2
LaB	Lakin loamy fine sand, 1 to 6 percent slopes	536	0.2
LaC	Lakin loamy fine sand, 6 to 12 percent slopes	309	0.1
LaD	Lakin loamy fine sand, 12 to 18 percent slopes	260	0.1
LaE	Lakin loamy fine sand, 18 to 40 percent slopes	259	0.1
LkB	Licking silt loam, 1 to 6 percent slopes	704	0.3
LkC2	Licking silt loam, 6 to 12 percent slopes, eroded	1,725	0.6
LkD2	Licking silt loam, 12 to 18 percent slopes, eroded	613	0.2
Mo	Moshannon silt loam, frequently flooded	1,264	0.5
Nk	Newark silt loam, frequently flooded	1,730	0.6
No	Nolin silt loam, frequently flooded	3,598	1.3
OmB	Omulga silt loam, 2 to 6 percent slopes	4,328	1.6
OmC	Omulga silt loam, 6 to 12 percent slopes	5,254	1.9
Or	Orrville silt loam, frequently flooded	1,725	0.6
PnB	Pinegrove coarse sandy loam, 0 to 8 percent slopes	452	0.2
PnD	Pinegrove coarse sandy loam, 8 to 25 percent slopes	2,770	1.0
PnF	Pinegrove coarse sandy loam, 25 to 70 percent slopes	602	0.2
PuB	Pinegrove silty clay loam, 0 to 8 percent slopes	743	0.3
PuD	Pinegrove silty clay loam, 8 to 25 percent slopes	224	0.1
PuF	Pinegrove silty clay loam, 25 to 70 percent slopes	404	0.1
Px	Pits, gravel	671	0.2
RaC2	Rarden silt loam, 8 to 15 percent slopes, eroded	1,805	0.7
RcB	Richland silt loam, 2 to 6 percent slopes	1,071	0.4
StF	Steinsburg fine sandy loam, 40 to 70 percent slopes	899	0.3
TaA	Taggart silt loam, 0 to 2 percent slopes	1,406	0.5
UbC	Upshur silt loam, 8 to 15 percent slopes	2,238	0.8
UgC2	Upshur-Gilpin complex, 8 to 15 percent slopes, eroded	35,153	12.7
UgD	Upshur-Gilpin complex, 15 to 25 percent slopes	48,439	17.5
UgE	Upshur-Gilpin complex, 25 to 50 percent slopes	98,438	35.6
UsD	Upshur-Steinsburg complex, 15 to 25 percent slopes	1,654	0.6
UsE	Upshur-Steinsburg complex, 25 to 50 percent slopes	6,366	2.3
VaC2	Vandalia silt loam, 8 to 15 percent slopes, eroded	391	0.1
VaD2	Vandalia silt loam, 15 to 25 percent slopes, eroded	3,598	1.3

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
VnB2	Vincent silty clay loam, 2 to 6 percent slopes, eroded	398	0.1
VnC2	Vincent silty clay loam, 6 to 12 percent slopes, eroded	949	0.3
WgD	Westmoreland-Gilpin complex, 15 to 25 percent slopes	25	*
WgE	Westmoreland-Gilpin complex, 25 to 40 percent slopes	25	*
WgF	Westmoreland-Gilpin complex, 40 to 70 percent slopes	99	*
WoB	Woodsfield silt loam, 2 to 6 percent slopes	694	0.3
	Water	753	0.3
	Total	276,794	100.0

* Less than 0.1 percent.

Table 5.--Pasture and Hayland Suitability and Production

(Yields are those that can be expected under a high level of management. High levels of fertility must be maintained to obtain the yields in the production column. Annual applications of nitrogen must be applied on grasses grown alone to obtain these production levels. Absence of a yield indicates that the soil is not suited to pasture and hayland or is not generally used for this purpose)

Map symbol and soil name	Suitability group	Production*								
		Alfalfa hay	Alfalfa/ orchardgrass		Orchardgrass		Red clover/ orchardgrass		Kentucky bluegrass	
		Tons	AUM	Tons	AUM	Tons	AUM	Tons	AUM	Tons
AgC**:										
Aaron	A-6	3.8	6.3	3.8	6.0	3.6	5.2	3.1	3.8	2.3
Gilpin	F-1	3.8	6.3	3.8	6.0	3.6	5.2	3.1	3.8	2.3
AuC2**:										
Aaron	A-6	3.5	5.8	3.5	5.7	3.4	6.0	3.6	3.5	2.1
Upshur	F-5	3.5	5.8	3.5	5.7	3.4	6.0	3.6	3.5	2.1
Cg Chagrin	A-5	4.3	7.1	4.3	6.7	4.0	6.0	3.6	4.5	2.7
CkA Cidermill	A-1	4.2	7.0	4.2	6.7	4.0	5.9	3.6	4.5	2.7
CkB Cidermill	A-1	4.1	6.8	4.1	6.5	3.9	---	---	4.4	2.6
CnA Conotton	B-1	3.6	6.0	3.6	5.7	3.4	4.7	3.0	3.5	2.1
CnC Conotton	B-1	3.3	5.5	3.3	5.2	3.1	4.3	2.8	3.2	1.9
CnE Conotton	B-2	---	3.1	---	1.6	---	1.6	---	1.0	---
DoA*** Doles	C-2	---	---	---	6.7	4.0	6.0	3.6	4.5	2.7
Dp. Dumps, mine										
DuC Duncannon	A-6	4.3	7.1	4.3	6.7	4.0	5.5	3.2	4.5	2.7
EkA Elkinsville	A-6	4.3	7.1	4.3	6.7	4.0	5.5	3.2	4.5	2.7
GaC Gallia	A-1	4.2	7.0	4.2	6.7	4.0	5.9	3.6	4.5	2.7
GaD Gallia	A-1	---	6.4	3.9	6.2	3.7	5.5	3.3	4.1	2.5
GbA Gallipolis	A-6	4.3	7.1	4.3	6.7	4.0	5.5	3.2	4.5	2.7
GbB Gallipolis	A-6	4.2	6.9	4.2	6.5	3.9	5.3	3.1	4.4	2.6
GhB Gilpin	F-1	3.8	6.3	3.8	6.0	3.6	5.2	3.1	3.8	2.3

See footnotes at end of table.

Table 5.--Pasture and Hayland Suitability and Production--Continued

Map symbol and soil name	Suitability group	Alfalfa hay	Alfalfa/ orchardgrass		Orchardgrass		Red clover/ orchardgrass		Kentucky bluegrass	
		Production*								
		Tons	AUM	Tons	AUM	Tons	AUM	Tons	AUM	Tons
GhC2**---------- Gilpin	F-1	3.6	5.9	3.6	5.6	3.4	4.9	2.9	3.6	2.2
GkD2**:										
Gilpin---------	F-1	---	5.6	3.4	5.3	3.2	4.7	2.8	3.4	2.1
Rarden---------	F-1	---	5.6	3.4	5.3	3.2	4.7	2.8	3.4	2.1
GkE**:										
Gilpin---------	F-2	---	3.2	---	3.1	---	2.7	---	2.0	---
Rarden---------	F-2	---	3.2	---	3.1	---	2.7	---	2.0	---
GuC**:										
Gilpin---------	F-1	3.8	6.3	3.8	6.0	3.6	5.2	3.1	3.5	2.3
Upshur---------	F-5	3.5	5.8	3.5	5.7	3.4	6.0	3.6	3.5	2.1
GuD**:										
Gilpin---------	F-1	---	5.3	3.2	5.0	3.0	4.4	2.6	3.2	1.9
Upshur---------	F-5	---	4.9	2.9	4.8	2.8	5.0	3.0	2.9	1.8
GuE**:										
Gilpin---------	F-2	---	4.4	---	4.1	---	3.6	---	2.6	---
Upshur---------	F-6	---	4.0	---	4.0	---	4.1	---	2.4	---
GwD**:										
Guernsey-------	A-2	---	6.3	3.8	6.0	3.6	5.3	3.2	4.0	2.4
Gilpin---------	F-1	---	6.3	3.8	6.0	3.6	5.2	3.1	3.8	2.3
GwE**:										
Guernsey-------	A-3	---	4.4	---	2.7	---	2.5	---	1.7	---
Gilpin---------	F-2	---	4.4	---	2.7	---	2.5	---	1.7	---
KeB------------- Keene	A-6	4.3	7.1	4.3	6.7	4.0	5.5	3.2	4.5	2.7
KeC------------- Keene	A-6	3.8	6.3	3.8	6.0	3.6	5.3	3.2	4.0	2.4
Ky-------------- Kyger	H-1	---	---	---	---	---	---	---	---	---
LaB------------- Lakin	B-1	3.6	6.0	3.6	5.7	3.4	4.9	3.1	3.5	2.1
LaC------------- Lakin	B-1	3.5	5.8	3.5	5.5	3.3	4.8	3.0	3.4	2.0
LaD------------- Lakin	B-1	3.2	5.3	3.2	5.0	3.0	4.4	2.7	3.1	1.8
LaE------------- Lakin	B-2	---	3.7	---	3.5	---	3.1	---	2.1	---
LkB------------- Licking	A-6	4.3	7.1	4.3	6.7	4.0	5.5	3.2	4.5	2.7
LkC2------------ Licking	A-6	4.1	6.8	4.1	6.4	3.8	5.3	3.1	4.3	2.6

See footnotes at end of table.

Table 5.--Pasture and Hayland Suitability and Production--Continued

Map symbol and soil name	Suitability group	Production*								
		Alfalfa hay	Alfalfa/ orchardgrass		Orchardgrass		Red clover/ orchardgrass		Kentucky bluegrass	
		Tons	AUM	Tons	AUM	Tons	AUM	Tons	AUM	Tons
LkD2------------ Licking	A-6	---	6.2	3.7	5.8	3.5	5.3	3.2	3.9	2.4
Mo-------------- Moshannon	A-5	4.3	7.1	4.3	6.7	4.0	4.8	2.8	4.5	2.7
Nk***----------- Newark	C-3	---	---	---	7.3	4.4	6.6	4.0	5.3	3.2
No-------------- Nolin	A-5	4.3	7.1	4.3	6.7	4.0	6.0	3.6	4.5	2.7
OmB------------- Omulga	F-3	3.6	5.9	3.6	5.7	3.4	5.0	3.0	3.7	2.3
OmC------------- Omulga	F-3	3.4	5.6	3.4	5.4	3.2	4.8	2.9	3.5	2.2
Or***----------- Orrville	C-3	---	---	---	7.3	4.4	6.6	4.0	5.3	3.2
PnB, PnD, PnF--- Pinegrove	H-1	---	---	---	---	---	---	---	---	---
PuB------------- Pinegrove	G-1	2.8	4.7	2.8	4.7	2.8	4.0	2.4	2.7	1.6
PuD------------- Pinegrove	G-1	---	3.9	2.3	3.9	2.3	3.3	2.0	2.2	1.3
PuF------------- Pinegrove	H-1	---	---	---	---	---	---	---	---	---
Px. Pits, gravel										
RaC2------------ Rarden	F-1	3.8	6.3	3.8	6.0	3.6	5.2	3.1	3.8	2.3
RcB------------- Richland	A-1	4.2	7.0	4.2	6.7	4.0	5.9	3.6	4.5	2.7
StF------------- Steinsburg	H-1	---	---	---	---	---	---	---	---	---
TaA***---------- Taggart	C-1	---	---	---	7.3	4.4	6.6	4.0	5.3	3.2
UbC------------- Upshur	F-5	3.5	5.8	3.5	5.7	3.4	6.0	3.6	3.5	2.1
UgC2***:										
Upshur---------	F-5	3.5	5.8	3.5	5.7	3.4	6.0	3.6	3.5	2.1
Gilpin---------	F-1	3.8	6.3	3.8	6.0	3.6	5.2	3.1	3.8	2.3
UgD**:										
Upshur---------	F-5	---	4.9	2.9	4.8	2.8	5.0	3.0	2.9	1.8
Gilpin---------	F-1	---	5.3	3.2	5.0	3.0	4.4	2.6	3.2	1.9

See footnotes at end of table.

Table 5.--Pasture and Hayland Suitability and Production--Continued

Map symbol and soil name	Suitability group	Production*								
		Alfalfa hay	Alfalfa/ orchardgrass		Orchardgrass		Red clover/ orchardgrass		Kentucky bluegrass	
		Tons	AUM	Tons	AUM	Tons	AUM	Tons	AUM	Tons
UgE**:										
Uphsur	F-6	---	4.0	---	4.0	---	4.1	---	2.4	---
Gilpin	F-2	---	4.4	---	4.1	---	3.6	---	2.6	---
UsD**:										
Upshur	F-5	---	4.9	2.9	4.8	2.9	5.0	3.0	2.9	1.8
Steinsburg	F-1	---	5.3	3.2	5.0	3.0	4.4	2.6	3.2	1.9
UsE**:										
Upshur	F-6	---	4.0	---	4.0	---	4.1	---	2.4	---
Steinsburg	F-2	---	4.4	---	4.1	---	3.6	---	2.6	---
VaC2 Vandalia	F-5	3.5	5.8	3.5	5.7	3.4	6.0	3.6	3.5	2.1
VaD2 Vandalia	F-5	---	4.9	2.9	4.8	2.9	5.0	3.0	2.5	1.8
VnB2 Vincent	A-1	4.2	7.0	4.2	6.7	4.0	5.9	3.6	4.5	2.7
VnC2 Vincent	A-1	4.0	6.7	4.0	6.4	3.8	5.7	3.5	4.3	2.6
WgD**:										
Westmoreland	A-2	---	6.3	3.8	6.0	3.6	5.3	3.2	4.0	2.4
Gilpin	F-1	---	6.3	3.8	6.0	3.6	5.2	3.1	3.8	2.3
WgE**:										
Westmoreland	A-3	---	2.8	---	2.7	---	2.5	---	1.7	---
Gilpin	F-2	---	2.8	---	2.7	---	2.5	---	1.7	---
WgF**:										
Westmoreland	H-1	---	---	---	---	---	---	---	---	---
Gilpin	H-1	---	---	---	---	---	---	---	---	---
WoB Woodsfield	A-1	4.2	7.0	4.2	6.7	4.0	5.9	3.6	4.5	2.7

* Pasture production is given in AUM (animal unit months), and hay production is given in tons per acre. Animal unit month is 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. Hay yields for legume/grass mixtures are about 0.5 ton more if tall fescue is substituted for orchardgrass.

** See description of the map unit for composition and behavior characteristics of the map unit.

*** These soils are better suited to an alsike clover/orchardgrass mixture. Yields will be about 10 to 15 percent less than red clover/orchardgrass.

Table 6.--Land Capability and Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Oats
		Bu	Bu	Bu	Bu
AgC Aaron-Gilpin	IIIe	94	---	---	---
AuC2 Aaron-Upshur	IVe	96	---	---	---
Cg Chagrin	IIw	115	35	---	---
CkA Cidermill	I	125	40	---	75
CkB Cidermill	IIe	125	40	---	75
CnA Conotton	IIIs	80	---	30	58
CnC Conotton	IVe	60	---	26	52
CnE Conotton	VIIe	---	---	---	---
DoA Doles	IIw	95	35	45	---
Dp*. Dumps, mine					
DuC Duncannon	IIIe	110	---	---	65
EkA Elkinsville	I	120	42	48	---
GaC Gallia	IIIe	100	---	38	63
GaD Gallia	IVe	80	---	34	58
GbA Gallipolis	I	115	40	45	75
GbB Gallipolis	IIe	115	38	45	75
GhB Gilpin	IIe	90	---	---	65
GhC2 Gilpin	IIIe	85	---	---	60
GkD2 Gilpin-Rarden	VIe	---	---	---	---

See footnote at end of table.

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Oats
		Bu	Bu	Bu	Bu
GkE: Gilpin-Rarden	VIIe	---	---	---	---
GuC: Gilpin-Upshur	IIIe	88	---	---	60
GuD: Gilpin-Upshur	IVe	---	---	---	---
GuE: Gilpin-Upshur	VIe	---	---	---	---
GwD: Guernsey-Gilpin	IVe	83	---	---	53
GwE: Guernsey-Gilpin	VIe	---	---	---	---
KeB: Keene	IIe	110	---	40	65
KeC: Keene	IIIe	100	---	38	62
Ky: Kyger	VIw	---	---	---	---
LaB: Lakin	IIIs	80	---	---	---
LaC: Lakin	IVs	70	---	---	---
LaD: Lakin	VIs	---	---	---	---
LaE: Lakin	VIIs	---	---	---	---
LkB: Licking	IIe	110	---	52	78
LkC2: Licking	IVe	95	---	34	64
LkD2: Licking	VIe	---	---	---	---
Mo: Moshannon	IIw	125	35	45	75
Nk: Newark	IIw	95	35	---	---
No: Nolin	IIw	105	35	---	---
OmB: Omulga	IIe	105	37	47	---

See footnote at end of table.

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Oats
		Bu	Bu	Bu	Bu
OmC----------------------- Omulga	IIIe	95	30	37	---
Or------------------------ Orrville	IIw	100	32	---	70
PnB, PnD------------------ Pinegrove	VIIs	---	---	---	---
PnF----------------------- Pinegrove	VIIe	---	---	---	---
PuB----------------------- Pinegrove	VIs	---	---	---	---
PuD----------------------- Pinegrove	VIs	---	---	---	---
PuF----------------------- Pinegrove	VIIe	---	---	---	---
Px*. Pits, gravel					
RaC2---------------------- Rarden	IVe	87	---	32	---
RcB----------------------- Richland	IIe	110	---	45	75
StF----------------------- Steinsburg	VIIe	---	---	---	---
TaA----------------------- Taggart	IIw	110	38	44	---
UbC----------------------- Upshur	IVe	90	---	---	60
UgC2---------------------- Upshur-Gilpin	IVe	88	---	---	60
UgD----------------------- Upshur-Gilpin	VIe	---	---	---	---
UgE----------------------- Upshur-Gilpin	VIIe	---	---	---	---
UsD----------------------- Upshur-Steinsburg	VIe	---	---	---	---
UsE----------------------- Upshur-Steinsburg	VIIe	---	---	---	---
VaC2---------------------- Vandalia	IIIe	100	---	---	60
VaD2---------------------- Vandalia	IVe	90	---	---	55

See footnote at end of table.

Table 6.--Land Capability and Yields per Acre of Crops--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Oats
		Bu	Bu	Bu	Bu
VnB2---------------------- Vincent	IIe	115	---	40	75
VnC2---------------------- Vincent	IIIe	95	---	36	70
WgD----------------------- Westmoreland-Gilpin	IVe	83	---	---	61
WgE----------------------- Westmoreland-Gilpin	VIe	---	---	---	---
WgF----------------------- Westmoreland-Gilpin	VIIe	---	---	---	---
WoB----------------------- Woodsfield	IIe	102	34	48	66

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 7.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass) Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	4,914	---	---	---
II	31,355	10,824	20,531	---
III	15,360	14,078	---	1,282
IV	47,719	47,710	---	309
V	---	---	---	---
VI	55,765	54,056	482	1,227
VII	119,965	116,484	---	3,481
VIII	---	---	---	---

Table 8.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
Cg	Chagrin silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
CkA	Cidermill silt loam, 0 to 2 percent slopes
CkB	Cidermill silt loam, 2 to 6 percent slopes
DoA	Doles silt loam, 0 to 2 percent slopes (where drained)
EkA	Elkinsville silt loam, 0 to 2 percent slopes
GbA	Gallipolis silt loam, 0 to 2 percent slopes
GbB	Gallipolis silt loam, 2 to 6 percent slopes
GhB	Gilpin silt loam, 3 to 8 percent slopes
KeB	Keene silt loam, 2 to 6 percent slopes
LkB	Licking silt loam, 1 to 6 percent slopes
Mo	Moshannon silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
Nk	Newark silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
No	Nolin silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
OmB	Omulga silt loam, 2 to 6 percent slopes
Or	Orrville silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
RcB	Richland silt loam, 2 to 6 percent slopes
TaA	Taggart silt loam, 0 to 2 percent slopes (where drained)
VnB2	Vincent silty clay loam, 2 to 6 percent slopes, eroded
WoB	Woodsfield silt loam, 2 to 6 percent slopes

Table 9.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordi- nation symbol	Management concerns: Erosion hazard	Seedling mortal- ity	Wind- throw hazard	Plant competi- tion	Potential productivity: Common trees	Site index	Volume*	Trees to plant
AgC**:									
Aaron	4C	Slight	Severe	Severe	Severe	Black oak	85	67	White ash, northern red oak, white oak, yellow-poplar, eastern white pine.
						White ash	76	---	
						Black locust	78	---	
						Chinkapin oak	81	63	
						Hickory	---	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
						Eastern redcedar	---	---	
						Black walnut	---	---	
						American elm	---	---	
Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
AuC2**:									
Aaron	4C	Slight	Severe	Severe	Severe	Black oak	85	67	White ash, northern red oak, white oak, yellow-poplar, eastern white pine.
						White ash	76	---	
						Black locust	78	---	
						Chinkapin oak	81	63	
						Hickory	---	---	
						Sugar maple	---	---	
						Northern red oak	---	---	
						Eastern redcedar	---	---	
						Black walnut	---	---	
						American elm	---	---	
Upshur	3C	Slight	Severe	Severe	Moderate	Northern red oak	65	48	Eastern white pine, pin oak, yellow-poplar.
						Yellow-poplar	80	71	
						Eastern white pine	80	181	
Cg Chagrin	5A	Slight	Slight	Slight	Severe	Northern red oak	86	68	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						Yellow-poplar	96	100	
						Sugar maple	86	53	
						White oak	---	---	
						Black cherry	---	---	
						White ash	---	---	
						Black walnut	---	---	
CkA, CkB Cidermill	4A	Slight	Slight	Slight	Severe	Northern red oak	80	62	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	90	90	
CnA, CnC Conotton	4F	Slight	Moderate	Slight	Moderate	White oak	70	52	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
						Northern red oak	70	52	
						Black cherry	---	---	
						Black oak	---	---	
						Scarlet oak	---	---	
						Red maple	---	---	
						Yellow-poplar	---	---	

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
CnE------------- Conotton	4R	Slight	Moderate	Slight	Moderate	White oak-----------	70	52	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
						Northern red oak----	70	52	
						Black cherry--------	---	---	
						Black oak-----------	---	---	
						Scarlet oak---------	---	---	
						Red maple-----------	---	---	
						Yellow-poplar-------	---	---	
DoA------------- Doles	4D	Slight	Slight	Moderate	Severe	White oak-----------	75	57	Eastern white pine, yellow-poplar, white ash, red pine, white oak.
						Northern red oak----	80	62	
						Yellow-poplar-------	---	---	
						Black cherry--------	---	---	
						Sugar maple---------	---	---	
						White ash-----------	---	---	
DuC------------- Duncannon	4A	Slight	Slight	Slight	Severe	Northern red oak----	80	62	Yellow-poplar, black walnut, eastern white pine.
EkA------------- Elkinsville	5A	Slight	Slight	Slight	Severe	White oak-----------	90	72	Eastern white pine, red pine, white ash, yellow-poplar, black walnut, black locust.
						Yellow-poplar-------	98	104	
						Sweetgum------------	76	70	
GaC------------- Gallia	5A	Slight	Slight	Slight	Severe	White oak-----------	85	67	Eastern white pine, red pine, yellow-poplar, black walnut, white ash, white oak, northern red oak.
						Northern red oak----	95	77	
						Yellow-poplar-------	95	98	
						Black walnut--------	---	---	
						Black cherry--------	---	---	
						Sugar maple---------	---	---	
						White ash-----------	---	---	
GaD------------- Gallia	5R	Moderate	Slight	Slight	Severe	White oak-----------	85	67	Eastern white pine, red pine, yellow-poplar, black walnut, white ash, white oak, northern red oak.
						Northern red oak----	95	77	
						Yellow-poplar-------	95	98	
						Black walnut--------	---	---	
						Black cherry--------	---	---	
						Sugar maple---------	---	---	
						White ash-----------	---	---	
GbA, GbB-------- Gallipolis	5A	Slight	Slight	Slight	Severe	Northern red oak----	85	67	Eastern white pine, yellow-poplar, northern red oak, white oak, white ash, eastern cottonwood.
						Yellow-poplar-------	---	---	
						White oak-----------	---	---	
						White ash-----------	---	---	
						Black cherry--------	---	---	
						Sugar maple---------	---	---	

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
GhB, GhC2: Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
GkD2**, GkE**: Gilpin (north aspect)	4R	Moderate	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
Rarden (north aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak	67	49	Austrian pine, green ash, yellow-poplar, pin oak, red maple.
						White ash	---	---	
						Black cherry	---	---	
						Slippery elm	---	---	
						Red maple	---	---	
GkD2**, GkE**: Gilpin (south aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	70	52	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	90	90	
Rarden (south aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak	58	41	Austrian pine, green ash, yellow-poplar, pin oak, red maple.
						White ash	---	---	
						Black cherry	---	---	
						Slippery elm	---	---	
						Red maple	---	---	
GuC**: Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
Upshur	3C	Moderate	Slight	Slight	Moderate	Northern red oak	65	48	Eastern white pine, pin oak, yellow-poplar.
						Yellow-poplar	80	71	
						Eastern white pine	80	181	
GuD**: Gilpin (north aspect)	4R	Moderate	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, pin oak, yellow-poplar.
						Yellow-poplar	95	98	
Upshur (north aspect)	4R	Moderate	Severe	Severe	Moderate	Northern red oak	70	52	Eastern white pine, pin oak, yellow-poplar.
						Yellow-poplar	90	90	
						Eastern white pine	90	211	
GuD**: Gilpin (south aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	70	52	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	90	90	

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
GuD**: Upshur (south aspect)	3R	Moderate	Severe	Severe	Moderate	Northern red oak	65	48	Eastern white pine, yellow-poplar, pin oak.
						Eastern white pine	75	166	
GuE**: Gilpin (north aspect)	4R	Severe	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
Upshur (north aspect)	4R	Moderate	Severe	Severe	Moderate	Northern red oak	70	52	Eastern white pine, pin oak, yellow-poplar.
						Yellow-poplar	90	90	
						Eastern white pine	90	211	
GuE**: Gilpin (south aspect)	4R	Severe	Moderate	Slight	Moderate	Northern red oak	70	52	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	90	90	
Upshur (south aspect)	3R	Severe	Moderate	Slight	Moderate	Northern red oak	65	48	Eastern white pine, pin oak, yellow-poplar.
						Eastern white pine	75	166	
GwD**, GwE**: Guernsey (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	78	60	Eastern white pine, yellow-poplar, green ash, white ash, red pine, white oak, northern red oak.
						Yellow-poplar	95	98	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
						Black cherry	---	---	
Gilpin (north aspect)	4R	Moderate	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
GwD**, GwE**: Guernsey (south aspect)	4R	Moderate	Moderate	Slight	Severe	Northern red oak	70	52	White oak, yellow-poplar, white ash, northern red oak, eastern white pine, red pine.
						White oak	65	48	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
GwD**, GwE**:									
Gilpin (south aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak	70	52	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	90	90	
KeB, KeC	4A	Slight	Slight	Slight	Severe	Northern red oak	80	62	Eastern white pine, yellow-poplar, black walnut, white ash, red pine, white oak, northern red oak.
Keene						White oak	75	57	
						Yellow-poplar	95	98	
						White ash	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
LaB, LaC	3S	Slight	Slight	Slight	Slight	Northern red oak	60	43	Virginia pine, eastern white pine.
Lakin						Virginia pine	60	91	
						Chestnut oak	60	43	
						Black oak	60	43	
LaD, LaE	3R	Moderate	Slight	Slight	Slight	Northern red oak	60	43	Virginia pine, eastern white pine.
Lakin						Virginia pine	60	91	
						Chestnut oak	60	43	
						Black oak	60	43	
LkB, LkC2	4C	Slight	Slight	Moderate	Severe	White oak	76	58	Eastern white pine, red pine, yellow-poplar, white ash, white oak, northern red oak.
Licking						Northern red oak	80	62	
						Yellow-poplar	90	90	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
LkD2	4R	Moderate	Slight	Moderate	Severe	White oak	76	58	Eastern white pine, red pine, yellow-poplar, white ash, white oak, northern red oak.
Licking						Northern red oak	80	62	
						Yellow-poplar	90	90	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
Mo	5A	Slight	Slight	Slight	Severe	Northern red oak	85	67	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak, green ash, black cherry, black locust, eastern cottonwood, American sycamore.
Moshannon						Yellow-poplar	95	98	
						Sugar maple	85	52	
						Black walnut	---	---	
						White oak	---	---	
						White ash	---	---	
						Black cherry	---	---	

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
Nk-------------- Newark	5A	Slight	Slight	Slight	Severe	Pin oak------------- Eastern cottonwood-- Green ash-----------	96 89 ---	78 100 ---	Eastern cottonwood, sweetgum, American sycamore.
No-------------- Nolin	5A	Slight	Slight	Slight	Severe	Northern red oak---- Eastern cottonwood-- Black willow-------- American sycamore---	90 --- --- ---	72 --- --- ---	Eastern cottonwood, green ash, sweegum, pin oak.
OmB, OmC-------- Omulga	4D	Slight	Slight	Moderate	Severe	Northern red oak---- White oak----------- Black walnut-------- Black cherry-------- Sugar maple--------- White ash----------- Yellow-poplar-------	80 --- --- --- --- --- ---	62 --- --- --- --- --- ---	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, white oak, northern red oak, green ash, black cherry, black locust, American sycamore, eastern cottonwood.
Or-------------- Orrville	5A	Slight	Slight	Slight	Severe	Pin oak------------- Northern red oak---- Yellow-poplar------- Sugar maple--------- White oak----------- White ash----------- Black cherry--------	85 80 90 80 --- --- ---	67 62 90 50 --- --- ---	Eastern white pine, yellow-poplar, green ash, red pine, white ash, white oak, northern red oak, black cherry, black locust, American sycamore.
PnB, PnD, PnF, PuB, PuD, PuF-- Pinegrove	---	--------	--------	--------	--------		---	---	Virginia pine, red pine, pitch pine.
RaC2------------ Rarden	4C	Slight	Severe	Severe	Moderate	Black oak----------- White ash----------- Northern red oak---- Slippery elm-------- Red maple-----------	71 --- 62 --- ---	53 --- 45 --- ---	Austrian pine, green ash, yellow-poplar, pin oak, red maple.
RcB------------- Richland	5A	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow-poplar------- White ash----------- Black walnut--------	85 95 --- ---	67 98 --- ---	Yellow-poplar, black walnut, eastern white pine, red pine, white oak, northern red oak, white ash.

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
StF------------- Steinsburg (north aspect)	4R	Severe	Slight	Slight	Moderate	Northern red oak----	74	56	Eastern white pine, Virginia pine, Norway spruce.
						Virginia pine-------	70	109	
						Yellow-poplar-------	---	---	
StF------------- Steinsburg (south aspect)	3R	Severe	Severe	Slight	Moderate	Northern red oak----	65	48	Eastern white pine, Virginia pine, yellow-poplar, black oak.
						Virginia pine-------	60	91	
						Yellow-poplar-------	---	---	
						Black oak-----------	---	---	
TaA------------- Taggart	4A	Slight	Slight	Slight	Severe	Northern red oak----	75	57	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
						White oak-----------	75	57	
						Pin oak-------------	85	67	
						Yellow-poplar-------	85	81	
						Sweetgum------------	80	79	
UbC------------- Upshur	3C	Slight	Severe	Severe	Moderate	Northern red oak----	65	48	Eastern white pine, pin oak, yellow-poplar.
						Yellow-poplar-------	80	71	
						Eastern white pine--	80	181	
UgC2**:									
Upshur---------	3C	Slight	Severe	Severe	Moderate	Northern red oak----	65	48	Eastern white pine, pin oak, yellow-poplar.
						Yellow-poplar-------	80	71	
						Eastern white pine--	80	181	
Gilpin---------	4A	Slight	Slight	Slight	Moderate	Northern red oak----	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	98	
UgD**:									
Upshur (north aspect)-------	4R	Moderate	Severe	Severe	Moderate	Northern red oak----	70	52	Eastern white pine, pin oak, yellow-poplar.
						Yellow-poplar-------	90	90	
						Eastern white pine--	90	211	
Gilpin (north aspect)-------	4R	Moderate	Slight	Slight	Moderate	Northern red oak----	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	98	
UgD**:									
Upshur (south aspect)-------	3R	Moderate	Severe	Severe	Moderate	Northern red oak----	65	48	Eastern white pine, pin oak, yellow-poplar.
						Eastern white pine--	75	166	
Gilpin (south aspect)-------	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	70	52	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	90	90	

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
UgE**:									
Upshur (north aspect)-------	4R	Severe	Severe	Severe	Moderate	Northern red oak---- Yellow-poplar------- Eastern white pine--	70 90 90	52 90 211	Eastern white pine, pin oak, yellow-poplar.
Gilpin (north asepct--------	4R	Severe	Slight	Slight	Moderate	Northern red oak---- Yellow-poplar-------	80 95	62 98	Eastern white pine, black cherry, yellow-poplar.
UgE**:									
Upshur (south aspect)-------	3R	Severe	Severe	Severe	Moderate	Northern red oak---- Eastern white pine--	65 75	48 166	Eastern white pine, pin oak, yellow-poplar.
Gilpin (south aspect--------	4R	Severe	Moderate	Slight	Moderate	Northern red oak---- Yellow-poplar-------	70 90	52 90	Eastern white pine, black cherry, yellow-poplar.
UsD**:									
Upshur (north aspect)-------	4R	Moderate	Severe	Severe	Moderate	Northern red oak---- Yellow-poplar------- Eastern white pine--	70 90 90	52 90 211	Eastern white pine, pin oak, yellow-poplar.
Steinsburg (north aspect)	4R	Moderate	Slight	Slight	Moderate	Northern red oak---- Virginia pine------- Yellow-poplar------- Northern red oak----	74 70 --- ---	56 109 --- ---	Eastern white pine, Virginia pine, Norway spruce.
UsD**:									
Upshur (south aspect)-------	3R	Moderate	Severe	Severe	Moderate	Northern red oak---- Eastern white pine--	65 75	48 166	Eastern white pine, pin oak, yellow-poplar.
Steinsburg (south aspect)	3R	Moderate	Moderate	Slight	Moderate	Northern red oak---- Virginia pine------- Yellow-poplar------- Black oak-----------	65 60 --- ---	48 91 --- ---	Eastern white pine, Virginia pine, yellow-poplar, black oak.
UsE**:									
Upshur (north aspect)-------	4R	Severe	Severe	Severe	Moderate	Northern red oak---- Yellow-poplar------- Eastern white pine--	70 90 90	52 90 211	Eastern white pine, pin oak, yellow-poplar.
Steinsburg (north aspect)	4R	Severe	Slight	Slight	Moderate	Northern red oak---- Virginia pine------- Yellow-poplar------- Northern red oak----	74 70 --- ---	56 109 --- ---	Eastern white pine, Virginia pine, Norway spruce.

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
UsE**:									
Upshur (south aspect)	3R	Severe	Severe	Severe	Moderate	Northern red oak	65	48	Eastern white pine, pin oak, yellow-poplar.
						Eastern white pine	75	166	
Steinsburg (south aspect)	3R	Severe	Severe	Slight	Moderate	Northern red oak	65	48	Eastern white pine, Virginia pine, yellow-poplar, black oak.
						Virginia pine	60	91	
						Yellow-poplar	---	---	
						Black oak	---	---	
VaC2 Vandalia	4C	Slight	Severe	Severe	Moderate	Northern red oak	73	55	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	75	62	
VaD2 Vandalia (north aspect)	4R	Moderate	Severe	Severe	Moderate	Northern red oak	77	59	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	90	90	
VaD2 Vandalia (south aspect)	4R	Moderate	Severe	Severe	Moderate	Northern red oak	68	50	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	75	62	
VnB2, VnC2 Vincent	4C	Slight	Severe	Severe	Moderate	Northern red oak	70	52	Red maple, yellow-poplar, Austrian pine, green ash, pin oak, black oak, American sycamore, eastern cottonwood.
						White oak	65	48	
						Yellow-poplar	75	62	
						White ash	---	---	
						Sugar maple	---	---	
						Red maple	---	---	
WgD**, WgE**:									
Westmoreland (north aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	81	63	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar	90	90	
						Eastern white pine	75	166	
Gilpin (north aspect)	4R	Moderate	Slight	Slight	Moderate	Northern red oak	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
WgD**, WgE**:									
Westmoreland (south aspect)	4R	Moderate	Slight	Slight	Severe	Northern red oak	70	52	Eastern white pine, white oak, yellow-poplar.
						Yellow-poplar	80	71	
						Eastern white pine	65	136	

See footnotes at end of table.

Table 9.--Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
WgD**, WgE**:									
Gilpin (south aspect)-------	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	70	52	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	90	90	
WgF**:									
Westmoreland (north aspect)	4R	Severe	Slight	Slight	Severe	Northern red oak----	81	63	Black walnut, yellow-poplar, eastern white pine.
						Yellow-poplar-------	90	90	
						Eastern white pine--	75	166	
Gilpin (north aspect)-------	4R	Severe	Slight	Slight	Moderate	Northern red oak----	80	62	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	95	98	
WgF**:									
Westmoreland (south aspect)	4R	Severe	Slight	Slight	Severe	Northern red oak----	70	52	Eastern white pine, white oak, yellow-poplar.
						Yellow-poplar-------	80	71	
						Eastern white pine--	65	136	
Gilpin (south aspect)-------	4R	Severe	Moderate	Slight	Moderate	Northern red oak----	70	52	Eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar-------	90	90	
WoB------------- Woodsfield	4C	Slight	Moderate	Moderate	Severe	White oak-----------	76	58	Austrian pine, green ash, American sycamore, yellow-poplar, pin oak, red maple, black oak.
						Black cherry--------	---	---	
						Slippery elm--------	---	---	
						Red maple-----------	---	---	
						White ash-----------	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.--Woodland Harvesting and Regeneration Activities

(Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
AgC*:				
Aaron	Severe: low strength.	Severe: low strength.	Slight	Slight.
Gilpin	Moderate: depth to rock.	Moderate: depth to rock.	Slight	Slight.
AuC2*:				
Aaron	Severe: low strength.	Severe: low strength.	Slight	Slight.
Upshur	Severe: low strength.	Severe: low strength.	Slight	Slight.
Cg Chagrin	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.
CkA, CkB Cidermill	Slight	Slight	Slight	Slight.
CnA Conotton	Slight	Slight	Slight	Slight.
CnC Conotton	Slight	Moderate: slope.	Slight	Slight.
CnE Conotton	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
DoA Doles	Severe: low strength, wetness.	Severe: low strength, wetness.	Slight	Slight.
DuC Duncannon	Slight	Moderate: slope.	Slight	Slight.
EkA Elkinsville	Moderate: low strength.	Moderate: low strength.	Slight	Slight.
GaC Gallia	Slight	Moderate: slope.	Slight	Slight.
GaD Gallia	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
GbA, GbB Gallipolis	Severe: low strength.	Severe: low strength.	Slight	Slight.
GhB, GhC2 Gilpin	Moderate: depth to rock.	Moderate: depth to rock.	Slight	Slight.
GkD2*, GkE*:				
Gilpin	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope.

See footnote at end of table.

Table 10.--Woodland Harvesting and Regeneration Activities--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
GkD2*, GkE*:				
Rarden	Severe: low strength, slippage.	Severe: low strength, slope, slippage.	Moderate: slope.	Moderate: slope.
GuC*:				
Gilpin	Moderate: depth to rock.	Moderate: depth to rock, slope.	Slight	Slight.
Upshur	Severe: low strength.	Severe: low strength.	Slight	Slight.
GuD*:				
Gilpin	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope.
Upshur	Severe: low strength, slippage.	Severe: slope, slippage, low strength.	Moderate: slope.	Moderate: slope.
GuE*:				
Gilpin	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope.
Upshur	Severe: slope, slippage, low strength.	Severe: slope, slippage, low strength.	Moderate: slope.	Moderate: slope.
GwD*:				
Guernsey	Severe: low strength, slippage.	Severe: low strength, slippage.	Moderate: slope.	Moderate: slope.
Gilpin	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope.
GwE*:				
Guernsey	Severe: low strength, slippage.	Severe: low strength, slope, slippage.	Moderate: slope.	Moderate: slope.
Gilpin	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
KeB, KeC Keene	Severe: low strength.	Severe: low strength.	Slight	Slight.
LaB Lakin	Slight	Slight	Slight	Slight.
LaC Lakin	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

Table 10.--Woodland Harvesting and Regeneration Activities--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
LaD, LaE: Lakin	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
LkB, LkC2: Licking	Severe: low strength.	Severe: low strength.	Slight	Slight.
LkD2: Licking	Severe: low strength.	Severe: slope, low strength.	Moderate: slope.	Moderate: slope.
Mo: Moshannon	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.
No: Nolin	Severe: low strength, flooding.	Severe: low strength, flooding.	Moderate: flooding.	Moderate: flooding.
OmB, OmC: Omulga	Severe: low strength.	Severe: low strength.	Slight	Slight.
Or: Orrville	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.
PnB: Pinegrove	Slight	Slight	Slight	Slight.
PnD: Pinegrove	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
PnF: Pinegrove	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PuB: Pinegrove	Slight	Slight	Slight	Slight.
PuD: Pinegrove	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
PuF: Pinegrove	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Px. Pits, gravel				
RaC2: Rarden	Severe: low strength.	Severe: low strength.	Slight	Slight.
RcB: Richland	Moderate: low strength.	Moderate: low strength.	Slight	Slight.
StF: Steinsburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TaA: Taggart	Severe: low strength, wetness.	Severe: low strength, wetness.	Slight	Slight.
UbC: Upshur	Severe: low strength.	Severe: low strength.	Slight	Slight.

See footnote at end of table.

Table 10.--Woodland Harvesting and Regeneration Activities--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
UgC2*:				
Upshur	Severe: low strength.	Severe: low strength.	Slight	Slight.
Gilpin	Moderate: depth to rock.	Moderate: depth to rock, slope.	Slight	Slight.
UgD*:				
Upshur	Severe: low strength, slippage.	Severe: low strength, slippage, slope.	Moderate: slope.	Moderate: slope.
Gilpin	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
UgE*:				
Upshur	Severe: low strength, slope, slippage.	Severe: slope, slippage, low strength.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UsD*:				
Upshur	Severe: slippage, low strength.	Severe: slope, slippage.	Moderate: slope.	Moderate: slope.
Steinsburg	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope.
UsE*:				
Upshur	Severe: slope, slippage, low strength.	Severe: low strength, slope, slippage.	Severe: slope.	Severe: slope.
Steinsburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
VaC2 Vandalia	Severe: low strength.	Severe: low strength.	Slight	Slight.
VaD2 Vandalia	Severe: low strength, slippage.	Severe: low strength, slippage, slope.	Moderate: slope.	Moderate: slope.
VnB2 Vincent	Severe: low strength.	Severe: low strength.	Slight	Slight.
VnC2 Vincent	Severe: low strength.	Severe: low strength.	Slight	Slight.
WgD*:				
Westmoreland	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate slope.

See footnote at end of table.

Table 10.--Woodland Harvesting and Regeneration Activities--Continued

Soil name and map symbol	Haul roads	Log landings	Skid trails and logging areas	Site preparation and planting
WgD*:				
Gilpin	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope.
WgE*:				
Westmoreland	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Gilpin	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope.
WgF*:				
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WoB Woodsfield	Severe: low strength.	Severe: low strength.	Slight	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.--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
AgC*:					
Aaron	---	Washington hawthorn, Amur honeysuckle, Amur privet, American cranberrybush, eastern redcedar, arrowwood.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
Gilpin	Siberian peashrub	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
AuC2*:					
Aaron	---	Washington hawthorn, Amur honeysuckle, Amur privet, American cranberrybush, eastern redcedar, arrowwood.	Green ash, Osage-orange, Austrian pine.	Eastern white pine, pin oak.	---
Upshur	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---
Cg Chagrin	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
CkA, CkB Cidermill	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Norway spruce	Austrian pine, pin oak, eastern white pine.
CnA, CnC, CnE Conotton	Siberian peashrub	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn olive, Amur honeysuckle, lilac.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---

See footnote at end of table.

Table 11.--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
DoA---------------Doles	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---
Dp*. Dumps					
DuC---------------Duncannon	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Norway spruce-----	Austrian pine, pin oak, eastern white pine.
EkA---------------Elkinsville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
GaC, GaD----------Gallia	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, northern whitecedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
GbA, GbB----------Gallipolis	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, northern whitecedar, white fir, Washington hawthorn, blue spruce.	Norway spruce-----	Eastern white pine, pin oak.
GhB, GhC2---------Gilpin	Siberian peashrub	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
GkD2*, GkE*:					
Gilpin-----------	Siberian peashrub	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Rarden-----------	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---

See footnote at end of table.

Table 11.--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
GuC*, GuD*, GuE*:					
Gilpin	Siberian peashrub	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Upshur	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---
GwD*, GwE*:					
Guernsey	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---
Gilpin	Siberian peashrub	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
KeB, KeC Keene	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Northern whitecedar, Austrian pine, Washington hawthorn, white fir, blue spruce.	Norway spruce	Eastern white pine, pin oak.
Ky. Kyger					
LaB, LaC, LaD, LaE Lakin	Siberian peashrub	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, red pine, Austrian pine.	Eastern white pine	---
LkB, LkC2, LkD2 Licking	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---

See footnote at end of table.

Table 11.--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
Mo---------------- Moshannon	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
Nk---------------- Newark	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
No---------------- Nolin	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir, Austrian pine.	Norway spruce-----	Pin oak, eastern white pine.
OmB, OmC---------- Omulga	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---
Or---------------- Orrville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
PnB, PnD, PnF, PuB, PuD, PuF. Pinegrove					
Px*. Pits					
RaC2-------------- Rarden	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
RcB--------------- Richland	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.

See footnote at end of table.

Table 11.--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
StF--------------- Steinsburg	Siberian peashrub	Eastern redcedar, Washington hawthorn, radiant crabapple, autumn olive, lilac, Amur honeysuckle.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
TaA--------------- Taggart	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
UbC--------------- Upshur	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---
UgC2*, UgD*, UgE*: Upshur-----------	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---
Gilpin-----------	Siberian peashrub	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
UsD*, UsE*: Upshur-----------	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---
Steinsburg-------	Siberian peashrub	Eastern redcedar, Washington hawthorn, radiant crabapple, autumn olive, lilac, Amur honeysuckle.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---

See footnote at end of table.

Table 11.--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
VaC2, VaD2 Vandalia	---	American cranberrybush, Amur honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, Osage-orange, Austrian pine.	Pin oak, eastern white pine.	---
VnB2, VnC2 Vincent	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
WgD*, WgE*, WgF*:					
Westmoreland	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern whitecedar, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Gilpin	Siberian peashrub	Amur honeysuckle, lilac, autumn olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
WoB Woodsfield	---	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, Austrian pine, green ash.	Eastern white pine, pin oak.	---

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AgC*:					
Aaron	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
AuC2*:					
Aaron	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Upshur	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Cg Chagrin	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
CkA Cidermill	Slight	Slight	Slight	Slight	Slight.
CkB Cidermill	Slight	Slight	Moderate: slope.	Slight	Slight.
CnA Conotton	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones.
CnC Conotton	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
CnE Conotton	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
DoA Doles	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Dp*. Dumps					
DuC Duncannon	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
EkA Elkinsville	Slight	Slight	Slight	Severe: erodes easily.	Slight.
GaC Gallia	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

Table 12.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GaD------------------- Gallia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GbA------------------- Gallipolis	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight----------	Slight.
GbB------------------- Gallipolis	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
GhB------------------- Gilpin	Slight----------	Slight----------	Moderate: small stones, slope.	Slight----------	Moderate: thin layer.
GhC2------------------ Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
GkD2*:					
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Rarden---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GkE*:					
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rarden---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
GuC*:					
Gilpin---------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
Upshur---------------	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	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*:					
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

Table 12.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GwD*:					
Guernsey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GwE*:					
Guernsey	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
KeB Keene	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Moderate: wetness.
KeC Keene	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Ky Kyger	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
LaB Lakin	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
LaC Lakin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, droughty.
LaD Lakin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
LaE Lakin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LkB Licking	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
LkC2 Licking	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, wetness.
LkD2 Licking	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Mo Moshannon	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Nk Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.	Severe: wetness, flooding.

See footnote at end of table.

Table 12.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
No-------------------- Nolin	Severe: flooding.	Moderate: flooding.	Slight----------	Severe: erodes easily.	Severe: flooding.
OmB------------------- Omulga	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
OmC------------------- Omulga	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Or-------------------- Orrville	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
PnB------------------- Pinegrove	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Moderate: droughty.
PnD, PnF-------------- Pinegrove	Severe: slope.	Severe: slope.	Severe: slope.	Slight----------	Severe: slope.
PuB------------------- Pinegrove	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones.	Slight----------	Moderate: droughty.
PuD------------------- Pinegrove	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
PuF------------------- Pinegrove	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Px*. Pits					
RaC2------------------ Rarden	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer, area reclaim.
RcB------------------- Richland	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, large stones.
StF------------------- Steinsburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TaA------------------- Taggart	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
UbC------------------- Upshur	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

Table 12.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UgC2*:					
Upshur	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
UgD*:					
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
UgE*:					
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UsD*:					
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Steinsburg	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
UsE*:					
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Steinsburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
VaC2 Vandalia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
VaD2 Vandalia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
VnB2 Vincent	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight	Slight.
VnC2 Vincent	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
WgD*:					
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

Table 12.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WgE*, WgF*:					
Westmoreland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WoB Woodsfield	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--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: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AgC*:										
Aaron	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
AuC2*:										
Aaron	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Upshur	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cg: Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CkA: Cidermill	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CkB: Cidermill	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CnA, CnC: Conotton	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CnE: Conotton	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DoA: Doles	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Dp*. Dumps										
DuC: Duncannon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
EkA: Elkinsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GaC: Gallia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaD: Gallia	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GbA: Gallipolis	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GbB: Gallipolis	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GhB: Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

Table 13.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
GhC2: Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GkD2*:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Rarden	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GkE*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Rarden	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	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.	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.
GwD*:										
Guernsey	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GwE*:										
Guernsey	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
KeB: Keene	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KeC: Keene	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ky: Kyger	Very poor.	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor	Fair.

See footnote at end of table.

Table 13.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
LaB, LaC, LaD------ Lakin	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
LaE---------------- Lakin	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
LkB---------------- Licking	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LkC2--------------- Licking	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LkD2--------------- Licking	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mo----------------- Moshannon	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Nk----------------- Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
No----------------- Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OmB---------------- Omulga	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OmC---------------- Omulga	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Or----------------- Orrville	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
PnB, PnD, PnF------ Pinegrove	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
PuB---------------- Pinegrove	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.
PuD---------------- Pinegrove	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
PuF---------------- Pinegrove	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Px*. Pits										
RaC2--------------- Rarden	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RcB---------------- Richland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
StF---------------- Steinsburg	Very poor.	Poor	Good	Good	---	Very poor.	Very poor.	Poor	Fair	Very poor.
TaA---------------- Taggart	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

See footnote at end of table.

Table 13.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
UbC---------------- Upshur	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
UgC2*:										
Upshur------------	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin------------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
UgD*:										
Upshur------------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin------------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UgE*:										
Upshur------------	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Gilpin------------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
UsD*:										
Upshur------------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Steinsburg--------	Poor	Fair	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
UsE*:										
Upshur------------	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Steinsburg--------	Very poor.	Poor	Good	Good	---	Very poor.	Very poor.	Poor	Fair	Very poor.
VaC2--------------- Vandalia	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VaD2--------------- Vandalia	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VnB2--------------- Vincent	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
VnC2--------------- Vincent	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WgD*:										
Westmoreland------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin------------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
WgE*:										
Westmoreland------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

Table 13.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
WgE*:										
Gilpin------------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
WgF*:										
Westmoreland------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Gilpin------------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
WoB---------------- Woodsfield	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.--Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AgC*:						
Aaron	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
AuC2*:						
Aaron	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
Upshur	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.
Cg Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
CkA Cidermill	Slight	Slight	Slight	Slight	Moderate: frost action, low strength.	Slight.
CkB Cidermill	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action, low strength.	Slight.
CnA Conotton	Slight	Slight	Slight	Slight	Moderate: frost action.	Severe: small stones.
CnC Conotton	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: small stones.
CnE Conotton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
DoA Doles	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Dp*. Dumps						
DuC Duncannon	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
EkA Elkinsville	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action.	Slight.

See footnote at end of table.

Table 14.--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
GaC: Gallia	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
GaD: Gallia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GbA: Gallipolis	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
GbB: Gallipolis	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
GhB: Gilpin	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: thin layer.
GhC2: Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
GkD2*, GkE*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rarden	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
GuC*:						
Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	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*:						
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: shrink-swell, low strength, slope.	Severe: slope.
GwD*, GwE*:						
Guernsey	Severe: wetness, slope, slippage.	Severe: slope, slippage, shrink-swell.	Severe: wetness, slope, shrink-swell.	Severe: slope, slippage, shrink-swell.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 14.--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
KeB----- Keene	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
KeC----- Keene	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
Ky----- Kyger	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, flooding.
LaB----- Lakin	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
LaC----- Lakin	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope, droughty.
LaD, LaE----- Lakin	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LkB----- Licking	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
LkC2----- Licking	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope, wetness.
LkD2----- Licking	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Mo----- Moshannon	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
Nk----- Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
No----- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
OmB----- Omulga	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
OmC----- Omulga	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.

See footnote at end of table.

Table 14.--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
Or---------------- Orrville	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
PnB--------------- Pinegrove	Severe: cutbanks cave.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Moderate: droughty.
PnD, PnF---------- Pinegrove	Severe: cutbanks cave, slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope.
PuB--------------- Pinegrove	Severe: cutbanks cave.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Moderate: droughty.
PuD, PuF---------- Pinegrove	Severe: cutbanks cave, slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope.
Px*. Pits						
RaC2-------------- Rarden	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope, thin layer, area reclaim.
RcB--------------- Richland	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Moderate: small stones, large stones.
StF--------------- Steinsburg	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TaA--------------- Taggart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
UbC--------------- Upshur	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.
UgC2*: Upshur-----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.
Gilpin-----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
UgD*, UgE*: Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 14.--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
UsD*, UsE*:						
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Steinsburg-------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
VaC2-------------- Vandalia	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
VaD2-------------- Vandalia	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
VnB2-------------- Vincent	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
VnC2-------------- Vincent	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
WgD*, WgE*, WgF*:						
Westmoreland-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WoB--------------- Woodsfield	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AgC*:					
Aaron	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock, wetness.	Moderate: depth to rock, wetness, slope.	Poor: too clayey, hard to pack.
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
AuC2*:					
Aaron	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock, wetness.	Moderate: depth to rock, wetness, slope.	Poor: too clayey, hard to pack.
Upshur	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Cg Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: thin layer.
CkA, CkB Cidermill	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
CnA Conotton	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
CnC Conotton	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
CnE Conotton	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
DoA Doles	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Dp*. Dumps					
DuC Duncannon	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: area reclaim, slope.
EkA Elkinsville	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

Table 15.--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
GaC----------------- Gallia	Moderate: slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, small stones, slope.
GaD----------------- Gallia	Severe: slope.	Severe: slope.	Severe: slope, seepage.	Severe: slope.	Poor: slope.
GbA, GbB------------ Gallipolis	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
GhB----------------- Gilpin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GhC2---------------- Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GkD2*, GkE*:					
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.
Rarden--------------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, slippage.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope, slippage.	Poor: area reclaim, too clayey, hard to pack.
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: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
GuD*, GuE*:					
Gilpin--------------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Upshur--------------	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
GwD*, GwE*:					
Guernsey------------	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

Table 15.--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
GwD*, GwE*:					
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.
KeB Keene	Severe: wetness, percs slowly.	Severe: wetness.	Severe: seepage, wetness.	Moderate: wetness.	Poor: too clayey, hard to pack.
KeC Keene	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: seepage, wetness.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
Ky Kyger	Severe: flooding, ponding.	Severe: seepage, flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding.
LaB Lakin	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
LaC Lakin	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
LaD, LaE Lakin	Severe: slope, poor filter.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, seepage.
LkB Licking	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey, wetness.	Moderate: wetness.	Poor: too clayey, hard to pack.
LkC2 Licking	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey, wetness.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
LkD2 Licking	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, wetness.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Mo Moshannon	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: too clayey.
Nk Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
No Nolin	Severe: flooding, wetness.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
OmB Omulga	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.

See footnote at end of table.

Table 15.--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
OmC----------------- Omulga	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Or------------------ Orrville	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
PnB----------------- Pinegrove	Severe: poor filter, unstable fill.	Severe: seepage, unstable fill.	Severe: seepage, too sandy.	Severe: seepage, unstable fill.	Poor: seepage, too sandy.
PnD, PnF------------ Pinegrove	Severe: poor filter, slope, unstable fill.	Severe: seepage, slope, unstable fill.	Severe: seepage, slope, too sandy.	Severe: seepage, slope, unstable fill.	Poor: seepage, too sandy, slope.
PuB----------------- Pinegrove	Severe: poor filter, unstable fill.	Severe: seepage, unstable fill.	Severe: seepage, too sandy.	Severe: seepage, unstable fill.	Poor: seepage, too sandy.
PuD, PuF------------ Pinegrove	Severe: poor filter, slope, unstable fill.	Severe: seepage, slope, unstable fill.	Severe: seepage, slope, too sandy.	Severe: seepage, slope, unstable fill.	Poor: seepage, too sandy, slope.
Px*. Pits					
RaC2---------------- Rarden	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, slippage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
RcB----------------- Richland	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, small stones.
StF----------------- Steinsburg	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
TaA----------------- Taggart	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
UbC----------------- Upshur	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
UgC2*:					
Upshur--------------	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Gilpin--------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.

See footnote at end of table.

Table 15.--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
UgD*, UgE*:					
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
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.
UsD*, UsE*:					
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
Steinsburg	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
VaC2 Vandalia	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
VaD2 Vandalia	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
VnB2 Vincent	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
VnC2 Vincent	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
WgD*, WgE*, WgF*:					
Westmoreland	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
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.
WoB Woodsfield	Severe: percs slowly.	Moderate: seepage, slope.	Severe: seepage, too clayey.	Slight	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.--Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AgC*:				
Aaron	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
AuC2*:				
Aaron	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Cg Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
CkA, CkB Cidermill	Fair: low strength.	Probable	Probable	Fair: small stones.
CnA, CnC Conotton	Good	Probable	Probable	Poor: small stones, area reclaim.
CnE Conotton	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
DoA Doles	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Dp*. Dumps				
DuC Duncannon	Fair: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
EkA Elkinsville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
GaC Gallia	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GaD Gallia	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
GbA, GbB** Gallipolis	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

See footnotes at end of table.

Table 16.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GhB, GhC2------------- Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GkD2*:				
Gilpin---------------	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Rarden---------------	Poor: area reclaim, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
GkE*:				
Gilpin---------------	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Rarden---------------	Poor: area reclaim, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
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: too clayey, slope.
GuE*:				
Gilpin---------------	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur---------------	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
GwD*:				
Guernsey-------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too clayey.
Gilpin---------------	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.

See footnotes at end of table.

Table 16.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GwE*:				
Guernsey	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too clayey.
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
KeB, KeC Keene	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim.
Ky Kyger	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
LaB Lakin	Good	Probable	Improbable: excess fines.	Fair: too sandy.
LaC Lakin	Good	Probable	Improbable: excess fines.	Fair: too sandy, slope.
LaD Lakin	Severe: slope, seepage.	Probable	Improbable: excess fines.	Poor: slope.
LaE Lakin	Poor: slope.	Probable	Improbable: excess fines.	Poor: slope.
LkB, LkC2 Licking	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
LkD2 Licking	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Mo Moshannon	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Nk Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
No Nolin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, area reclaim.
OmB Omulga	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
OmC Omulga	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.

See footnotes at end of table.

Table 16.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Or-------------------- Orrville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
PnB------------------- Pinegrove	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: too sandy, small stones.
PnD------------------- Pinegrove	Fair: slope.	Probable-------------	Improbable: too sandy.	Poor: too sandy, small stones, slope.
PnF------------------- Pinegrove	Poor: slope.	Probable-------------	Improbable: too sandy.	Poor: too sandy, small stones, slope.
PuB------------------- Pinegrove	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: small stones, too sandy.
PuD------------------- Pinegrove	Fair: slope.	Probable-------------	Improbable: too sandy.	Poor: small stones, too sandy, slope.
PuF------------------- Pinegrove	Poor: slope.	Probable-------------	Improbable: too sandy.	Poor: small stones, too sandy, slope.
Px*. Pits				
RaC2------------------ Rarden	Poor: area reclaim, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
RcB------------------- Richland	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
StF------------------- Steinsburg	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
TaA------------------- Taggart	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
UbC------------------- Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
UgC2*:				
Upshur---------------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnotes at end of table.

Table 16.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UgC2*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
UgD*:				
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
UgE*:				
Upshur	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
UsD*:				
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Steinsburg	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
UsE*:				
Upshur	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Steinsburg	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
VaC2 Vandalia	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
VaD2 Vandalia	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
VnB2, VnC2 Vincent	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
WgD*:				
Westmoreland	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnotes at end of table.

Table 16.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WgD*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
WgE*, WgF*:				
Westmoreland	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
WoB Woodsfield	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.
** Sand or gravel, or both, may underlie these soils in the Ohio River valley.

Table 17.--Soil Material for Reconstruction of Strip-Mined Land

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "fair" and "poor")

Map symbol and soil name	Surface layer (A horizon)	Subsoil (B horizon)	Substratum (C horizon)
AgC*:			
Aaron	Fair: erodes easily.	Fair: too clayey.	---
Gilpin	Fair: too acid.	Fair: too acid, large stones.	---
AuC2*:			
Aaron	Fair: erodes easily.	Fair: too clayey.	---
Upshur	Fair: erodes easily, too acid.	Poor: too clayey.	Fair: too clayey.
Cg Chagrin	Good	Good	Poor: too sandy.
CkA, CkB Cidermill	Fair: erodes easily.	Fair: too acid.	Fair: too acid, too droughty, too sandy.
CnA, CnC, CnE Conotton	Fair: too acid.	Fair: too droughty, too sandy.	Poor: too droughty, too sandy.
DoA Doles	Fair: erodes easily.	Fair: too acid, erodes easily, too clayey.	Fair: too acid, erodes easily, too clayey.
DuC Duncannon	Fair: erodes easily, too acid.	Fair: erodes easily, too acid.	Fair: erodes easily, too acid.
Dp*. Dumps, mine			
EkA Elkinsville	Fair: erodes easily.	Fair: erodes easily, too acid.	Fair: erodes easily, too acid.
GaC, GaD Gallia	Fair: erodes easily.	Fair: too acid, erodes easily.	Fair: too droughty, too acid, too sandy.
GbA, GbB Gallipolis	Fair: erodes easily.	Fair: erodes easily, too acid, too clayey.	Fair: too acid, erodes easily.
GhB, GhC2 Gilpin	Fair: too acid.	Fair: too acid, large stones.	---

See footnotes at end of table.

Table 17.--Soil Material for Reconstruction of Strip-Mined Land--Continued

Map symbol and soil name	Surface layer (A horizon)	Subsoil (B horizon)	Substratum (C horizon)
GkD2*, GkE*:			
Gilpin	Fair: too acid.	Fair: too acid, large stones.	---
Rarden	Fair: too acid, erodes easily.	Poor: too clayey, too acid.	---
GuC*, GuD*, GuE*:			
Gilpin	Fair: too acid.	Fair: too acid, large stones.	---
Upshur	Fair: erodes easily, too acid.	Poor: too clayey, too acid.	Fair: too clayey.
GwD*, GwE*:			
Guernsey	Fair: erodes easily.	Poor: too clayey.	Fair: too droughty.
Gilpin	Fair: too acid.	Fair: too acid, large stones.	---
KeB, KeC Keene	Fair: erodes easily.	Fair: too acid, erodes easily, too clayey.	---
Ky** Kyger	Poor: too sandy, too droughty.	---	Good.
LaB, LaC, LaD, LaE Lakin	Fair: too sandy, too droughty, too acid.	Fair: too sandy, too droughty, too acid.	Poor: too sandy, too droughty.
LkB, LkC2, LkD2 Licking	Fair: erodes easily, too acid.	Poor: too clayey.	Poor: too clayey.
Mo Moshannon	Fair: erodes easily.	Fair: erodes easily.	Fair: erodes easily.
Nk Newark	Fair: erodes easily.	Fair: erodes easily.	Fair: erodes easily.
No Nolin	Fair: erodes easily.	Fair: erodes easily.	Fair: erodes easily.
OmB, OmC Omulga	Fair: erodes easily.	Fair: erodes easily, too acid, too clayey.	Fair: too clayey.
Or Orrville	Fair: erodes easily.	Fair: erodes easily.	Fair: erodes easily.

See footnotes at end of table.

Table 17.--Soil Material for Reconstruction of Strip-Mined Land--Continued

Map symbol and soil name	Surface layer (A horizon)	Subsoil (B horizon)	Substratum (C horizon)
PnB, PnD, PnF: Pinegrove	Fair: too acid.	---	Fair: too acid, too sandy, too droughty.
PuB, PuD, PuF: Pinegrove	Fair: erodes easily, too clayey.	---	Fair: too acid, too sandy, too droughty.
Px*. Pits, gravel			
RaC2: Rarden	Fair: too acid, erodes easily.	Poor: too clayey.	---
RcB: Richland	Fair: erodes easily.	Good	Fair: too droughty.
StF: Steinsburg	Fair: too acid.	Fair: too acid.	Fair: too acid, too droughty, large stones.
TaA: Taggart	Fair: erodes easily.	Fair: erodes easily, too acid, too clayey.	Fair: erodes easily.
UbC: Upshur	Fair: erodes easily, too acid.	Poor: too clayey.	Fair: too clayey.
UgC2*, UgD*, UgE*:			
Upshur	Fair: erodes easily, too acid.	Poor: too clayey.	Fair: too clayey.
Gilpin	Fair: too acid.	Fair: too acid, large stones.	---
UsD*, UsE*:			
Upshur	Fair: erodes easily, too acid.	Poor: too clayey.	Fair: too clayey.
Steinsburg	Fair: too acid.	Fair: too acid.	Fair: too acid, too droughty, large stones.
VaC2, VaD2: Vandalia	Fair: erodes easily, too acid, too clayey.	Poor: too clayey.	Fair: too clayey, too droughty.
VnB2, VnC2: Vincent	Fair: too clayey, erodes easily.	Poor: too clayey.	Poor: too clayey.

See footnotes at end of table.

Table 17.--Soil Material for Reconstruction of Strip-Mined Land--Continued

Map symbol and soil name	Surface layer (A horizon)	Subsoil (B horizon)	Substratum (C horizon)
WgD*, WgE*, WgF*:			
Westmoreland	Fair: erodes easily, too acid.	Fair: too acid, too clayey.	Fair: too clayey, too acid, too droughty.
Gilpin	Fair: too acid.	Fair: too acid, large stones.	---
WoB: Woodsfield	Fair: erodes easily.	Poor: too clayey.	---

* See description of the map unit for composition and behavior characteristics of the map unit.

** This soil does not have an A horizon. The values are for the surface layer.

Table 18.--Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
AgC*:						
Aaron	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
AuC2*:						
Aaron	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Upshur	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Cg Chagrin	Moderate: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Favorable	Favorable.
CkA Cidermill	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
CkB Cidermill	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
CnA Conotton	Severe: seepage.	Moderate: seepage, thin layer.	Severe: no water.	Deep to water	Favorable	Droughty.
CnC, CnE Conotton	Severe: seepage, slope.	Moderate: seepage, thin layer.	Severe: no water.	Deep to water	Slope	Slope, droughty.
DoA Doles	Slight	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
Dp*. Dumps						
DuC Duncannon	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
EkA Elkinsville	Moderate: seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
GaC, GaD Gallia	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
GbA Gallipolis	Moderate: seepage.	Severe: piping.	Severe: slow refill.	Frost action	Erodes easily, wetness.	Erodes easily.

See footnote at end of table.

Table 18.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
GbB--------------- Gallipolis	Moderate: seepage, slope.	Severe: piping.	Severe: slow refill.	Frost action, slope.	Erodes easily, wetness.	Erodes easily.
GhB--------------- Gilpin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock, large stones.	Depth to rock, large stones.
GhC2-------------- Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
GkD2*, GkE*:						
Gilpin-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Rarden-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, thin layer, frost action.	Slope, area reclaim, erodes easily.	Slope, erodes easily, area reclaim.
GuC*, GuD*, GuE*:						
Gilpin-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Upshur-----------	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
GwD*, GwE*:						
Guernsey---------	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Slope, erodes easily, slippage.	Slope, erodes easily, percs slowly.
Gilpin-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
KeB--------------- Keene	Moderate: seepage, slope.	Moderate: thin layer, piping, hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
KeC--------------- Keene	Severe: slope.	Moderate: thin layer, piping, hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Ky---------------- Kyger	Severe: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, flooding, frost action.	Ponding, soil blowing.	Wetness.
LaB--------------- Lakin	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy------	Droughty.
LaC, LaD, LaE----- Lakin	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.

See footnote at end of table.

Table 18.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
LkB: Licking	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
LkC2, LkD2: Licking	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Mo: Moshannon	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
Nk: Newark	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
No: Nolin	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
OmB: Omulga	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
OmC: Omulga	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Or: Orrville	Moderate: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
PnB: Pinegrove	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
PnD, PnF: Pinegrove	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
PuB: Pinegrove	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily, droughty.
PuD, PuF: Pinegrove	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, erodes easily, too sandy.	Slope, erodes easily, droughty.
Px*. Pits						
RaC2: Rarden	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, thin layer, frost action.	Slope, area reclaim, erodes easily.	Slope, erodes easily, area reclaim.
RcB: Richland	Moderate: seepage, slope.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.

See footnote at end of table.

Table 18.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
StF--------------- Steinsburg	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
TaA--------------- Taggart	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
UbC--------------- Upshur	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
UgC2*, UgD*, UgE*:						
Upshur-----------	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Gilpin-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
UsD*, UsE*:						
Upshur-----------	Severe: slope, slippage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Steinsburg-------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
VaC2, VaD2-------- Vandalia	Severe: slope.	Moderate: thin layer, piping, hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
VnB2-------------- Vincent	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
VnC2-------------- Vincent	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
WgD*, WgE*, WgF*:						
Westmoreland-----	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
Gilpin-----------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
WoB--------------- Woodsfield	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 19.--Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
AgC*:											
Aaron	0-8	Silt loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	20-35	5-15
	8-42	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	90-100	90-100	85-100	80-100	45-70	22-43
	42-50	Silty clay loam, silty clay, channery silty clay.	CL, CH	A-7	0-10	75-90	75-90	70-90	65-90	45-65	22-40
	50-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-33	Channery loam, silt loam, 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
	33-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
AuC2*:											
Aaron	0-8	Silt loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	20-35	5-15
	8-49	Silty clay loam, silty clay, clay.	CL, CH	A-7	0-5	90-100	90-100	85-100	80-100	45-70	22-43
	49-65	Silty clay loam, silty clay, channery silty clay loam.	CL, CH	A-7	0-10	75-90	75-90	70-90	65-90	45-65	22-40
	65-70	Weathered bedrock	---	---	---	---	---	---	---	---	---
Upshur	0-5	Silt loam	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	5-56	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	56-65	Very channery 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
	65-70	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cg Chagrin	0-12	Silt loam	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	12-47	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	47-80	Stratified silt loam to gravelly fine sand.	ML, SM, SP-SM	A-4, A-2	0	75-100	65-100	40-85	10-80	20-40	NP-10
CkA, CkB Cidermill	0-9	Silt loam	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	9-46	Silty clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	46-80	Stratified very fine sand to very gravelly loamy coarse sand.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	4-45	<20	NP-10

See footnote at end of table.

Table 19.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
CnA, CnC--------- Conotton	0-9	Gravelly loam----	SM, ML, GM	A-2, A-4	0-5	65-90	45-80	40-70	25-55	<30	NP-6
	9-27	Very gravelly sandy loam, very gravelly loam, very gravelly coarse sandy loam.	GM, SM, GM-GC, SC-SM	A-2	0-10	35-70	25-50	25-40	25-30	<25	NP-6
	27-80	Stratified extremely gravelly sand to very gravelly loamy coarse sand.	GW-GM, GM, SM, SW-SM	A-1	0-10	25-65	15-60	15-40	10-20	---	NP
CnE-------------- Conotton	0-4	Gravelly loam----	SM, ML, GM	A-2, A-4	0-5	65-90	45-80	40-70	25-55	<30	NP-6
	4-45	Extremely gravelly loamy coarse sand, gravelly loam, very gravelly sandy loam.	GM, SM, GM-GC, SC-SM	A-2	0-10	35-70	25-50	25-40	25-30	<25	NP-6
	45-80	Stratified extremely gravelly sand to very gravelly loamy coarse sand.	GW-GM, GM, SM, SW-SM	A-1	0-10	25-65	15-60	15-40	10-20	---	NP
DoA-------------- Doles	0-13	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-90	20-35	3-15
	13-27	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	100	100	90-100	70-95	25-45	5-20
	27-72	Silt loam, silty clay loam.	CL, ML	A-6	0	100	100	90-100	75-100	30-40	10-20
	72-80	Silt loam, silty clay loam.	CL, ML	A-6, A-7	0	100	100	90-100	75-100	30-45	10-25
Dp*. Dumps											
DuC-------------- Duncannon	0-8	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-100	20-30	NP-5
	8-70	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	90-100	85-100	70-100	17-30	NP-8
EkA-------------- Elkinsville	0-9	Silt loam--------	CL-ML, ML	A-4	0	100	100	90-100	70-90	<25	NP-7
	9-34	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	85-100	65-90	20-35	7-15
	34-51	Loam, silt loam, clay loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	0	100	90-100	75-100	45-80	20-35	5-15
	51-80	Silt loam, fine sandy loam, loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	0	100	90-100	60-100	40-80	20-35	5-15

See footnote at end of table.

Table 19.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
GaC-------------- Gallia	0-12	Loam-------------	ML, CL, CL-ML	A-4	0	100	85-100	75-95	60-85	22-35	3-10
	12-67	Sandy clay loam, gravelly clay loam, loam.	CL, SC	A-6	0	85-100	65-100	60-95	35-70	32-40	13-20
	67-86	Loamy sand, gravelly loamy sand, sandy loam.	SM	A-2, A-1	0-5	75-100	65-100	45-70	15-35	---	NP
GaD-------------- Gallia	0-7	Loam-------------	ML, CL, CL-ML	A-4	0	100	85-100	75-95	60-85	22-35	3-10
	7-62	Sandy loam, gravelly loam, loam.	CL, SC	A-6	0	85-100	65-100	60-95	35-70	32-40	13-20
	62-80	Loamy sand, gravelly loamy sand, sandy loam.	SM	A-2, A-1	0-5	75-100	65-100	45-70	15-35	---	NP
GbA, GbB--------- Gallipolis	0-11	Silt loam--------	CL-ML, CL, ML	A-4, A-6, A-7	0	95-100	95-100	90-100	70-100	25-45	4-15
	11-45	Silt loam, silty clay loam.	CL, CL-ML, CL	A-6, A-7, A-4	0	95-100	90-100	85-100	70-100	25-45	5-18
	45-73	Silt loam, silty clay loam, loam.	CL, ML, CL-ML	A-6, A-4	0	95-100	90-100	85-100	65-95	20-40	3-18
	73-80	Stratified fine sandy loam to silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	55-95	15-35	3-15
GhB-------------- Gilpin	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	8-35	Channery loam, silt loam, 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
	34-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GhC2------------- Gilpin	0-4	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	4-34	Channery loam, 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
	34-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GkD2*, GkE*:											
Gilpin----------	0-3	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	3-31	Channery loam, silt loam, very channery 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
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rarden----------	0-5	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	85-95	25-40	4-15
	5-28	Channery silty clay, clay, silty clay loam.	CH, MH	A-7	0-10	85-100	70-100	65-100	60-100	50-70	25-40
	28-36	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 19.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
GuC*, GuD*, GuE*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-31	Channery loam, 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
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-6	Silt loam--------	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	6-47	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	47-53	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
	53-56	Weathered bedrock	---	---	---	---	---	---	---	---	---
GwD*, GwE*:											
Guernsey--------	0-6	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0-2	90-100	80-100	75-100	70-90	25-40	4-14
	6-24	Silty clay loam, silt loam.	CL, CH, ML, MH	A-7, A-6	0-2	90-100	80-100	75-100	70-100	30-55	10-30
	24-60	Silty clay, clay, silty clay loam.	CH, CL, ML, MH	A-7	0-10	75-100	65-100	60-100	55-100	45-65	15-35
	60-72	Clay, silty clay, shaly silty clay loam.	CH, MH, ML, CL	A-7	0-20	70-100	60-90	55-90	55-90	40-70	15-40
	72-75	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin----------	0-4	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	4-32	Channery loam, 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
	32-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
KeB, KeC--------- Keene	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	95-100	90-100	85-100	70-95	25-36	4-12
	8-26	Silt loam, silty clay loam.	CL, CL-ML, ML	A-6, A-4	0	95-100	90-100	85-100	75-100	25-40	6-18
	26-48	Silty clay loam, silty clay.	CL, CH	A-6, A-7	0-5	95-100	75-100	70-95	65-90	30-55	10-28
	48-67	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ky--------------- Kyger	0-19	Loamy sand-------	SM, SP-SM	A-2, A-1	0	85-100	80-100	40-70	10-30	---	NP
	19-80	Silt loam, loam, sandy loam.	CL, CL-ML, ML, SM	A-2, A-4, A-6	0	85-100	80-100	55-95	30-90	15-30	3-14
LaB, LaC, LaD---- Lakin	0-9	Loamy fine sand	SM, SC-SM	A-2	0	95-100	95-100	95-100	10-35	<30	NP-7
	9-72	Loamy sand, fine sand, loamy fine sand.	SM, SC-SM, SP-SM	A-2, A-3	0	95-100	95-100	90-100	5-35	<30	NP-7
	72-80	Sand, sandy loam, gravelly sand.	SM, SC-SM, GM, SP-SM	A-1, A-2, A-3	0	40-100	35-100	20-80	5-25	<30	NP-7

See footnote at end of table.

Table 19.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
LaE-------------- Lakin	0-2	Loamy fine sand	SM, SC-SM	A-2	0	95-100	95-100	95-100	10-35	<30	NP-7
	2-63	Loamy sand, fine sand, loamy fine sand.	SM, SC-SM, SP-SM	A-2, A-3	0	95-100	95-100	90-100	5-35	<30	NP-7
	63-80	Sand, sandy loam, gravelly sand.	SM, SC-SM, GM, SP-SM	A-1, A-2, A-3	0	40-100	35-100	20-80	5-25	<30	NP-7
LkB-------------- Licking	0-10	Silt loam--------	ML, CL-ML, CL	A-4	0	95-100	95-100	90-100	70-90	22-35	4-10
	10-20	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	90-100	80-95	30-50	15-25
	20-66	Silty clay, clay	CH, CL	A-7	0	100	100	95-100	75-95	45-70	26-42
	66-80	Clay, silty clay, silt loam.	CH, CL, ML, MH	A-7	0	100	100	90-100	70-95	45-70	20-36
LkC2, LkD2------- Licking	0-5	Silt loam--------	ML, CL-ML, CL	A-4	0	95-100	95-100	90-100	70-90	22-35	4-10
	5-14	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	90-100	80-95	30-50	15-25
	14-53	Silty clay, clay	CH, CL	A-7	0	100	100	95-100	75-95	45-70	26-42
	53-80	Clay, silty clay, silt loam.	CH, CL, ML, MH	A-7	0	100	100	90-100	70-95	45-70	20-36
Mo--------------- Moshannon	0-7	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	95-100	95-100	90-100	70-95	22-40	3-15
	7-40	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	90-100	80-95	25-40	3-15
	40-80	Silt loam, clay loam, gravelly fine sandy loam.	ML, CL, CL-ML, SC	A-4, A-6	0	80-100	70-100	55-100	35-80	25-40	3-15
Nk--------------- Newark	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	9-39	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-100	22-42	3-20
	39-80	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
No--------------- Nolin	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	9-40	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
	40-80	Loam, silt loam, gravelly loam.	ML, CL, CL-ML, GM	A-4, A-6	0-10	50-100	50-100	40-95	35-95	<30	NP-15
OmB, OmC--------- Omulga	0-9	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	65-90	25-35	5-15
	9-23	Silty clay loam, silt loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	95-100	90-100	85-100	65-100	25-45	5-20
	23-49	Silty clay loam, silt loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	85-100	80-100	75-95	60-90	20-40	5-20
	49-67	Silty clay loam, silt loam.	CL, CL-ML, ML	A-6, A-7, A-4	0	85-100	80-100	75-95	70-90	20-45	5-20
	67-80	Stratified sandy loam to clay.	CL	A-6, A-7	0	80-100	75-100	65-95	50-90	30-50	15-30

See footnote at end of table.

Table 19.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Or--------------- Orrville	0-4	Silt loam--------	ML, CL-ML, CL	A-4	0	100	90-100	85-100	60-80	20-35	3-10
	4-42	Silt loam, loam, sandy loam.	CL, CL-ML, ML	A-4, A-6	0-2	95-100	75-100	70-95	50-90	20-40	2-16
	42-80	Stratified gravelly loamy sand to silt loam.	ML, CL, SM, SC	A-4, A-2, A-1	0-2	95-100	65-100	40-85	15-75	15-35	NP-10
PnB, PnD, PnF---- Pinegrove	0-2	Coarse sandy loam	SM, SC-SM	A-2, A-1, A-4	0-5	85-100	80-100	40-85	15-40	<15	NP-5
	2-80	Very channery loamy sand, sand, channery loamy sand.	SM, SP-SM	A-2, A-1, A-3	0-10	70-100	65-100	35-75	5-30	---	NP
PuB, PuD, PuF---- Pinegrove	0-9	Silty clay loam	CL	A-7, A-6	0-5	90-100	80-100	75-95	70-95	35-50	12-24
	9-80	Loamy coarse sand, gravelly loamy coarse sand, sand.	SM, SP-SM	A-2, A-3, A-1	0-10	70-100	65-100	35-75	5-30	---	NP
Px*. Pits											
RaC2------------- Rarden	0-6	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	85-95	25-40	4-15
	6-32	Silty clay, channery clay, silty clay loam.	CH, MH	A-7	0-10	85-100	70-100	65-100	60-100	50-70	25-40
	32-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
RcB-------------- Richland	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-10	90-100	80-95	70-95	50-90	16-35	3-20
	10-54	Loam, silty clay loam, gravelly loam.	CL, SC, SM, ML	A-4, A-6, A-7	5-15	80-95	65-95	55-90	35-75	30-45	9-18
	54-80	Channery clay loam, very gravelly loam, loam.	CL, GC, SM, GM	A-4, A-6, A-7	5-15	65-90	40-85	40-85	35-75	30-45	9-18
StF-------------- Steinsburg	0-3	Fine sandy loam	ML, SM, SC-SM, CL	A-4	0-5	95-100	90-100	65-90	35-70	<25	5-10
	3-18	Loam, gravelly sandy loam, fine sandy loam.	SM, SC-SM	A-2, A-4, A-1	0-10	75-95	65-85	35-60	15-40	<25	NP-5
	18-26	Channery fine sandy loam, very gravelly loamy sand.	SM, GM	A-2, A-1	10-40	45-85	40-80	35-60	15-35	<25	NP-3
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TaA-------------- Taggart	0-8	Silt loam--------	CL, CL-ML	A-4	0	100	100	90-100	70-90	20-30	5-10
	8-72	Silty clay loam, clay loam, silt loam.	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	72-80	Stratified silty clay loam to loam.	CL	A-6, A-4	0-1	90-100	75-100	65-95	50-85	25-35	8-15

See footnote at end of table.

Table 19.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
UbC-------------- Upshur	0-8	Silt loam--------	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	8-42	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	42-60	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
	60-80	Weathered bedrock	---	---	---	---	---	---	---	---	---
UgC2*, UgD*, UgE*:											
Upshur---------	0-6	Silt loam--------	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	6-51	Silty clay, silty clay loam.	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	51-62	Channery 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
	62-65	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin---------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-31	Loam, 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
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
UsD*, UsE*:											
Upshur----------	0-6	Silt loam--------	CL-ML, ML, CL	A-6, A-4	0	95-100	95-100	85-100	65-90	25-40	5-15
	6-43	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	43-51	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
	51-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Steinsburg------	0-3	Fine sandy loam	ML, SM, SC-SM, CL	A-4	0-5	95-100	90-100	65-90	35-70	<25	5-10
	3-18	Loam, gravelly sandy loam, fine sandy loam.	SM, SC-SM	A-2, A-4, A-1	0-10	75-95	65-85	35-60	15-40	<25	NP-5
	18-32	Channery sandy loam, very gravelly loamy sand.	SM, GM	A-2, A-1	10-40	45-85	40-80	35-60	15-35	<25	NP-3
	32-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
VaC2, VaD2------- Vandalia	0-6	Silt loam--------	ML, CL	A-4, A-6, A-7	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	6-63	Very channery silty clay loam, channery silty clay, very channery silty clay.	CL, CH, ML	A-6, A-7	0-5	75-100	70-95	65-90	60-85	35-55	15-30
	63-80	Very channery 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

See footnote at end of table.

Table 19.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
VnB2, VnC2------- Vincent	0-8	Silty clay loam	ML, CL, CL-ML	A-6, A-4	0	100	100	95-100	80-95	25-40	4-14
	8-60	Silty clay, silty clay loam, clay.	CH, MH, CL, ML	A-7, A-6	0	100	95-100	90-100	80-100	38-66	14-34
	60-80	Silty clay, silty clay loam, clay.	CH, MH, CL, ML	A-7, A-6	0	100	95-100	85-100	75-100	38-66	14-34
WgD*, WgE*, WgF*:											
Westmoreland----	0-3	Silt loam--------	ML, CL	A-4, A-6	0	85-100	80-100	75-95	60-95	<35	NP-10
	3-32	Channery silty clay loam, channery loam, 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
	32-42	Very channery loam, very channery silt loam, very channery 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
	42-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin----------	0-3	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	3-33	Very channery loam, 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
	33-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WoB------------- Woodsfield	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	95-100	90-100	85-100	65-90	25-40	5-15
	8-14	Silt loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-100	85-100	65-90	30-50	10-25
	14-49	Silty clay loam, silty clay, clay.	CH, CL, MH, ML	A-7, A-6	0-5	85-100	75-100	70-100	60-95	35-75	15-40
	49-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 20.--Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AgC*:										
Aaron	0-8	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-7.8	Low	0.37	3	1-3
	8-42	35-60	1.30-1.60	0.06-0.2	0.14-0.18	5.1-7.8	High	0.28		
	42-50	35-60	1.35-1.65	0.06-0.2	0.10-0.14	5.1-7.8	High	0.28		
	50-55	---	---	0.00-0.2	---	---	-------------	----		
Gilpin	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.32	3	.5-4
	5-33	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.24		
	33-35	---	---	0.2-2.0	---	---	-------------	----		
AuC2*:										
Aaron	0-8	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-7.8	Low	0.37	3	1-3
	8-49	35-60	1.30-1.60	0.06-0.2	0.14-0.18	5.1-7.8	High	0.28		
	49-65	35-60	1.35-1.65	0.06-0.2	0.10-0.14	5.1-7.8	High	0.28		
	65-70	---	---	0.00-0.2	---	---	-------------	----		
Upshur	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Moderate	0.43	3	1-4
	5-56	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-8.4	High	0.32		
	56-65	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate	0.32		
	65-70	---	---	---	---	---	-------------	----		
Cg Chagrin	0-12	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.32	5	2-4
	12-47	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low	0.32		
	47-80	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low	0.32		
CkA, CkB Cidermill	0-9	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.5	Low	0.37	4	1-3
	9-46	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.5	Low	0.32		
	46-80	8-15	1.30-1.50	6.0-20	0.04-0.08	5.1-6.0	Low	0.20		
CnA, CnC Conotton	0-9	8-16	1.30-1.50	2.0-6.0	0.10-0.14	4.5-6.5	Low	0.24	3	.5-3
	9-27	6-22	1.25-1.60	6.0-20	0.06-0.10	4.5-7.3	Low	0.24		
	27-80	2-9	1.20-1.50	>6.0	0.02-0.06	5.6-7.8	Low	0.10		
CnE Conotton	0-4	8-16	1.30-1.50	2.0-6.0	0.10-0.14	4.5-6.5	Low	0.24	3	.5-3
	4-45	6-22	1.25-1.60	6.0-20	0.06-0.10	4.5-7.3	Low	0.24		
	45-80	2-9	1.20-1.50	>6.0	0.02-0.06	5.6-7.8	Low	0.10		
DoA Doles	0-13	15-25	1.30-1.45	0.6-2.0	0.18-0.22	4.5-7.3	Low	0.43	4	1-3
	13-27	20-35	1.40-1.60	0.2-0.6	0.16-0.20	4.5-5.5	Moderate	0.43		
	27-72	20-30	1.60-1.80	0.06-0.2	0.06-0.08	4.5-5.5	Moderate	0.43		
	72-80	20-35	1.40-1.60	0.2-0.6	0.15-0.18	4.5-6.0	Moderate	0.43		
Dp*. Dumps										
DuC Duncannon	0-8	10-20	1.20-1.40	0.6-2.0	0.16-0.20	5.1-6.0	Low	0.37	4	2-4
	8-70	10-24	1.40-1.60	0.6-2.0	0.14-0.16	5.1-6.0	Low	0.43		
EkA Elkinsville	0-9	7-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.37	5	.5-2
	9-34	19-30	1.40-1.60	0.6-2.0	0.18-0.22	4.5-5.5	Moderate	0.37		
	34-51	16-30	1.45-1.65	0.6-2.0	0.15-0.19	4.5-5.5	Moderate	0.37		
	51-80	14-30	1.40-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.37		
GaC Gallia	0-12	10-22	1.30-1.50	0.6-2.0	0.18-0.23	4.5-7.3	Low	0.37	5	1-3
	12-67	18-35	1.20-1.60	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.37		
	67-86	2-15	1.20-1.50	6.0-20	0.05-0.09	4.5-6.0	Low	0.10		

See footnote at end of table.

Table 20.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
GaD--------------	0-7	10-22	1.30-1.50	0.6-2.0	0.18-0.23	4.5-7.3	Low----------	0.37	5	1-3
Gallia	7-62	18-35	1.20-1.60	0.6-2.0	0.12-0.18	4.5-6.5	Moderate-----	0.37		
	62-80	2-15	1.20-1.50	6.0-20	0.05-0.09	4.5-6.0	Low----------	0.10		
GbA, GbB---------	0-11	15-27	1.30-1.45	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.37	5	1-3
Gallipolis	11-45	20-35	1.45-1.65	0.2-0.6	0.16-0.20	4.5-5.5	Moderate-----	0.37		
	45-73	20-35	1.45-1.65	0.2-2.0	0.15-0.18	4.5-5.5	Low----------	0.37		
	73-80	18-32	1.40-1.60	0.2-2.0	0.12-0.17	4.5-6.0	Low----------	0.37		
GhB--------------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
Gilpin	8-35	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	35-37	---	---	0.2-2.0	---	---	-------------	----		
GhC2-------------	0-4	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
Gilpin	4-34	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	34-36	---	---	---	---	---	-------------	----		
GkD2*, GkE*:										
Gilpin-----------	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	3-31	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	31-35	---	---	0.2-2.0	---	---	-------------	----		
Rarden-----------	0-5	17-27	1.30-1.50	0.6-2.0	0.21-0.24	3.6-6.5	Low----------	0.43	3-2	1-3
	5-28	35-60	1.50-1.70	0.06-0.2	0.10-0.14	3.6-5.5	High---------	0.32		
	28-36	---	---	0.0-0.2	---	---	-------------	----		
GuC*, GuD*, GuE*:										
Gilpin-----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	5-31	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	31-35	---	---	0.2-2.0	---	---	-------------	----		
Upshur-----------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Moderate-----	0.43	3	1-4
	6-47	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-8.4	High---------	0.32		
	47-53	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	53-56	---	---	---	---	---	-------------	----		
GwD*, GwE*:										
Guernsey---------	0-6	13-27	1.30-1.50	0.6-2.0	0.19-0.24	4.5-7.3	Low----------	0.43	3-2	1-3
	6-24	22-38	1.35-1.55	0.2-2.0	0.15-0.21	4.5-6.0	Moderate-----	0.43		
	24-51	35-60	1.40-1.60	0.06-0.6	0.10-0.15	4.5-7.8	High---------	0.32		
	51-72	35-60	1.40-1.60	0.06-0.6	0.06-0.10	5.1-8.4	High---------	0.32		
	72-75	---	---	0.00-0.2	---	---	-------------	----		
Gilpin-----------	0-4	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	4-32	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	32-35	---	---	0.2-2.0	---	---	-------------	----		
KeB, KeC---------	0-8	12-25	1.30-1.45	0.6-2.0	0.21-0.24	4.5-7.3	Low----------	0.43	4	1-3
Keene	8-26	18-33	1.30-1.55	0.2-2.0	0.18-0.22	4.5-5.5	Moderate-----	0.37		
	26-48	30-45	1.40-1.60	0.06-0.6	0.10-0.15	4.5-5.5	Moderate-----	0.37		
	48-67	---	---	0.0-0.2	---	---	-------------	----		
Ky---------------	0-19	4-12	1.35-1.60	6.0-20	0.08-0.10	3.6-5.5	Low----------	0.17	5	<.5
Kyger	19-80	8-20	1.30-1.60	0.6-6.0	0.14-0.22	5.1-7.3	Low----------	0.28		
LaB, LaC, LaD----	0-9	2-6	1.20-1.40	6.0-20	0.06-0.10	4.5-6.0	Low----------	0.17	5	1-2
Lakin	9-72	3-8	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low----------	0.17		
	72-80	1-3	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low----------	0.17		

See footnote at end of table.

Table 20.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
LaE--------------	0-2	2-6	1.20-1.40	6.0-20	0.06-0.10	4.5-6.0	Low----------	0.17	5	1-2
Lakin	2-63	3-8	1.30-1.50	6.0-20	0.04-0.08	4.5-6.5	Low----------	0.17		
	63-80	1-3	1.30-1.50	6.0-20	0.04-0.08	4.5-6.5	Low----------	0.17		
LkB--------------	0-10	15-27	1.35-1.50	0.6-2.0	0.21-0.24	4.5-6.0	Low----------	0.43	3	1-3
Licking	10-20	24-35	1.40-1.60	0.2-0.6	0.18-0.22	4.5-6.0	Moderate-----	0.43		
	20-66	40-60	1.45-1.65	0.06-0.2	0.10-0.14	5.1-7.3	High---------	0.32		
	66-80	40-60	1.55-1.75	0.06-0.2	0.06-0.10	5.6-7.8	High---------	0.32		
LkC2, LkD2-------	0-5	15-27	1.35-1.50	0.6-2.0	0.21-0.24	4.5-6.0	Low----------	0.43	3	1-3
Licking	5-14	24-35	1.40-1.60	0.2-0.6	0.18-0.22	4.5-6.0	Moderate-----	0.43		
	14-53	40-60	1.45-1.65	0.06-0.2	0.10-0.14	5.1-7.3	High---------	0.32		
	53-80	40-60	1.55-1.75	0.06-0.2	0.06-0.10	5.6-7.8	High---------	0.32		
Mo---------------	0-7	15-27	1.20-1.50	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	5	1-3
Moshannon	7-40	18-32	1.20-1.50	0.6-2.0	0.18-0.22	5.6-6.5	Low----------	0.37		
	40-80	12-32	1.20-1.50	0.6-2.0	0.14-0.18	5.6-7.3	Low----------	0.37		
Nk---------------	0-9	7-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low----------	0.43	5	1-4
Newark	9-39	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.8	Low----------	0.43		
	39-80	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43		
No---------------	0-9	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	2-4
Nolin	9-40	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43		
	40-80	10-30	1.30-1.55	0.6-6.0	0.10-0.23	5.1-8.4	Low----------	0.43		
OmB, OmC---------	0-9	12-18	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	4	.5-2
Omulga	9-23	20-35	1.30-1.45	0.6-2.0	0.18-0.22	3.6-5.5	Moderate-----	0.43		
	23-49	18-30	1.60-1.80	0.06-0.2	0.06-0.08	3.6-5.5	Moderate-----	0.43		
	49-67	20-35	1.50-1.60	0.2-0.6	0.18-0.21	4.5-6.0	Moderate-----	0.43		
	67-80	22-45	1.50-1.60	0.2-0.6	0.10-0.18	4.5-7.3	Moderate-----	0.32		
Or---------------	0-4	12-27	1.25-1.45	0.6-2.0	0.18-0.22	5.1-7.3	Low----------	0.37	5	2-4
Orrville	4-42	18-30	1.30-1.50	0.6-2.0	0.15-0.19	5.1-6.5	Low----------	0.37		
	42-80	10-25	1.20-1.40	0.6-6.0	0.08-0.15	5.1-7.3	Low----------	0.37		
PnB, PnD, PnF----	0-2	5-15	1.30-1.55	2.0-6.0	0.09-0.13	3.6-5.5	Low----------	0.24	5	<1
Pinegrove	2-80	2-12	1.35-1.60	6.0-20	0.04-0.08	3.6-5.5	Low----------	0.17		
PuB, PuD, PuF----	0-9	27-40	1.40-1.55	0.2-0.6	0.13-0.18	4.5-7.8	Moderate-----	0.43	5	.5-2
Pinegrove	9-80	2-12	1.35-1.60	6.0-20	0.04-0.08	3.6-5.5	Low----------	0.17		
Px*.										
Pits										
RaC2-------------	0-6	17-27	1.30-1.50	0.6-2.0	0.21-0.24	3.6-6.5	Low----------	0.43	3-2	1-3
Rarden	6-32	35-60	1.50-1.70	0.06-0.2	0.10-0.14	3.6-5.5	High---------	0.32		
	32-35	---	---	0.0-0.2	---	---	-------------	----		
RcB--------------	0-10	15-27	1.30-1.40	0.6-2.0	0.16-0.20	5.1-7.3	Low----------	0.37	5	1-3
Richland	10-54	18-35	1.40-1.60	0.6-2.0	0.10-0.16	5.1-7.3	Moderate-----	0.28		
	54-80	18-35	1.40-1.60	0.6-2.0	0.07-0.11	5.6-7.3	Moderate-----	0.28		
StF--------------	0-3	10-20	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.28	2	1-3
Steinsburg	3-18	10-20	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.20		
	18-26	5-18	1.10-1.40	2.0-6.0	0.04-0.08	3.6-5.5	Low----------	0.20		
	26-30	---	---	0.6-6.0	---	---	-------------	----		

See footnote at end of table.

Table 20.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
TaA--------------	0-8	12-20	1.30-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	5	1-3
Taggart	8-72	25-35	1.40-1.60	0.06-0.2	0.18-0.20	4.5-5.5	Moderate-----	0.37		
	72-80	20-30	1.40-1.60	0.6-2.0	0.19-0.21	4.5-5.5	Low----------	0.37		
UbC--------------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.16	3.6-6.5	Moderate-----	0.43	3	1-4
Upshur	8-42	40-55	1.30-1.60	0.06-0.2	0.10-0.14	3.6-8.4	High---------	0.32		
	42-60	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	60-80	---	---	---	---	---	-------------	----		
UgC2*, UgD*, UgE*:										
Upshur---------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Moderate-----	0.43	3	1-4
	6-51	40-55	1.30-1.60	0.06-0.2	0.10-0.14	3.6-8.4	High---------	0.32		
	51-62	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	62-65	---	---	---	---	---	-------------	----		
Gilpin---------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	5-31	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	31-35	---	---	0.2-2.0	---	---	-------------	----		
UsD*, UsE*:										
Upshur----------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Moderate-----	0.43	3	1-4
	6-43	40-55	1.30-1.60	0.06-0.2	0.10-0.14	3.5-8.4	High---------	0.32		
	43-51	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	51-60	---	---	---	---	---	-------------	----		
Steinsburg------	0-3	10-20	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.28	2	1-3
	3-18	10-20	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	Low----------	0.20		
	18-32	5-18	1.10-1.40	2.0-6.0	0.04-0.08	3.6-5.5	Low----------	0.20		
	32-35	---	---	0.6-6.0	---	---	-------------	----		
VaC2, VaD2-------	0-6	20-35	1.20-1.50	0.2-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.37	4	1-3
Vandalia	6-63	35-50	1.30-1.60	0.06-0.6	0.12-0.15	4.5-6.0	High---------	0.32		
	63-80	27-50	1.30-1.60	0.06-0.6	0.08-0.12	5.1-7.3	High---------	0.32		
VnB2, VnC2-------	0-8	20-40	1.20-1.50	0.06-2.0	0.20-0.24	5.1-7.3	Low----------	0.43	3	1-3
Vincent	8-60	35-55	1.35-1.65	0.06-0.2	0.10-0.18	4.5-7.3	High---------	0.32		
	60-80	35-55	1.40-1.70	0.06-0.2	0.08-0.18	5.6-7.8	High---------	0.32		
WgD*, WgE*, WgF*:										
Westmoreland----	0-3	15-30	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.0	Low----------	0.37	3	1-4
	3-32	20-35	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low----------	0.28		
	32-42	18-35	1.20-1.50	0.6-2.0	0.06-0.10	5.1-6.0	Low----------	0.17		
	42-45	---	---	0.06-2.0	---	---	-------------	----		
Gilpin----------	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	3-33	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	33-35	---	---	0.2-2.0	---	---	-------------	----		
WoB--------------	0-8	15-27	1.35-1.50	0.6-2.0	0.17-0.21	4.5-7.3	Low----------	0.43	3	1-3
Woodsfield	8-14	22-35	1.40-1.60	0.6-2.0	0.15-0.19	4.5-6.5	Moderate-----	0.32		
	14-49	35-60	1.40-1.65	0.06-0.2	0.12-0.16	5.1-7.8	High---------	0.32		
	49-60	---	---	0.0-0.2	---	---	-------------	----		

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 21.--Soil and Water Features

("Flooding" and "water table" and terms such as "frequent," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
AgC*:												
Aaron------------	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	40-60	Soft	High-----	High-----	Moderate.
Gilpin-----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
AuC2*:												
Aaron------------	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	40-60	Soft	High-----	High-----	Moderate.
Upshur-----------	D	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	High-----	Moderate.
Cg---------------- Chagrin	B	Frequent----	Brief-----	Nov-May	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low------	Moderate.
CkA, CkB---------- Cidermill	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
CnA, CnC, CnE----- Conotton	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
DoA--------------- Doles	C	None--------	---	---	1.0-2.0	Perched	Nov-May	>60	---	High-----	High-----	High.
Dp*. Dumps												
DuC--------------- Duncannon	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
EkA--------------- Elkinsville	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	High.
GaC, GaD---------- Gallia	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
GbA, GbB---------- Gallipolis	C	None--------	---	---	2.0-3.5	Apparent	Dec-Apr	>60	---	High-----	Moderate	Moderate.

See footnote at end of table.

Table 21.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
GhB, GhC2--------- Gilpin	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
GkD2*, GkE*:												
Gilpin-----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
Rarden-----------	C	None--------	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High-----	High.
GuC*, GuD*, GuE*:												
Gilpin-----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
Upshur-----------	D	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	High-----	Moderate.
GwD*, GwE*:												
Guernsey---------	C	None--------	---	---	1.5-3.0	Perched	Jan-Apr	>50	Soft	High-----	High-----	Moderate.
Gilpin-----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
KeB, KeC---------- Keene	C	None--------	---	---	1.5-3.0	Perched	Jan-Apr	40-84	Soft	High-----	High-----	High.
Ky---------------- Kyger	B	Frequent----	Long------	Nov-May	+2.-1.0	Apparent	Dec-May	>60	---	High-----	High-----	High.
LaB, LaC, LaD, LaE-------------- Lakin	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
LkB, LkC2, LkD2--- Licking	C	None--------	---	---	1.5-3.0	Perched	Jan-Apr	>60	---	High-----	High-----	High.
Mo---------------- Moshannon	B	Frequent----	Very brief	Jan-May	4.0-6.0	Apparent	Feb-Mar	>60	---	High-----	Low------	Moderate.
Nk---------------- Newark	C	Frequent----	Brief to long.	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	High-----	Low.
No---------------- Nolin	B	Frequent----	Brief to long.	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	---	Low------	Moderate.
OmB, OmC---------- Omulga	C	None--------	---	---	2.0-3.5	Perched	Jan-Apr	>60	---	High-----	Moderate	High.

See footnote at end of table.

Table 21.--Soil and Water Features--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Or---------------- Orrville	C	Frequent----	Very brief to brief.	Nov-May	1.0-2.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Moderate.
PnB, PnD, PnF, PuB, PuD, PuF---- Pinegrove	A	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	High.
Px*. Pits												
RaC2-------------- Rarden	C	None--------	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High-----	High.
RcB--------------- Richland	B	None--------	---	---	3.0-6.0	Apparent	Nov-May	>60	---	Moderate	Moderate	Moderate.
StF--------------- Steinsburg	B	None--------	---	---	>6.0	---	---	24-40	Soft	---	Low------	High.
TaA--------------- Taggart	C	None--------	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	High-----	High.
UbC--------------- Upshur	D	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	High-----	Moderate.
UgC2*, UgD*, UgE*:												
Upshur-----------	D	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	High-----	Moderate.
Gilpin-----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
UsD*, UsE*:												
Upshur-----------	D	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	High-----	Moderate.
Steinsburg-------	B	None--------	---	---	>6.0	---	---	24-40	Soft	---	Low------	High.
VaC2, VaD2-------- Vandalia	D	None--------	---	---	4.0-6.0	Perched	Feb-Apr	>60	---	Moderate	High-----	Moderate.
VnB2, VnC2-------- Vincent	C	None--------	---	---	2.0-4.0	Perched	Jan-Apr	>60	---	Moderate	High-----	Moderate.

See footnote at end of table.

Table 21.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
WgD*, WgE*, WgF*:												
Westmoreland-----	B	None--------	---	---	>6.0	---	---	>40	Hard	Moderate	Low------	High.
Gilpin-----------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
WoB--------------- Woodsfield	C	None--------	---	---	>6.0	---	---	40-72	Soft	Moderate	High-----	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 22.--Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Aaron	Fine, mixed, mesic Aquic Hapludalfs
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Cidermill	Fine-silty, mixed, mesic Ultic Hapludalfs
*Conotton	Loamy-skeletal, mixed, mesic Typic Hapludalfs
Doles	Fine-silty, mixed, mesic Aeric Fragiaqualfs
Duncannon	Coarse-silty, mixed, mesic Ultic Hapludalfs
Elkinsville	Fine-silty, mixed, mesic Ultic Hapludalfs
Gallia	Fine-loamy, siliceous, mesic Typic Paleudalfs
Gallipolis	Fine-silty, mixed, mesic Ultic Hapludalfs
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Guernsey	Fine, mixed, mesic Aquic Hapludalfs
Keene	Fine-silty, mixed, mesic Aquic Hapludalfs
Kyger	Coarse-loamy, mixed, nonacid, mesic Typic Fluvaquents
Lakin	Mixed, mesic Alfic Udipsamments
Licking	Fine, mixed, mesic Aquic Hapludalfs
Moshannon	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Omulga	Fine-silty, mixed, mesic Typic Fragiudalfs
Orrville	Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents
Pinegrove	Mixed, mesic Typic Udipsamments
Rarden	Fine, mixed, mesic Aquultic Hapludalfs
Richland	Fine-loamy, mixed, mesic Typic Hapludalfs
Steinsburg	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Taggart	Fine-silty, mixed, mesic Aeric Ochraqualfs
Upshur	Fine, mixed, mesic Typic Hapludalfs
Vandalia	Fine, mixed, mesic Typic Hapludalfs
*Vincent	Fine, mixed, mesic Typic Hapludalfs
Westmoreland	Fine-loamy, mixed, mesic Ultic Hapludalfs
Woodsfield	Fine, mixed, mesic Typic Hapludalfs

Interpretive Groups

Interpretive Groups

(Dashes indicate that the soil was not assigned to the interpretive group)

Map symbol and soil name	Land capability*	Prime farmland*	Woodland ordination symbol	Pasture and hayland suitability group
AgC	IIIe	---		
Aaron			4C	A-6
Gilpin			4A	F-1
AuC2	IVe	---		
Aaron			4C	A-6
Upshur			3C	F-5
Cg Chagrin	IIw	Yes**	5A	A-5
CkA Cidermill	I	Yes	4A	A-1
CkB Cidermill	IIe	Yes	4A	A-1
CnA Conotton	IIIs	---	4F	B-1
CnC Conotton	IVe	---	4F	B-1
CnE Conotton	VIIe	---	4R	B-2
DoA Doles	IIw	Yes***	4D	C-2
Dp. Dumps, mine				
DuC Duncannon	IIIe	---	4A	A-6
EkA Elkinsville	I	Yes	5A	A-6
GaC Gallia	IIIe	---	5A	A-1
GaD Gallia	IVe	---	5R	A-1
GbA Gallipolis	I	Yes	5A	A-6
GbB Gallipolis	IIe	Yes	5A	A-6
GhB Gilpin	IIe	Yes	4A	F-1
GhC2 Gilpin	IIIe	---	4A	F-1
GkD2	VIe	---		
Gilpin			4R	F-1
Rarden			3R	F-1

See footnotes at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability*	Prime farmland*	Woodland ordination symbol	Pasture and hayland suitability group
GkE	VIIe	---		
Gilpin			4R	F-2
Rarden			3R	F-2
GuC	IIIe	---		
Gilpin			4A	F-1
Upshur			3C	F-5
GuD	IVe	---		
Gilpin (north aspect)			4R	F-1
Upshur (north aspect)			4R	F-5
Gilpin (south aspect)			4R	F-1
Upshur (south aspect)			3R	F-5
GuE	VIe	---		
Gilpin (north aspect)			4R	F-2
Upshur (north aspect)			4R	F-6
Gilpin (south aspect)			4R	F-2
Upshur (south aspect)			3R	F-6
GwD	IVe	---		
Guernsey			4R	A-2
Gilpin			4R	F-1
GwE	VIe	---		
Guernsey			4R	A-3
Gilpin			4R	F-2
KeB Keene	IIe	Yes	4A	A-6
KeC Keene	IIIe	---	4A	A-6
Ky Kyger	VIw	---	---	H-1
LaB Lakin	IIIs	---	3S	B-1
LaC Lakin	IVs	---	3S	B-1
LaD Lakin	VIs	---	3R	B-1
LaE Lakin	VIIs	---	3R	B-2
LkB Licking	IIe	Yes	4C	A-6
LkC2 Licking	IVe	---	4C	A-6
LkD2 Licking	VIe	---	4R	A-6
Mo Moshannon	IIw	Yes**	5A	A-5

See footnotes at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability*	Prime farmland*	Woodland ordination symbol	Pasture and hayland suitability group
Nk: Newark	IIw	Yes****	5A	C-3
No: Nolin	IIw	Yes**	5A	A-5
OmB: Omulga	IIe	Yes	4D	F-3
OmC: Omulga	IIIe	---	4D	F-3
Or: Orrville	IIw	Yes****	5A	C-3
PnB: Pinegrove	VIIs	---	---	H-1
PnD: Pinegrove	VIIs	---	---	H-1
PnF: Pinegrove	VIIe	---	---	H-1
PuB: Pinegrove	VIs	---	---	G-1
PuD: Pinegrove	VIs	---	---	G-1
PuF: Pinegrove	VIIe	---	---	H-1
Px. Pits, gravel				
RaC2: Rarden	IVe	---	4C	F-1
RcB: Richland	IIe	Yes	5A	A-1
StF: Steinsburg	VIIe	---	4R (north aspect) 3R (south aspect)	H-1
TaA: Taggart	IIw	Yes***	4A	C-1
UbC: Upshur	IVe	---	3C	F-5
UgC2:	IVe	---		
Upshur			3C	F-5
Gilpin			4A	F-1
UgD:	VIe	---		
Upshur (north aspect)			4R	F-5
Gilpin (north aspect)			4R	F-1
Upshur (south aspect)			3R	F-5
Gilpin (south aspect)			4R	F-1

See footnotes at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability*	Prime farmland*	Woodland ordination symbol	Pasture and hayland suitability group
UgE	VIIe	---		
Upshur (north aspect)			4R	F-6
Gilpin (north aspect)			4R	F-2
Upshur (south aspect)			3R	F-6
Gilpin (south aspect)			4R	F-2
UsD	VIe	---		
Upshur (north aspect)			4R	F-5
Steinsburg (north aspect)			4R	F-1
Upshur (south aspect)			3R	F-5
Steinsburg (south aspect)			3R	F-1
UsE	VIIe	---		
Upshur (north aspect)			4R	F-6
Steinsburg (north aspect)			4R	F-2
Upshur (south aspect)			3R	F-6
Steinsburg (south aspect)			3R	F-2
VaC2 Vandalia	IIIe	---	4C	F-5
VaD2 Vandalia	IVe	---	4R	F-5
VnB2 Vincent	IIe	Yes	4C	A-1
VnC2 Vincent	IIIe	---	4C	A-1
WgD	IVe	---		
Westmoreland			4R	A-2
Gilpin			4R	F-1
WgE	VIe	---		
Westmoreland			4R	A-3
Gilpin			4R	F-2
WgF	VIIe	---		
Westmoreland			4R	H-1
Gilpin			4R	H-1
WoB Woodsfield	IIe	Yes	4C	A-1

* A complex is treated as a single management unit in the land capability and prime farmland columns.

** Where protected from flooding or not frequently flooded during the growing season.

*** Where drained.

**** Where drained and either protected from flooding or not frequently flooded during the growing season.

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