United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with the Kentucky Natural Resources and Environmental Protection Cabinet; Kentucky Agricultural Experiment Station; United States Department of the Interior, National Park Service, Mammoth Cave National Park; and Tennessee Valley Authority

Soil Survey of Butler and Edmonson Counties, Kentucky

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.

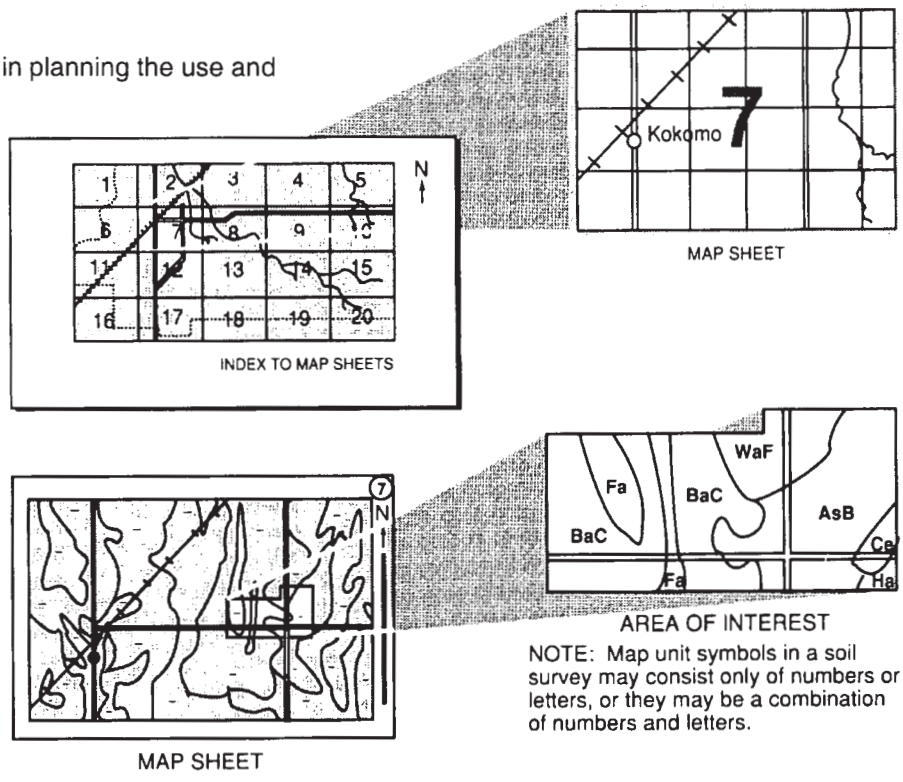
Detailed Soil Maps

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.



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 1994. Soil names and descriptions were approved in 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1995. This survey was made cooperatively by the Natural Resources Conservation Service; the Kentucky Natural Resources and Environmental Protection Cabinet; the Kentucky Agricultural Experiment Station; the United States Department of the Interior, National Park Service, Mammoth Cave National Park; and the Tennessee Valley Authority. The survey is part of the technical assistance furnished to the Butler County Conservation District and the Edmonson County Conservation District.

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Cover: A karst valley in Edmonson County. Fredonia-Hagerstown complex, 6 to 20 percent slopes, rocky, eroded, and Pembroke silt loam, 2 to 6 percent slopes, are in the foreground.

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").

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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 shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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

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Soil Survey of
Butler and Edmonson Counties, Kentucky

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Fieldwork by Arlin Barton, Edward Campbell, Jim Haagen, Michael Mitchell, and Michael Wilson, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the Kentucky Natural Resources and Environmental Protection Cabinet; the Kentucky Agricultural Experiment Station; the United States Department of the Interior, National Park Service, Mammoth Cave National Park; and the Tennessee Valley Authority

Butler and Edmonson Counties are in the south-central part of Kentucky (fig. 1). They are in the Kentucky and Indiana Sandstone and Shale Hills and Valleys and the Highland Rim and Pennyroyal Land Resource Areas (USDA 1981). The combined area of the counties is about 739 square miles. Butler County has an area of 276,141 acres, and Edmonson County has an area of 197,044 acres. In 1990, Butler County had a population of 11,245 and Edmonson County had a population of 10,357 (Barren River Area Development District 1994). Morgantown is the county seat of Butler County, and Brownsville is the county seat of Edmonson County.

The topography of the counties is nearly level to very steep. In Butler County, areas along stream and river channels are characterized by moderately wide valleys and the upland areas are characterized by rolling ridges and steep hillsides. The extreme southern part of Edmonson County is dominated by karst landscapes. The southwestern and central parts of Edmonson County, known locally as "the slash," are nearly level. The rest of the county is characterized by rolling ridges and steep hillsides.

Three major rivers flow through the survey area. The Nolin River, which enters Edmonson County at its northeast corner and flows southward, flows into the Green River near Brownsville, Kentucky. The Green River dissects Butler and Edmonson Counties. The Mud River, which is on the extreme western edge of Butler County, flows north and empties into the Green River at Rochester. Elevation ranges from 380 feet above sea level at the point where Green River leaves the survey area to more than 880 feet above sea level on high hills in Mammoth Cave National Park.

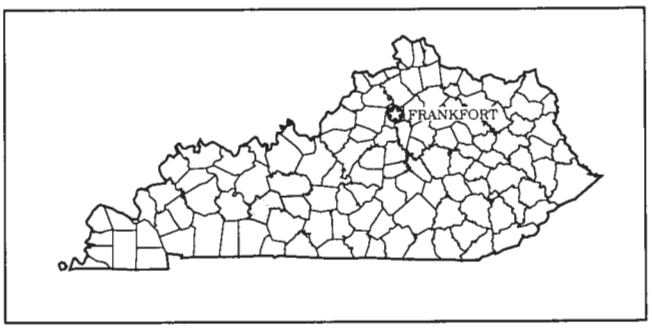

Figure 1.—Location of Butler and Edmonson Counties in Kentucky.

Farming is the major enterprise in Butler and Edmonson Counties. Corn, soybeans, hay, and pasture are the main crops. Beef cattle, dairy cattle, and hogs are the most common livestock.

Some gas and oil wells are in the survey area. Sand, gravel, coal, and limestone are major natural resources.

General Nature of the County

This section provides general information concerning history, geology, hydrogeology, farming, natural resources, transportation facilities, recreation, and climate.

History

Butler County was formed from parts of Logan and Ohio Counties by an act of the Kentucky Legislature in January 1810. It was named after General Richard Butler of Pennsylvania, a Revolutionary War soldier. Morgantown, the county seat, is on the south side of Green River, near the central part of the county. It was laid out in 1810 and incorporated on January 6, 1813 (Givens 1985). The development of the locks and dams on the Green River played an integral part in the development of agriculture and commerce in the survey area.

Edmonson County was officially established on February 12, 1825. Portions of the new county were formerly parts of Warren, Hart, and Grayson Counties. The county was named in honor of Captain John Edmonson, a native of Washington County, Virginia. In 1812, Edmonson raised a company of volunteer riflemen and joined Colonel John Allen's regiment. Edmonson was killed during the Battle of the River Raisin on January 27, 1813. Brownsville, the county seat, was established in 1838.

Mammoth Cave National Park, which was established in 1941 (Goode 1986), covers much of Edmonson County. It encompasses 340 miles of caves, which make up the longest known cave system in the world (fig. 2), and about 80 square miles of the county's surface area (Brucker and Watson 1978). Mammoth Cave has important international significance as both a natural and cultural site. The United Nations designated it as a "World Heritage Site" in 1981 and as an "International Man in the Biosphere Reserve" in 1990 because of its international significance and diverse biology.

Figure 2.—The cave system in Mammoth Cave National Park is the longest mapped cave system in the world. The historic entrance is in an area of Wallen-Bledsoe-Donahue complex, 35 to 50 percent slopes, very rocky.

Figure 3.—Sinkholes and caves occur throughout the survey area. This cave opening is in an area of Lily loam, 6 to 12 percent slopes, eroded.

Geology

Most of the survey area is in the Western Coal Fields physiographic region (Bailey and Winsor 1964). The extreme southern part of Edmonson County is in the Western Pennyroyal physiographic region. The surficial geology of the survey area consists of level-bedded sedimentary rocks of Upper Mississippian or Lower Pennsylvanian age. Some of the upland areas are covered with a thin or moderately thick layer of loess. The alluvium in the survey area was derived from soils formed in loess or residuum.

Ste. Genevieve or St. Louis Limestone caps the extreme southern part of Edmonson County (USGS 1994). These formations are 180 to 200 feet thick. The limestone in the formations may be interbedded with dolomite, siltstone, or chert.

The landscape in the southern and extreme southeastern parts of Edmonson County is dominated by karst topography and is characterized by sinkholes and subterranean drainage (fig. 3). Many of the cave formations associated with the Mammoth Cave system in Edmonson County are part of the Ste. Genevieve Formation and the lower part of the overlying Girkin Formation. The Girkin Formation is exposed in the central and eastern parts of Edmonson County. It is common near the edge of the more dissected Western Coal Fields region (Bailey and Winsor 1964).

Golconda Formation, Hardinsburg Sandstone, Glen Dean Limestone, and Leitchfield Formation are common in areas of Edmonson County that are characterized by dissected landscapes. The Golconda Formation overlies the Girkin Formation. It has two members—Big Clifty Sandstone, which is 50 to 120 feet thick and is composed of fine grained sandstone interbedded with siltstone and shale, and Haney Limestone, which is 10 to 50 feet thick and is

composed of medium grained, chert-bearing limestone. Hardinsburg Sandstone, which is fine grained and interbedded with siltstone, overlies the Golconda Formation. It is overlain by Glen Dean Limestone, which is fine grained or medium crystalline, thin-bedded to massive limestone interbedded with shale. The Leitchfield Formation, if it occurs, overlies Glen Dean Limestone. It is green or gray shale interbedded with siltstone (USGS 1968a).

Several formations are exposed in the central and southwestern parts of Butler County. Six additional formations may be present in the southern part of Butler County, even though the landscapes are similar to those in Edmonson County. These formations are Tar Springs Sandstone, Vienna Limestone, Walterburg, Menard Limestone, Clore Limestone, and Palestine Sandstone (USGS 1971). In the southern part of Butler County, Tar Springs Sandstone, which is very fine to medium grained and is 20 to 70 feet thick, overlies Glen Dean Sandstone. It is overlain by Vienna Limestone, which is medium grained and 10 to 30 feet thick. Walterburg Formation, which consists of shale, siltstone, and sandstone and is 20 to 60 inches thick, overlies Vienna Limestone. It is overlain by Menard and Clore Limestone and Palestine Sandstone. Menard Limestone, which consists of very fine or fine grained dolomitic and argillaceous limestone interbedded with shale, is 40 to 95 feet thick. Clore Limestone and Palestine Sandstone consist of shale interbedded with thin beds of limestone and thin layers of sandstone bedrock and, if they occur, are about 105 feet thick. The Walterburg Formation and the underlying Vienna Limestone and Tar Springs Sandstone, which overlie Glen Dean Sandstone, are mapped in the Leitchfield Formation in adjacent quadrangles (USGS 1968b).

The rest of the survey area is capped with Caseyville and Tradewater Sandstones. These sandstones form cliffs that contribute to a more rugged terrain (fig. 4). The formations consist of conglomerate, sandstone, shale, and coal. The rocks are of Lower or Middle Pennsylvanian age. Caseyville and Tradewater Formations are about 200 feet thick. Alluvial silts, sands, clays, and gravel are along the larger streams. A few small deposits of terrace or upland gravel are near Woodbury and Logansport in Butler County.

Hydrogeology

The Mammoth Cave karst aquifer receives the majority of its recharge from areas outside the park's boundary. This recharge, in the form of precipitation or seepage from rock strata and soil material, enters the aquifer through numerous sinking streams and countless sinkholes. Any practices that may have an adverse impact to water quality within the park's recharge area can directly impact the quality of water in the park.

The Mammoth Cave karst aquifer exhibits convergent flow, much like the convergent flow patterns of a dendritic surface stream system. While other aquifers may possess diffuse flow where contaminants slowly disperse, the convergent flow of the Mammoth Cave karst aquifer will channel recharge and pollutants toward a common trunk conduit or spring.

Flow through the Mammoth Cave karst aquifer can be very rapid, on the order of thousands to tens of thousands of feet of water per day. Contaminants entering the karst aquifer can thus be rapidly transported, unaltered, through the conduit system.

The karst aquifer responds nearly instantaneously to rainfall. Aquifer stage can rise tens of feet in a matter of hours (there are numerous records showing stage rises of nearly 100 feet during the course of 1 day). Also, chemical and bacteriological properties of the ground water can change dramatically following rainfall events. These stage rises can actuate high level overflow routes between ground water basins and thus direct flow in different directions dependent upon aquifer conditions.

Farming

The survey area supports a thriving agricultural community. In 1992, Butler County had 671 farms, averaging 210 acres each, and Edmonson County had 734 farms, averaging 126 acres each. In 1993, more than 81,000 acres of cropland was harvested. The value of agricultural products from Butler and Edmonson Counties was $31,775,000 in 1993 (Kentucky Agricultural Statistics Service 1994).

The principal row crops in the survey area are corn and soybeans. In 1993, corn and soybeans were grown on 31,800 acres in Butler County and on 8,200 acres in Edmonson County. Tobacco was grown on about 1,357 acres in the survey area. In Butler County, 390 acres of burley tobacco and 27 acres of dark, air-cured tobacco were harvested. In Edmonson County, 940 acres of burley tobacco was harvested. Tobacco production was 2,705,000 pounds in 1993.

Forage crops were harvested on 17,300 acres in Butler County and on 21,100 acres in Edmonson County. In 1993, forage production was 87,230 tons.

Livestock production is an integral part of the

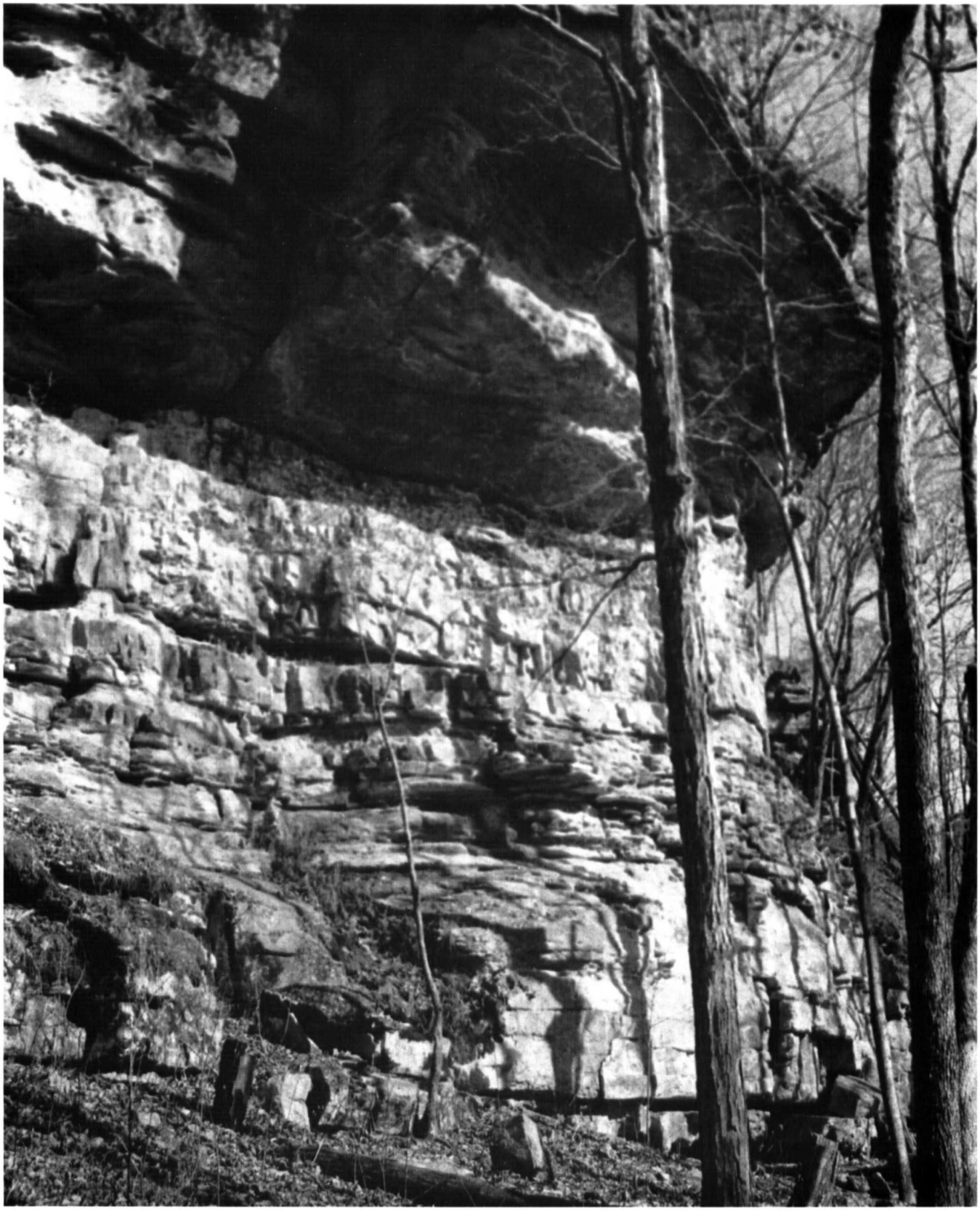

Figure 4.—The rugged natural cliffs expose a geological cross section of the Caseyville Formation.

agricultural community in the counties. In 1993, dairy production in the survey area was estimated at more than 27 million pounds of milk. Beef and dairy cattle numbered 15,800 in Butler County and 17,200 in Edmonson County, and hogs and pigs numbered 4,500 in Butler County and 6,900 in Edmonson County. In 1993, cash receipts from the sale of livestock totaled $17,081,000.

Specialty crops, such as nursery stock, truck crops, and small fruit, are grown on a few farms in the survey area.

Natural Resources

The major natural resources in Butler and Edmonson Counties are coal, oil, natural gas, tar sands, gravel, limestone, trees, and water.

Coal is the principal mineral resource. Coal deposits are in scattered areas throughout the counties. Many areas have been strip-mined; however, most of the strip-mined areas are in Butler County. Coal has been mined from at least seven beds or seams. Butler County has a large reserve of unmined coal.

Oil and gas fields are scattered throughout the survey area; however, the production from these fields is limited. Most wells are shallow and generally produce a high volume initially, but production declines rapidly to a few barrels per day (USGS 1968b). Many wells have a gas show, but most wells do not produce enough gas for commercial use. Most gas is used locally. A new oil field has been developed in Edmonson County, but it is not known if yields from this field will be extensive.

Deposits of tar sands are scattered throughout the survey area but are mostly in Edmonson County. Natural rock asphalt occurs mainly in the Caseyville Formation. Bitumen varies from a trace to as much as 7 or 8 percent (USGS 1968a). Outcrops of richer parts of asphalt rock have tarlike streaks of bitumen caused by bleeding during hot weather. These deposits were exploited from 1890 to 1958 as road-paving material. There are no active asphalt quarries in the survey area.

Terrace deposits and conglomerate sandstone are sources of gravel that have been mined in Butler County. Some terrace deposits were mined near Logansport, but most of the mined areas in the county have been abandoned. Conglomerate sandstone has been mined in the southern part of Butler County, near Harreldsville. Small quantities of gravel are available from beds of the Green and Nolin Rivers.

Iron ores are of historical interest. Limonite and siderite deposits were a source of much of the iron ores used to make cold blast iron in Nolin Furnace (fig. 5), which was known locally as Baker Furnace (USGS 1971). These ores were mined from the local hills surrounding the furnace. The deposits are not extensive or commercially significant.

Limestone has been quarried in the survey area for roadfill, aggregate, and agricultural lime. Most limestone quarries in the survey area are not active or have been abandoned.

Large tracts of land in the steeper uplands and smaller, isolated tracts of land in the lower landscape positions are used as woodland. About 147,600 acres in Butler County and 70,600 acres in Edmonson County are forested (Kinsley and Powell 1978). A few commercial sawmills are in operation in the survey area. Much of the woodland in the survey area has been logged. The remaining acreage of woodland is the timber reserve for the future.

The supply of water is adequate for most domestic uses throughout the survey area. Many rural communities are serviced by rural water systems. The Green and Nolin Rivers are a source of municipal water and are used for fire protection, fishing, and boating. Farm ponds and small lakes are used throughout the survey area as a source of water for livestock and irrigation and for swimming.

Transportation Facilities

Transportation facilities include a network of Federal, State, and county highways that provide access to all parts of the survey area. William Natcher Parkway crosses Butler County, and Interstate 65 runs through the southern part of Edmonson County.

Recreation

Several areas in Butler and Edmonson Counties have recreational value. The many forested areas provide sites for hunting, camping, and studying nature. Mammoth Cave National Park encompasses 23 percent of the land area in Edmonson County. Public areas in the park offer opportunities to hike, tour caves, ride horses, and camp.

Nolin Lake was formed by a flood-control structure built by the U.S. Army Corps of Engineers. More than 3,000 acres of this lake is within Edmonson County. The lake and surrounding area are used for boating, camping, fishing, and water skiing. Numerous private ponds and lakes are used for fishing or other recreational activities.

Figure 5.—The stone stack in the foreground is a ruin of Nolin Furnace. The original stack was about 40 feet high. The ruin is visible when the water level in Nolin Reservoir is low.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Beaver Dam in Butler County and Mammoth Cave National Park in Edmonson County in the period 1961 to 1990. 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 36.2 degrees F at Beaver Dam and 36.3 degrees F at Mammoth Cave National Park and the average daily minimum temperature is 26.2 degrees at both Beaver Dam and Mammoth Cave National Park. At Beaver Dam, the lowest temperature on record, which occurred on January 24, 1963, is -25 degrees. At Mammoth Cave National Park, the lowest temperature on record, which occurred on February 2, 1951, is -21 degrees. In summer, the average temperature is 75.7 degrees at Beaver Dam and 74.5 degrees at Mammoth Cave National Park and the average daily maximum temperature is 87.3 degrees at Beaver Dam and 86.2 degrees at Mammoth Cave National Park. At Beaver Dam, the highest recorded temperature, which occurred on July 28, 1952, is 106 degrees. At Mammoth Cave National Park, the highest recorded temperature, which occurred on July 27, 1952, is 108 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base

temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 47.6 inches at Beaver Dam and 52.1 inches at Mammoth Cave National Park. Of this, 24.4 inches at Beaver Creek and 26.4 inches at Mammoth Cave National Park, or about 51 percent of the precipitation at both sites, usually fall in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.95 inches at Beaver Dam on April 29, 1983, and 6.8 inches at Mammoth Cave National Park on May 7, 1984. At both sites, thunderstorms occur on about 54 days each year and most occur in July.

The average seasonal snowfall is 6.6 inches at Beaver Dam and 14.6 inches at Mammoth Cave National Park. The greatest snow depth at any one time during the period of record was 15 inches at Beaver Dam and 16 inches at Mammoth Cave National Park. On the average, 13 days of the year at Beaver Dam and 15 days of the year at Mammoth Cave National Park have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 9 inches at Beaver Dam and 16 inches at Mammoth Cave National Park.

The average relative humidity in midafternoon is about 57 percent at both sites. Humidity is higher at night, and the average at dawn is about 84 percent. The sun shines 64 percent of the time possible in summer and 44 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in March.

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 may 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.

General Soil Map Units

The general soil maps at the back of this publication show 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 maps can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the maps. Likewise, areas where the soils are not suitable can be identified.

Because of their small scale, the maps are 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.

Soil Descriptions of Butler County

1. Gilpin-Clarkrange-Rosine Association

Gently sloping to moderately steep, moderately deep to very deep, well drained and moderately well drained soils that have a loamy subsoil; formed in residuum derived from acid sandstone and in loess and the underlying residuum derived from shale interbedded with siltstone; on ridgetops and side slopes (fig. 6)

Setting

Landform: Ridges and side slopes
Slope: 2 to 20 percent

Composition

Extent of the association in Butler County: 2 percent
Extent of the soils in the association:
Gilpin soils—41 percent
Clarkrange soils—31 percent
Rosine soils—7 percent
Minor soils—21 percent

Soil Properties and Qualities

Gilpin

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Ridges and side slopes
Parent material: Residuum derived from acid sandstone
Surface texture: Loam
Slope: 2 to 20 percent

Clarkrange

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Landscape position: Ridges and side slopes
Parent material: Residuum derived from acid sandstone
Surface texture: Silt loam
Slope: 2 to 12 percent

Rosine

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Well drained
Landscape position: Ridges and side slopes
Parent material: Loess and the underlying residuum derived from shale interbedded with siltstone
Surface texture: Silt loam
Slope: 2 to 20 percent

Minor Soils

- Lily, Latham, and Wellston soils on narrow ridges and the upper part of hillsides
- Riney soils that formed in slumped sandstone and shale; on narrow ridges and side slopes

Use and Management

Major uses: Cropland
Management concerns: Wetness, erosion, a high content of clay, and depth to bedrock
Management measures: No-till planting, deep-rooted crops, grade stabilization structures, and outlet ditches

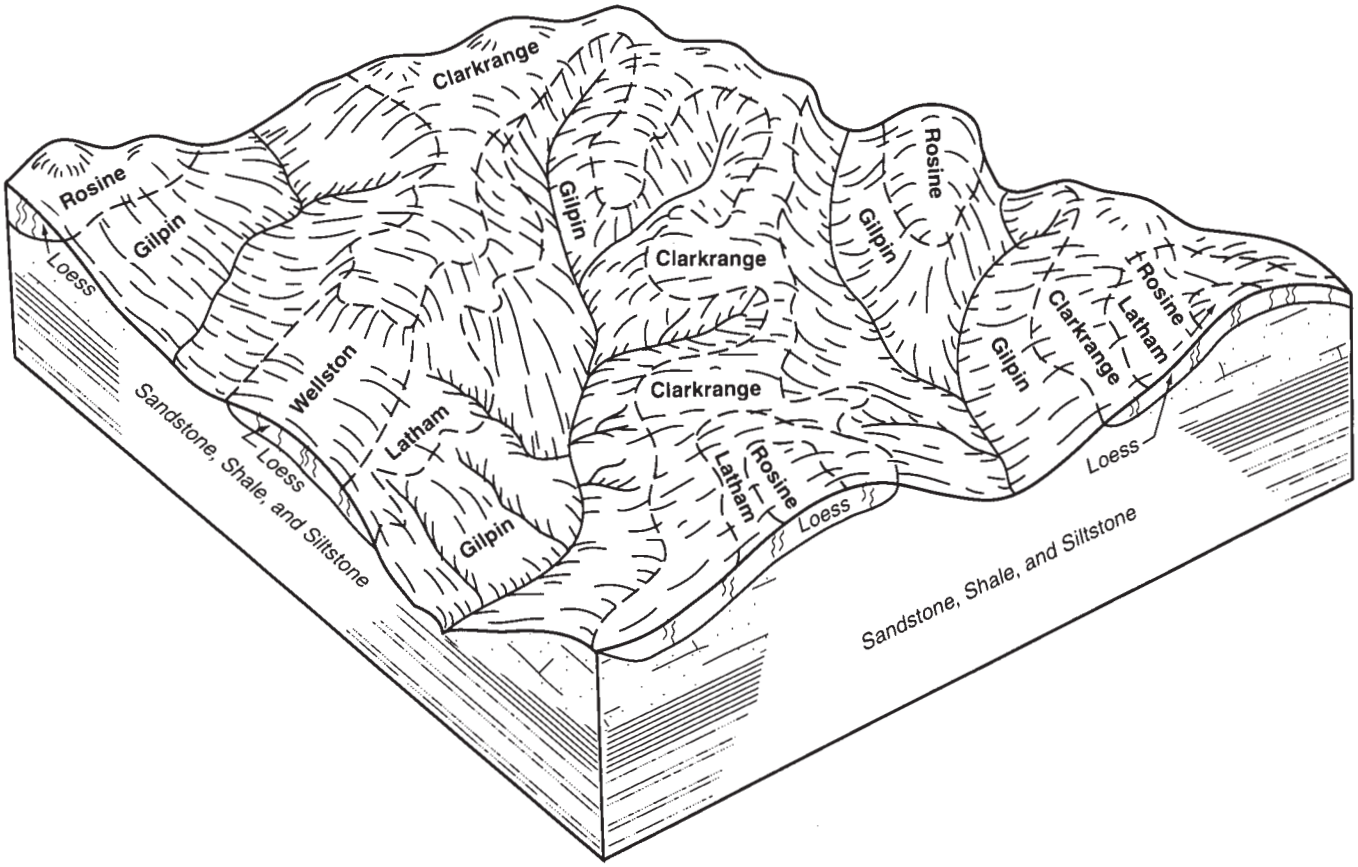

Figure 6.—Relationship of soils to topography and underlying material in the Gilpin-Clarkrange-Rosine association.

2. Newark-Nolin-Melvin Association

Nearly level, very deep, well drained, somewhat poorly drained, and poorly drained soils that have a loamy subsoil; formed in alluvium and in mixed alluvium derived from limestone, shale, siltstone, and sandstone; on flood plains and river bottoms (fig. 7)

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Composition

Extent of the association in Butler County: 17 percent
Extent of the soils in the association:
Newark soils—62 percent
Nolin soils—9 percent
Melvin soils—7 percent
Minor soils—22 percent

Soil Properties and Qualities

Newark

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Landscape position: Slight depressions along streams and river bottoms
Parent material: Mixed alluvium derived from limestone, shale, siltstone, and sandstone
Surface texture: Silt loam
Slope: 0 to 2 percent

Nolin

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Slightly higher positions along stream channels
Parent material: Mixed alluvium derived from limestone, shale, siltstone, and sandstone
Surface texture: Silt loam
Slope: 0 to 2 percent

Melvin

Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Landscape position: Slight depressions along stream channels

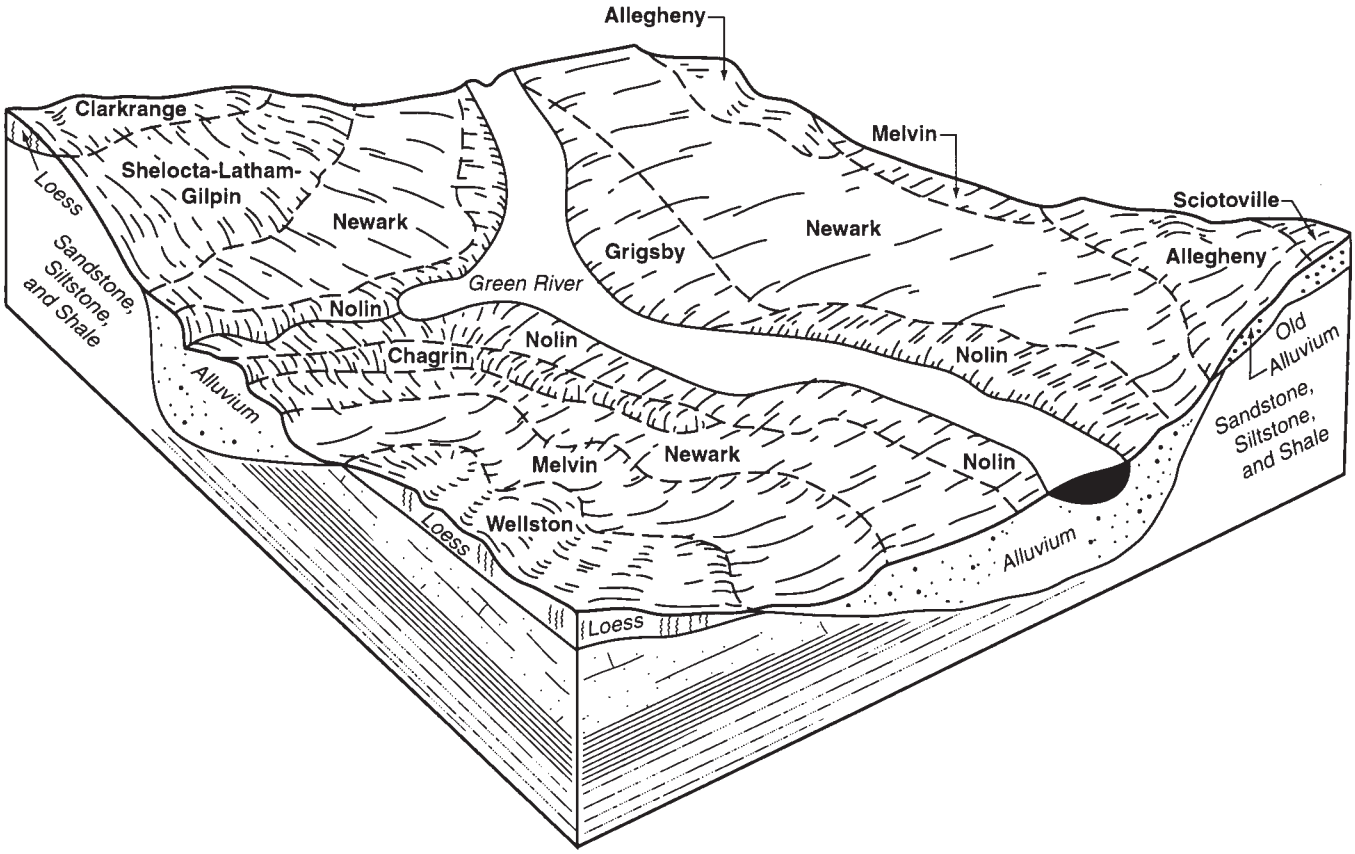

Figure 7.—Relationship of soils to topography and underlying material in the Newark-Nolin-Melvin association.

Parent material: Alluvium
Surface texture: Silt loam
Slope: 0 to 2 percent

Minor Soils

- Chagrin soils on flood plains between areas of Nolin and Newark soils
- Grigsby soils in bends along streams and drainageways
- Elk, Sciotoville, and Allegheny soils on low stream terraces
- Clarkrange, Shelocta, Latham, Gilpin, and Wellston soils on footslopes and uplands

Use and Management

Major uses: Cropland
Management concerns: Drainage, flooding, siltation, and wetness
Management measures: Outlet ditches, tile drainage, and no-till planting

3. Shelocta-Latham-Gilpin Association

Gently sloping to very steep, moderately deep to very deep, well drained soils that have a loamy or clayey subsoil; formed in colluvium derived from shale and siltstone and in residuum derived from acid shale and acid sandstone; on upland ridges and hillsides (fig. 8)

Setting

Landform: Hillsides
Slope: 2 to 35 percent

Composition

Extent of the association in Butler County: 46 percent
Extent of the soils in the association:
Shelocta soils—25 percent
Latham soils—23 percent
Gilpin soils—21 percent
Minor soils—31 percent

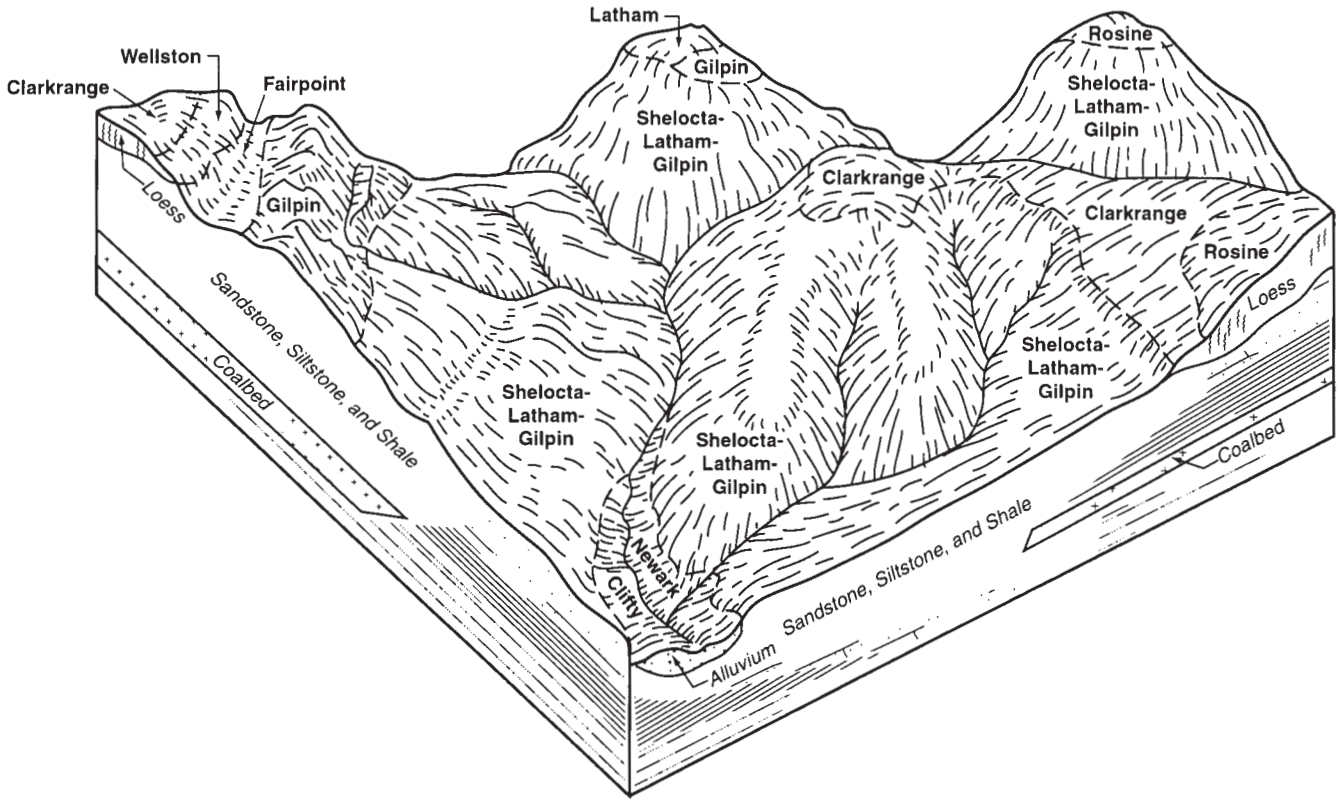

Figure 8.—Relationship of soils to topography and underlying material in the Shelocta-Latham-Gilpin association.

Soil Properties and Qualities

Shelocta

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Well drained
Landscape position: Hillsides and footslopes
Parent material: Colluvium derived from shale and siltstone
Surface texture: Silt loam
Slope: 12 to 35 percent

Latham

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Hillsides
Parent material: Residuum derived from acid shale
Surface texture: Silt loam
Slope: 6 to 20 percent

Gilpin

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Hillsides
Parent material: Residuum derived from acid sandstone
Surface texture: Loam
Slope: 2 to 20 percent

Minor Soils

- Carpenter and Lenberg soils on hillsides and footslopes
- Rosine, Latham, Wellston, and Clarkrange soils on narrow ridges and side slopes
- Bethesda and Fairpoint soils on hillsides and side slopes
- Clifty and Newark soils in narrow draws between hillsides

Use and Management

Major uses: Woodland and wildlife habitat
Management concerns: Erosion, depth to bedrock, and a high content of clay
Management measures: Tree planting, access roads, critical-area planting, and exclusion of livestock

4. Newark-Karnak-Nolin Association

Nearly level, very deep, well drained, somewhat poorly drained, and poorly drained soils that have a loamy or clayey subsoil; formed in mixed alluvium and in slackwater alluvium; on flood plains and river bottoms (fig. 9)

Setting

Landform: Flood plains
Slope: 0 to 2 percent

Composition

Extent of the association in Butler County: 8 percent
Extent of the soils in the association:
Newark soils—32 percent
Karnak soils—7 percent
Nolin soils—6 percent
Minor soils—55 percent

Soil Properties and Qualities

Newark

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Landscape position: Slight depressions along streams and river bottoms
Parent material: Mixed alluvium
Surface texture: Silt loam
Slope: 0 to 2 percent

Karnak

Depth class: Very deep (more than 60 inches)
Drainage class: Poorly drained
Landscape position: Low flood plains along small streams and drainageways
Parent material: Slackwater alluvium
Surface texture: Silty clay loam
Slope: 0 to 2 percent

Figure 9.—An area of the Newark-Karnak-Nolin association in the foreground. The animal waste storage lagoon is in an area of Karnak silty clay loam, overwash, frequently flooded.

Nolin

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Adjacent to stream channels
Parent material: Mixed alluvium
Surface texture: Silt loam
Slope: 0 to 2 percent

Minor Soils

- Melvin and Dunning soils in slight depressions or in areas adjacent to footslopes
- Lawrence soils on low stream terraces
- Chagrin and Grigsby soils along bends on river and stream channels
- Clifty soils along narrow streams and at the head of drainageways
- Elk, Otwell, Allegheny, and Sciotoville soils on low terraces and footslopes

Use and Management

Major uses: Cropland and idle land
Management concerns: Wetness, crop suitability, and a high content of clay
Management measures: Outlet ditches and tile drainage

5. Allegheny-Sciotoville Association

Gently sloping to moderately steep, very deep, well drained and moderately well drained soils that have a loamy subsoil; formed in loamy alluvium derived from sandstone, siltstone, and shale and in loamy old alluvium; on high stream terraces (fig. 10)

Setting

Landform: High stream terraces
Slope: 2 to 20 percent

Composition

Extent of the association in Butler County: 2 percent
Extent of the soils in the association:
Allegheny soils—60 percent
Sciotoville soils—18 percent
Minor soils—22 percent

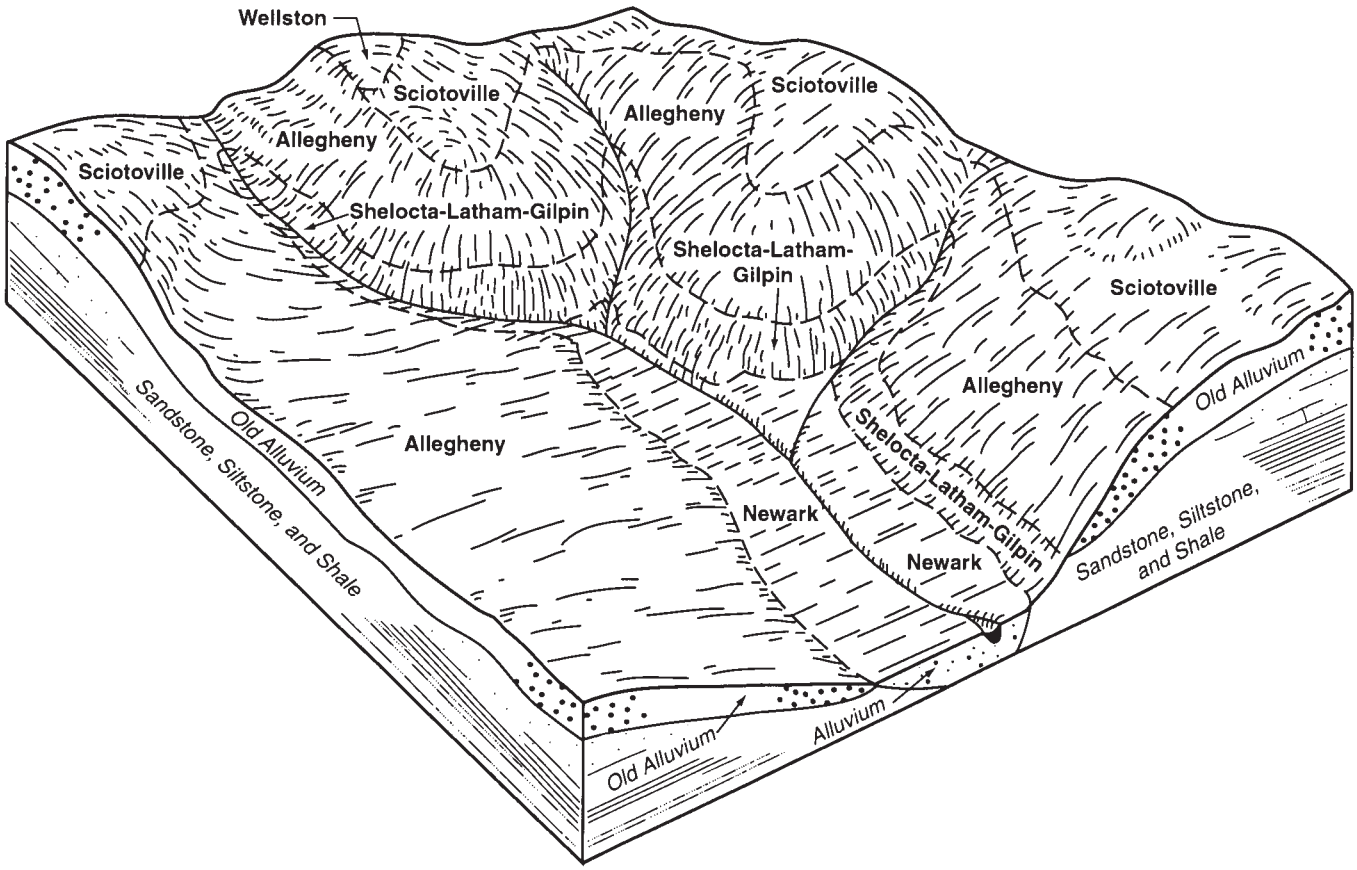

Figure 10.—Relationship of soils to topography and underlying material in the Allegheny-Sciotoville association.

Soil Properties and Qualities

Allegheny

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Smooth ridges and hillsides
Parent material: Loamy alluvium derived from sandstone, siltstone, and shale
Surface texture: Loam
Slope: 2 to 20 percent

Sciotoville

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Landscape position: Ridges and side slopes
Parent material: Loamy alluvium
Surface texture: Silt loam
Slope: 2 to 12 percent

Minor Soils

- Wellston soils on side slopes and points of ridges
- Shelocta, Gilpin, and Latham soils on hillsides and side slopes
- Nolin and Newark soils along drainageways and in areas between streams and footslopes

Use and Management

Major uses: Cropland, pasture, and hay
Management concerns: Erosion, wetness, and critical-area planting
Management measures: No-till planting, deep-rooted crops, and crop residue management

6. Caneyville-Lenberg-Zanesville Association

Gently sloping to very steep, moderately deep to very deep, well drained and moderately well drained soils that have a clayey or loamy subsoil; formed in loess and in residuum derived from limestone, shale, sandstone, and siltstone; on uplands (fig. 11)

Setting

Landform: Ridges and hillsides
Slope: 2 to 35 percent

Composition

Extent of the association in Butler County: 17 percent
Extent of the components in the association:
Caneyville soils—32 percent
Lenberg soils—11 percent
Zanesville soils—5 percent
Minor components—52 percent

Soil Properties and Qualities

Caneyville

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Ridges, side slopes, and hillsides
Parent material: Residuum derived from limestone

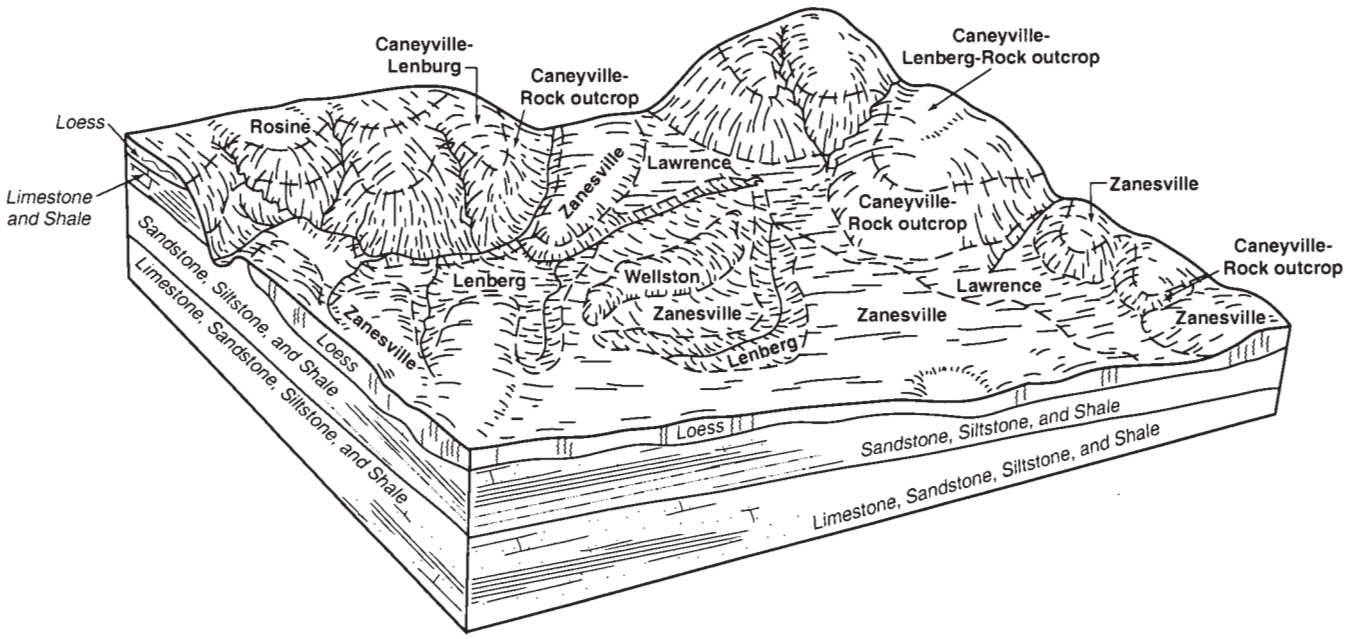

Figure 11.—Relationship of soils to topography and underlying material in the Caneyville-Lenberg-Zanesville association.

Surface texture: Silt loam
Slope: 2 to 35 percent

Lenberg

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Ridges, side slopes, and hillsides
Parent material: Residuum derived from acid shale
Surface texture: Silt loam
Slope: 6 to 30 percent

Zanesville

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Moderately well drained
Landscape position: Broad ridges and side slopes
Parent material: Loess and the underlying residuum derived from sandstone, siltstone, and shale
Surface texture: Silt loam
Slope: 2 to 12 percent

Minor Components

- Wellston, Riney, and Frondorf soils on ridges and side slopes
- Clarkrange and Sadler soils in the lower landscape positions
- Rosine soils in landscape positions above the Zanesville soils
- Newark and Nolin soils in sinks and depressions and along drainageways
- Lawrence and Epley soils on upland flats and broad ridges
- Crider and Pembroke soils on smooth slopes below Caneyville soils
- Rock outcrop in areas of the Caneyville and Lenberg soils

Use and Management

Major uses: Cropland, pasture, and hay
Management concerns: Erosion, wetness, and depth to bedrock
Management measures: No-till planting, crop residue management, and critical-area planting

7. Bethesda-Fairpoint Association

Gently sloping to very steep, very deep, well drained, loamy-skeletal soils; formed in acid and neutral regolith from surface mine operations; on uplands (fig. 12)

Setting

Landform: Dissected plateaus
Slope: 2 to 35 percent

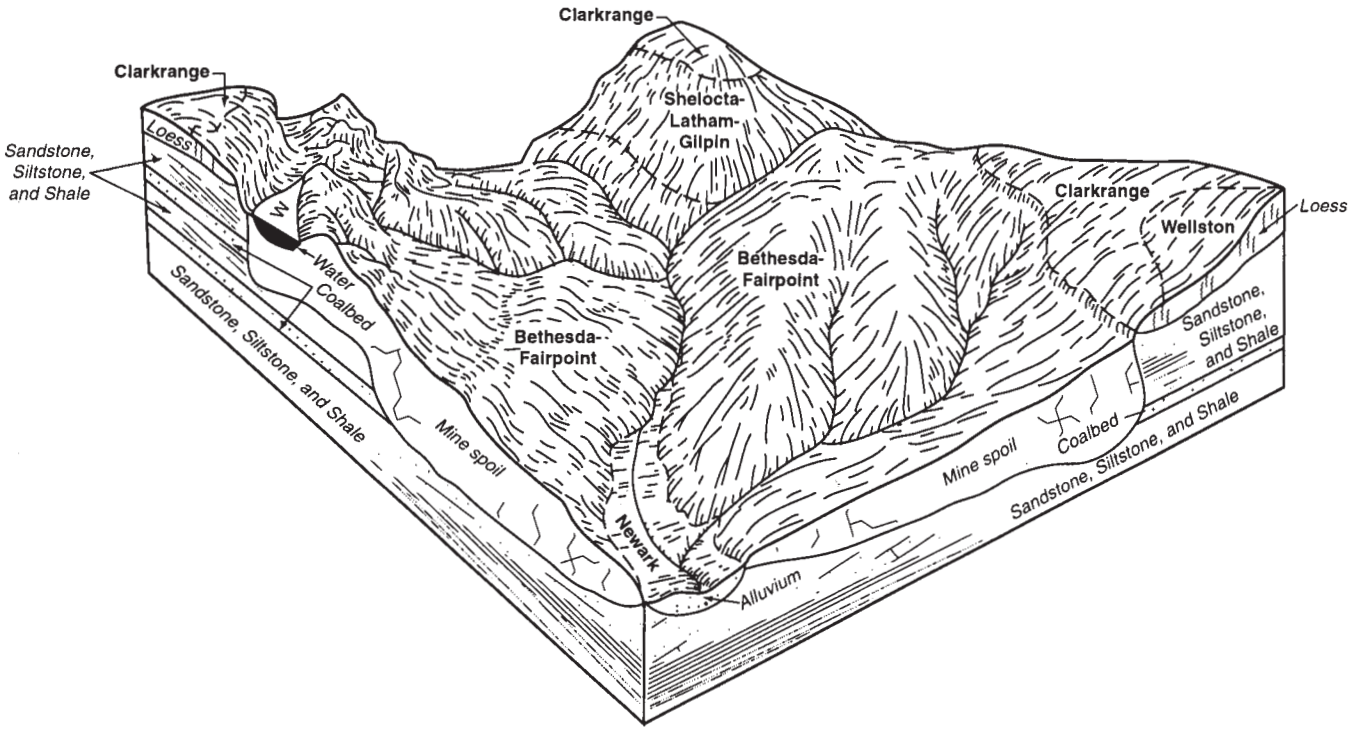

Figure 12.—Relationship of soils to topography and underlying material in the Bethesda-Fairpoint association.

Composition

Extent of the association in Butler County: 7 percent
Extent of the soils in the association:
Bethesda soils—30 percent
Fairpoint soils—22 percent
Minor soils—48 percent

Soil Properties and Qualities

Bethesda

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Ridges, shoulder slopes, and backslopes
Parent material: Mixed material from sandstone, siltstone, coal, and acid shale
Surface texture: Channery silty clay loam
Slope: 2 to 35 percent

Fairpoint

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Ridges, shoulder slopes, and backslopes
Parent material: Material from sandstone, siltstone, and shale
Surface texture: Channery silt loam
Slope: 2 to 35 percent

Minor Soils

- Clarkrange soils on smooth slopes and ridges above the Bethesda and Fairpoint soils
- Wellston soils on ridges and side slopes above the Bethesda and Fairpoint soils
- Shelocta, Latham, and Gilpin soils on hillsides adjacent to strip-mined areas
- Newark soils in draws between areas of Bethesda and Fairpoint soils

Use and Management

Major uses: Wildlife habitat and reclaimed areas
Management concerns: Large stones and rocks, erosion, and a high content of coarse fragments
Management measures: Terraces, critical-area planting, grassed waterways, and tree planting

8. Zanesville-Lawrence-Sadler Association

Nearly level to strongly sloping, deep and very deep, moderately well drained and somewhat poorly drained soils that have a loamy subsoil; formed in loess and the underlying residuum derived from sandstone, shale, and siltstone and in mixed alluvium, loess, and the underlying residuum derived from limestone, sandstone, and shale; on uplands (fig. 13)

Setting

Landform: Plateaus
Slope: 0 to 12 percent

Composition

Extent of the association in Butler County: 1 percent
Extent of the soils in the association:
Zanesville soils—45 percent
Lawrence soils—13 percent
Sadler soils—10 percent
Minor soils—32 percent

Soil Properties and Qualities

Zanesville

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Moderately well drained
Landscape position: Rolling ridges and side slopes
Parent material: Loess and the underlying residuum derived from sandstone, siltstone, and shale
Surface texture: Silt loam
Slope: 2 to 12 percent

Lawrence

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Landscape position: Low flats or areas on broad ridges
Parent material: Mixed alluvium, loess, and the underlying residuum derived from limestone, sandstone, and shale
Surface texture: Silt loam
Slope: 0 to 2 percent

Sadler

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Moderately well drained
Landscape position: Low flats or areas on broad ridges
Parent material: Loess and the underlying residuum derived from sandstone, siltstone, and shale
Surface texture: Silt loam
Slope: 0 to 6 percent

Minor Soils

- Wellston and Caneyville soils on side slopes below Zanesville soils

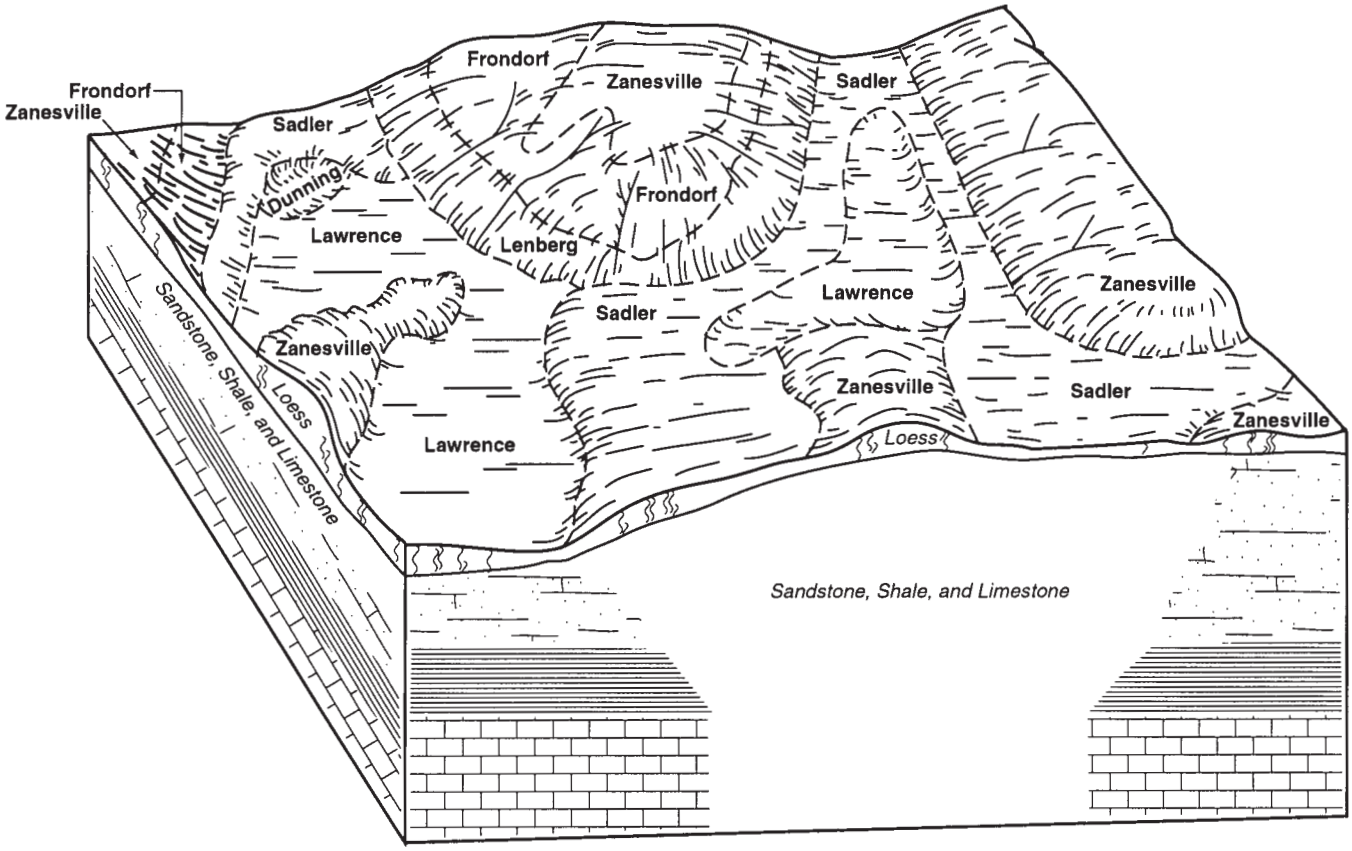

Figure 13.—Relationship of soils to topography and underlying material in the Zanesville-Lawrence-Sadler association.

- Frondorf and Lenberg soils on shoulder slopes and backslopes below Zanesville and Sadler soils
- Dunning soils in small depressions between areas of Sadler and Lawrence soils

Use and Management

Major uses: Cropland and pasture
Management concerns: Erosion, wetness, drainage, and depth to bedrock
Management measures: No-till planting, outlet ditches, and grassed waterways

Soil Descriptions of Edmonson County

1. Gilpin-Clarkrange-Rosine Association

Gently sloping to moderately steep, moderately deep to very deep, well drained and moderately well drained soils that have a loamy subsoil; formed in residuum derived from acid sandstone and in loess and the underlying residuum derived from shale interbedded with siltstone; on ridgetops and side slopes (fig. 14)

Setting

Landform: Ridges and side slopes
Slope: 2 to 20 percent

Composition

Extent of the association in Edmonson County: 13 percent
Extent of the soils in the association:
Gilpin soils—41 percent
Clarkrange soils—31 percent
Rosine soils—7 percent
Minor soils—21 percent

Soil Properties and Qualities

Gilpin

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Ridges and side slopes
Parent material: Residuum derived from acid sandstone
Surface texture: Loam
Slope: 2 to 20 percent

Clarkrange

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Landscape position: Ridges and side slopes
Parent material: Residuum derived from acid sandstone
Surface texture: Silt loam
Slope: 2 to 12 percent

Rosine

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Well drained
Landscape position: Ridges and side slopes
Parent material: Loess and the underlying residuum derived from shale and interbedded siltstone
Surface texture: Silt loam
Slope: 2 to 20 percent

Minor Soils

- Lily, Latham, and Wellston soils on narrow ridges and the upper part of hillsides
- Riney soils that formed in slumped sandstone and shale on narrow ridges and side slopes

Use and Management

Major uses: Cropland
Management concerns: Wetness, erosion, a high content of clay, and depth to bedrock
Management measures: No-till planting, deep-rooted crops, grade stabilization structures, and outlet ditches

2. Newark-Nolin-Otwell Association

Nearly level to strongly sloping, very deep, well drained to somewhat poorly drained soils that have a loamy subsoil; formed in loess and in mixed alluvium derived from limestone, shale, siltstone, and sandstone; on flood plains, river bottoms, and terraces

Setting

Landform: Flood plains and stream terraces
Slope: 0 to 12 percent

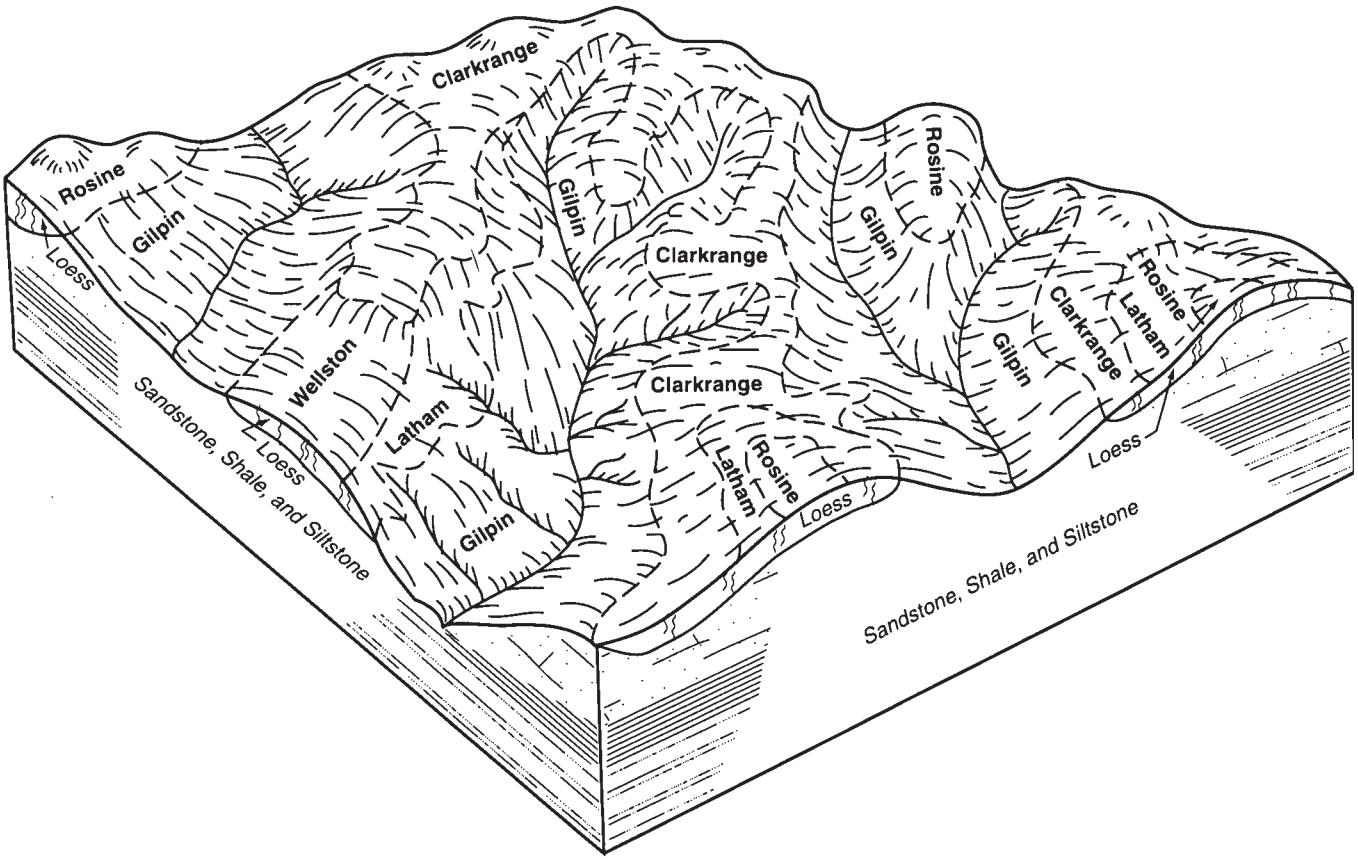

Figure 14.—Relationship of soils to topography and underlying material in the Gilpin-Clarkville-Rosine association.

Composition

Extent of the association in Edmonson County:
3 percent
Extent of the soils in the association:
Newark soils—55 percent
Nolin soils—16 percent
Otwell soils—13 percent
Minor soils—16 percent

Soil Properties and Qualities

Newark

Depth class: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Landscape position: Slight depressions along small streams and river bottoms
Parent material: Mixed alluvium derived from limestone, shale, siltstone, and sandstone
Surface texture: Silt loam
Slope: 0 to 2 percent

Nolin

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Slightly higher positions along small streams and river bottoms
Parent material: Mixed alluvium derived from limestone, shale, siltstone and sandstone
Surface texture: Silt loam
Slope: 0 to 2 percent

Otwell

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Landscape position: Slightly higher ridges
Parent material: Mixed alluvium
Surface texture: Silt loam
Slope: 2 to 12 percent

Minor Soils

- Chagrin soils on flood plains between areas of Nolin and Newark soils
- Elk and Allegheny soils on low stream terraces

Use and Management

Major uses: Cropland
Management concerns: Drainage, flooding, siltation, and wetness
Management measures: Outlet ditches, tile drainage, and no-till planting

3. Shelocta-Gilpin-Latham Association

Gently sloping to steep, very deep to moderately deep, well drained and moderately well drained soils that have a loamy or clayey subsoil; formed in colluvium derived from shale and siltstone and in residuum derived from acid sandstone or acid shale; on uplands (fig. 15)

Setting

Landform: Hillsides
Slope: 2 to 30 percent

Composition

Extent of the association in Edmonson County:
21 percent
Extent of the soils in the association:
Shelocta soils—28 percent
Gilpin soils—21 percent
Latham soils—16 percent
Minor soils—35 percent

Soil Properties and Qualities

Shelocta

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Well drained
Landscape position: Hillsides and footslopes
Parent material: Colluvium derived from shale and siltstone
Surface texture: Silt loam
Slope: 12 to 30 percent

Gilpin

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Hillsides
Parent material: Residuum derived from acid sandstone
Surface texture: Loam
Slope: 2 to 30 percent

Latham

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Landscape position: Hillsides
Parent material: Residuum derived from acid shale
Surface texture: Silt loam
Slope: 6 to 30 percent

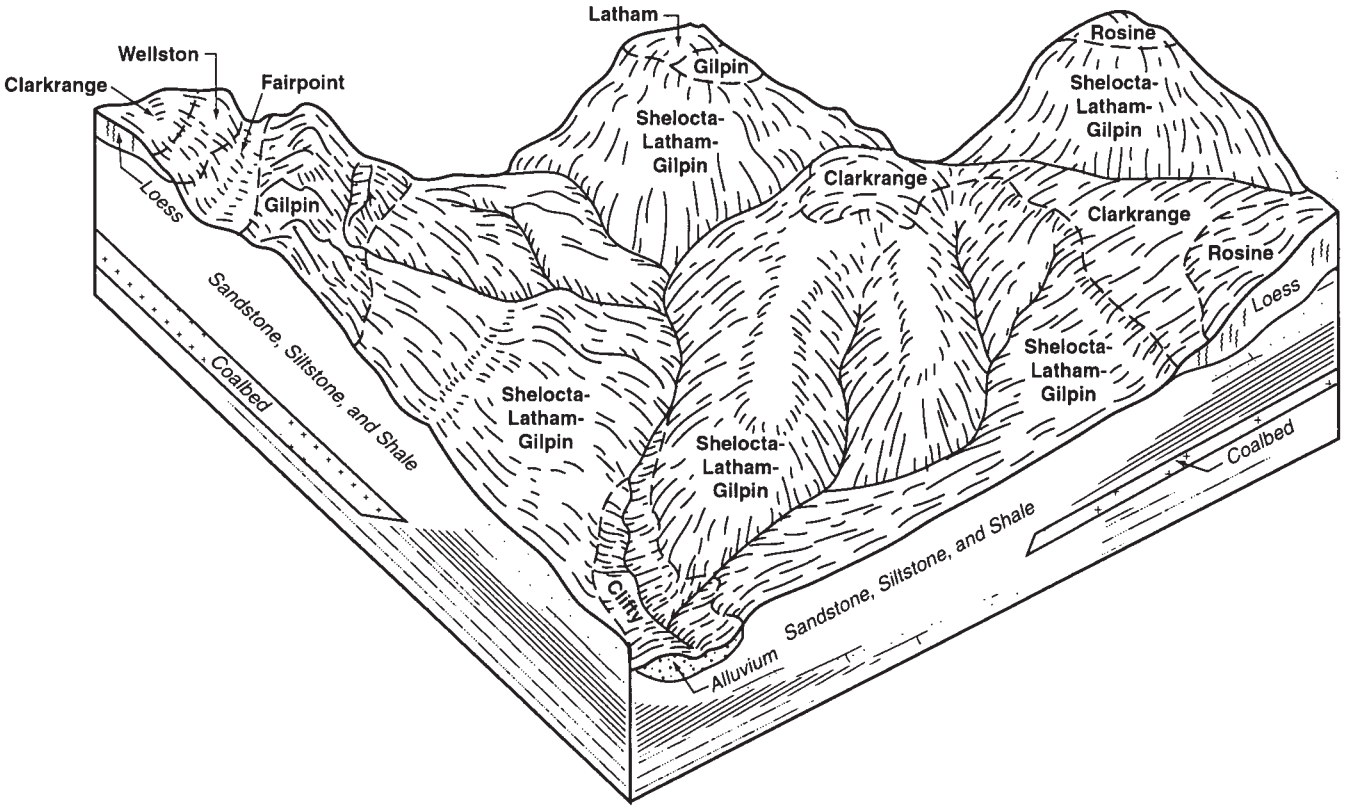

Figure 15.—Relationship of soils to topography and underlying material in the Shelocta-Gilpin-Latham association.

Minor Soils

- Carpenter and Lenberg soils on hillsides and footslopes along Nolin Lake
- Bethesda and Fairpoint soils on hillsides and side slopes
- Wellston, Clarkrange, and Rosine soils on ridges and side slopes
- Clifty and Newark soils in narrow draws between hillsides

Use and Management

Major uses: Woodland and wildlife habitat
Management concerns: Erosion, depth to bedrock, and a high content of clay
Management measures: Tree planting, access roads, critical-area planting, and exclusion of livestock

4. Clarkrange-Wellston Association

Gently sloping to moderately steep, deep and very deep, moderately well drained and well drained loamy soils; formed in loess and in the underlying residuum derived from shale, siltstone, sandstone, or interbedded sandstone and shale or in loess and the underlying residuum derived from acid siltstone and acid sandstone; on uplands (fig. 16)

Setting

Landform: Broad ridges and side slopes
Slope: 2 to 20 percent

Composition

Extent of the association in Edmonson County:
12 percent
Extent of the soils in the association:
Clarkrange soils—36 percent
Wellston soils—35 percent
Minor soils—29 percent

Soil Properties and Qualities

Clarkrange

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Landscape position: Broad ridges and side slopes

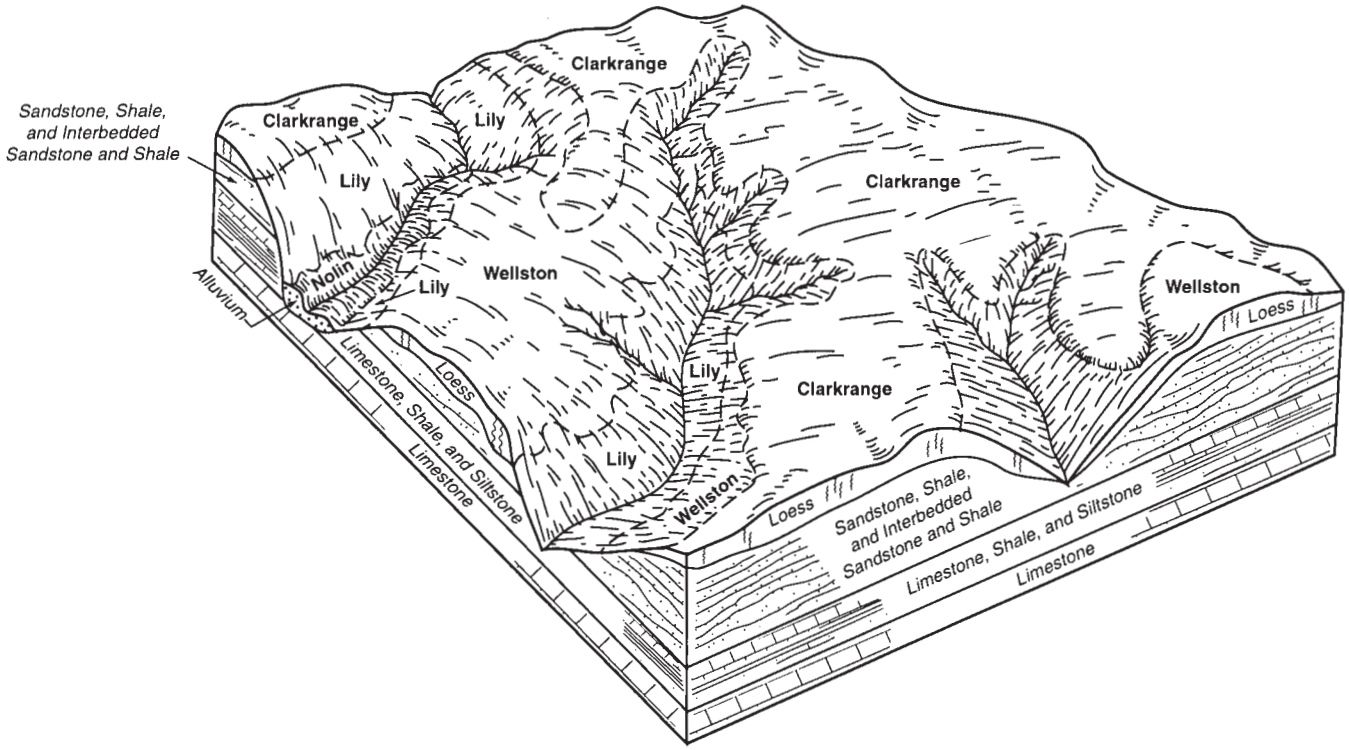

Figure 16.—Relationship of soils to topography and underlying material in the Clarkrange-Wellston association.

Parent material: Loess and the underlying residuum derived from shale, siltstone, and sandstone and interbedded sandstone and shale
Surface texture: Silt loam
Slope: 2 to 12 percent

Wellston

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Well drained
Landscape position: Narrow ridges and side slopes
Parent material: Loess and the underlying residuum derived from acid siltstone and acid sandstone
Surface texture: Silt loam
Slope: 2 to 20 percent

Minor Soils

- Lily and Gilpin soils on points of ridges and on side slopes
- Nolin soils on narrow flood plains and along drainageways
- Rosine soils on slight rises on ridgetops
- Riney, Bledsoe, Wallen, and Donahue soils on narrow ridges and hillsides

Use and Management

Major uses: Cropland
Management concerns: Erosion, wetness, and depth to bedrock
Management measures: Contour farming, grassed waterways, and plant suitability

5. Jefferson-Lily-Riney Association

Strongly sloping to very steep, very deep to moderately deep, well drained soils that have a loamy subsoil; formed in colluvium derived from sandstone, shale and siltstone, in residuum derived from acid sandstone, and in residuum derived from unconsolidated or weakly consolidated sandstone and shale; on uplands

Setting

Landform: Hillsides
Slope: 12 to 35 percent

Composition

Extent of the association in Edmonson County: 13 percent
Extent of the soils in the association:
Jefferson soils—45 percent
Lily soils—23 percent
Riney soils—11 percent
Minor soils—21 percent

Soil Properties and Qualities

Jefferson

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Backslopes and footslopes
Parent material: Colluvium derived from acid sandstone, shale, and siltstone
Surface texture: Loam
Slope: 12 to 35 percent

Lily

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Shoulder slopes and backslopes
Parent material: Residuum derived from acid sandstone
Surface texture: Loam
Slope: 12 to 35 percent

Riney

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Well drained
Landscape position: Shoulder slopes and backslopes
Parent material: Residuum derived from unconsolidated or weakly consolidated sandstone and shale
Surface texture: Silt loam
Slope: 12 to 30 percent

Minor Soils

- Wellston soils on nose slopes and head slopes
- Caneyville soils on footslopes and in the lower landscape positions

Use and Management

Major uses: Woodland and wildlife habitat
Management concerns: Depth to bedrock, erosion, and wildlife habitat
Management measures: Brush management, critical-area planting, and erosion control

6. Johnsburg-Clarkrange Association

Nearly level to strongly sloping, deep and very deep, somewhat poorly drained and moderately well drained soils that have a loamy subsoil; formed in loess and in the underlying residuum derived from sandstone, shale, and siltstone; on uplands (fig. 17)

Setting

Landform: Upland flats
Slope: 0 to 12 percent

Composition

Extent of the association in Edmonson County: 9 percent
Extent of the components in the association:
Johnsburg soils—30 percent
Clarkrange soils—25 percent
Minor components—45 percent

Soil Properties and Qualities

Johnsburg

Depth class: Deep and very deep (more than 40 inches)
Drainage class: Somewhat poorly drained
Landscape position: Broad, flat ridges
Parent material: Loess and the underlying residuum derived from acid sandstone, shale, and siltstone
Surface texture: Silt loam
Slope: 0 to 2 percent

Clarkrange

Depth class: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Landscape position: Broad ridges and side slopes
Parent material: Residuum derived from acid sandstone
Surface texture: Silt loam
Slope: 2 to 12 percent

Minor Components

- Wellston soils in the higher positions on ridgetops
- Mullins soils in the slightly lower or depressional areas
- Gilpin, Bledsoe, Donahue, and Wallen soils on hillsides, above major drainageways and streams
- Lily soils on side slopes along major drainageways or slope breaks
- Newark soils along narrow streams and drainageways
- Dunning soils in the slightly lower landscape positions between areas of Johnsburg and Clarkrange soils
- Caneyville soils and Rock outcrop in the higher positions on hillsides

Use and Management

Major uses: Cropland and hay
Management concerns: Wetness, drainage, and pasture and hay plantings
Management measures: Subsurface drainage system, pesticide management, grassed waterways, drainage outlets, and conservation tillage

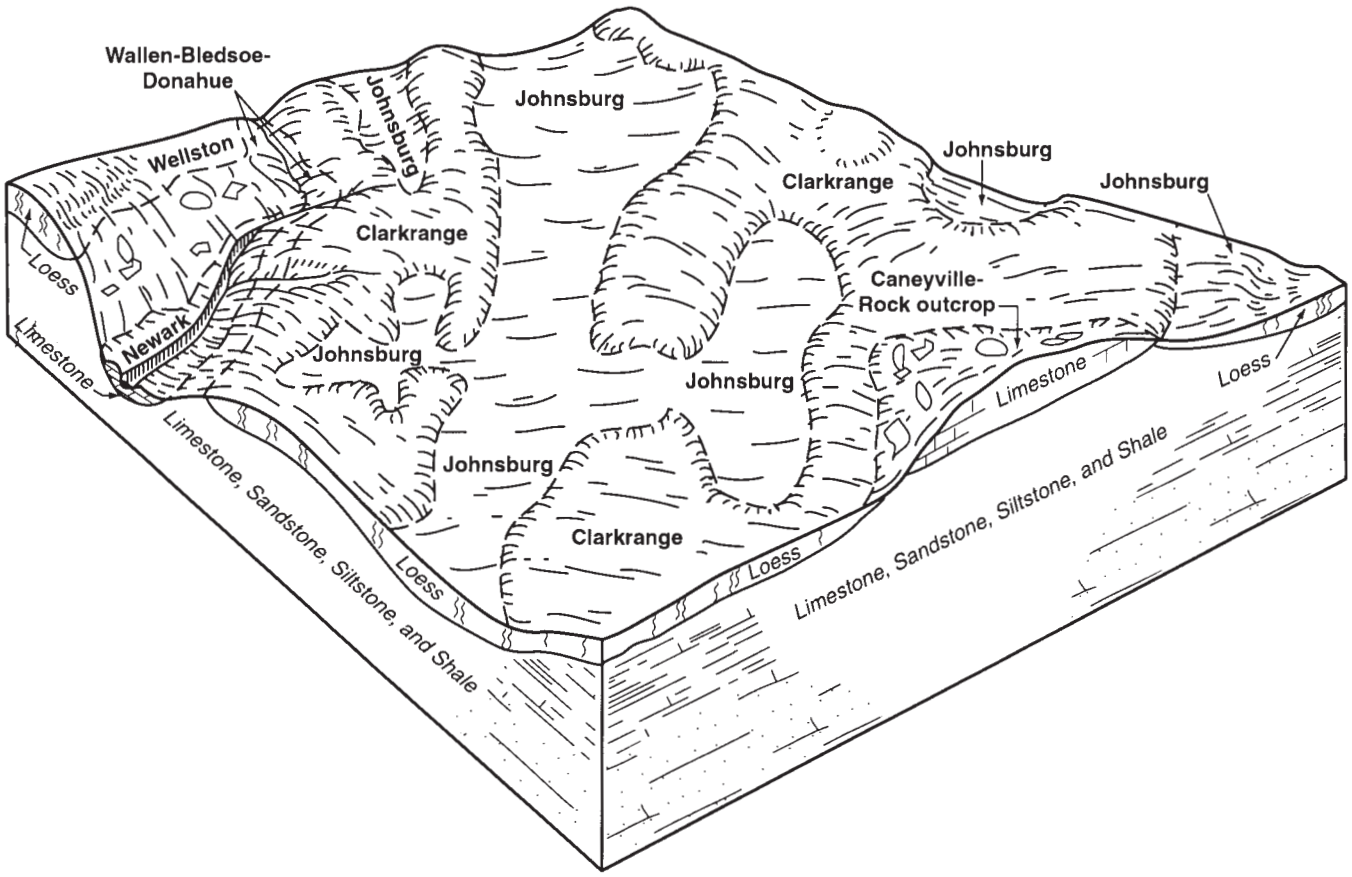

Figure 17.—Relationship of soils to topography and underlying material in the Johnsburg-Clarkrange association.

7. Jefferson-Caneyville Association

Strongly sloping to very steep, very deep and moderately deep, well drained soils that have a loamy and clayey subsoil; formed in colluvium derived from acid sandstone, shale, and siltstone and in residuum derived from limestone; on uplands

Setting

Landform: Hillslopes
Slope: 6 to 35 percent

Composition

Extent of the association in Edmonson County:
5 percent
Extent of the soils in the association:
Jefferson soils—54 percent
Caneyville soils—16 percent
Minor soils—30 percent

Soil Properties and Qualities

Jefferson

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Backslopes and footslopes
Parent material: Colluvium derived from acid sandstone, shale, and siltstone
Surface texture: Loam
Slope: 12 to 35 percent

Caneyville

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Footslopes and backslopes
Parent material: Residuum derived from limestone
Surface texture: Silt loam
Slope: 6 to 30 percent

Minor Soils

- Wellston soils on nose slopes and shoulder slopes of hillsides, above the Jefferson soils
- Bledsoe and Donahue soils on footslopes between areas of Jefferson and Caneyville soils

Use and Management

Major uses: Woodland and wildlife habitat

Management concerns: Depth to bedrock, erosion, and wildlife habitat
Management measures: Tree planting, critical-area planting, and exclusion of livestock

8. Wallen-Caneyville Association

Moderately steep to very steep, moderately deep, well drained loamy and clayey soils; formed in residuum derived from sandstone, siltstone, shale, and limestone; on uplands (fig. 18)

Setting

Landform: Hillslopes
Slope: 15 to 50 percent

Composition

Extent of the association in Edmonson County: 18 percent
Extent of the soils in the association:
Wallen soils—43 percent
Caneyville soils—22 percent
Minor soils—35 percent

Soil Properties and Qualities

Wallen

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Backslopes and shoulder slopes
Parent material: Loamy residuum derived from acid sandstone, siltstone, and shale
Surface texture: Gravelly loam
Slope: 15 to 50 percent

Caneyville

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Toeslopes and footslopes
Parent material: Clayey residuum derived from limestone

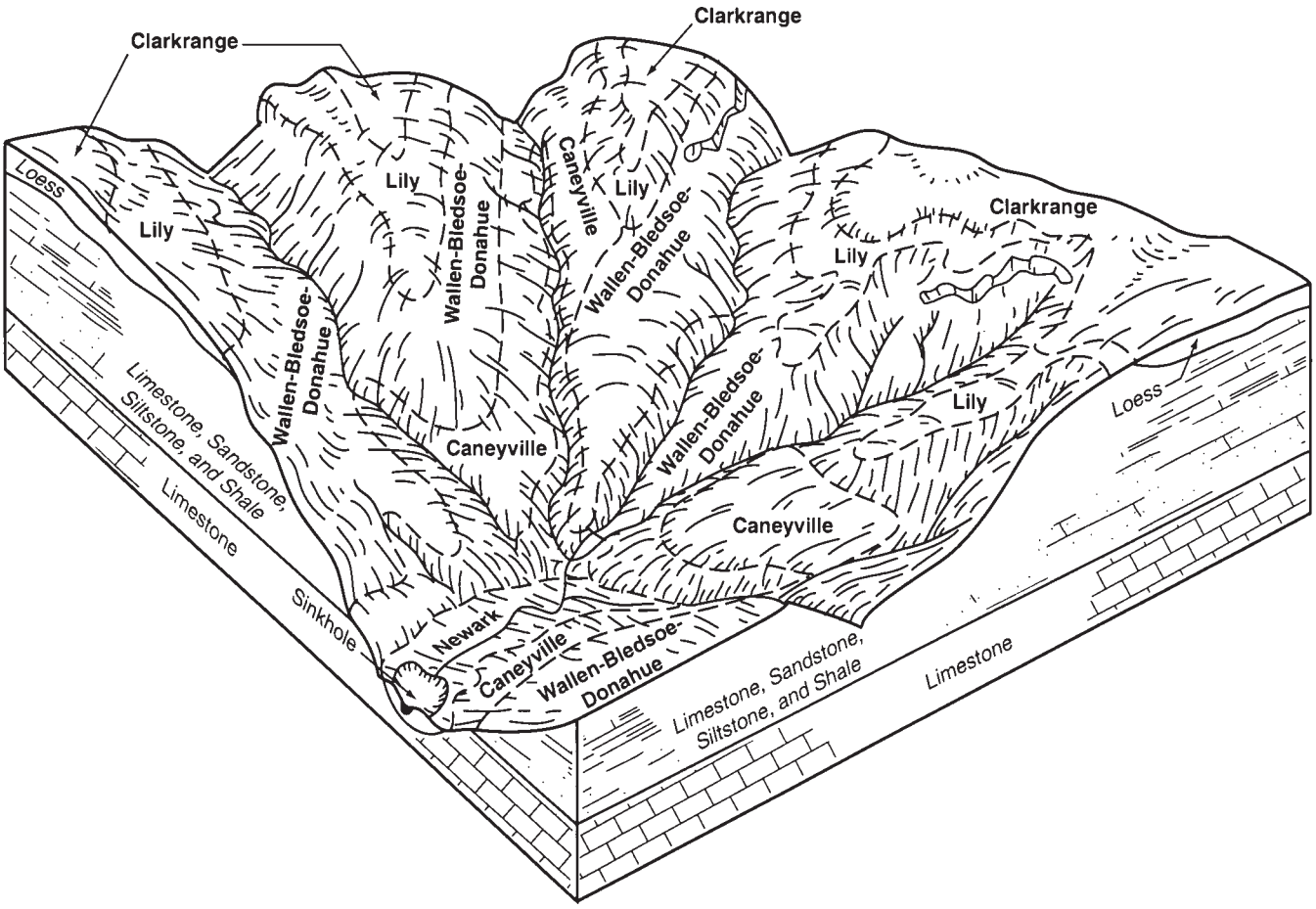

Figure 18.—Relationship of soils to topography and underlying material in the Wallen-Caneyville association.

Surface texture: Silt loam
Slope: 15 to 35 percent

Minor Soils

- Gilpin and Lily soils on shoulder slopes and backslopes
- Rosine, Clarkrange, and Wellston soils on side slopes
- Jefferson, Bledsoe, and Donahue soils on benches and footslopes
- Fredonia and Hagerstown soils in karst valleys
- Nolin and Newark soils in depressions and sinkholes

Use and Management

Major uses: Wildlife habitat, woodland, and recreation
Management concerns: Erosion, wildlife habitat, and depth to bedrock
Management measures: Brush management, erosion control, and critical-area planting

9. Baxter-Pembroke-Fredonia Association

Gently sloping to steep, very deep and moderately deep, well drained soils that have a loamy or clayey subsoil; formed in limestone residuum; on karst uplands (fig. 19)

Setting

Landform: Karst plains
Slope: 2 to 30 percent

Composition

Extent of the association in Edmonson County:
6 percent
Extent of the soils in the association:
Baxter soils—44 percent
Pembroke soils—14 percent
Fredonia soils—11 percent
Minor soils—31 percent

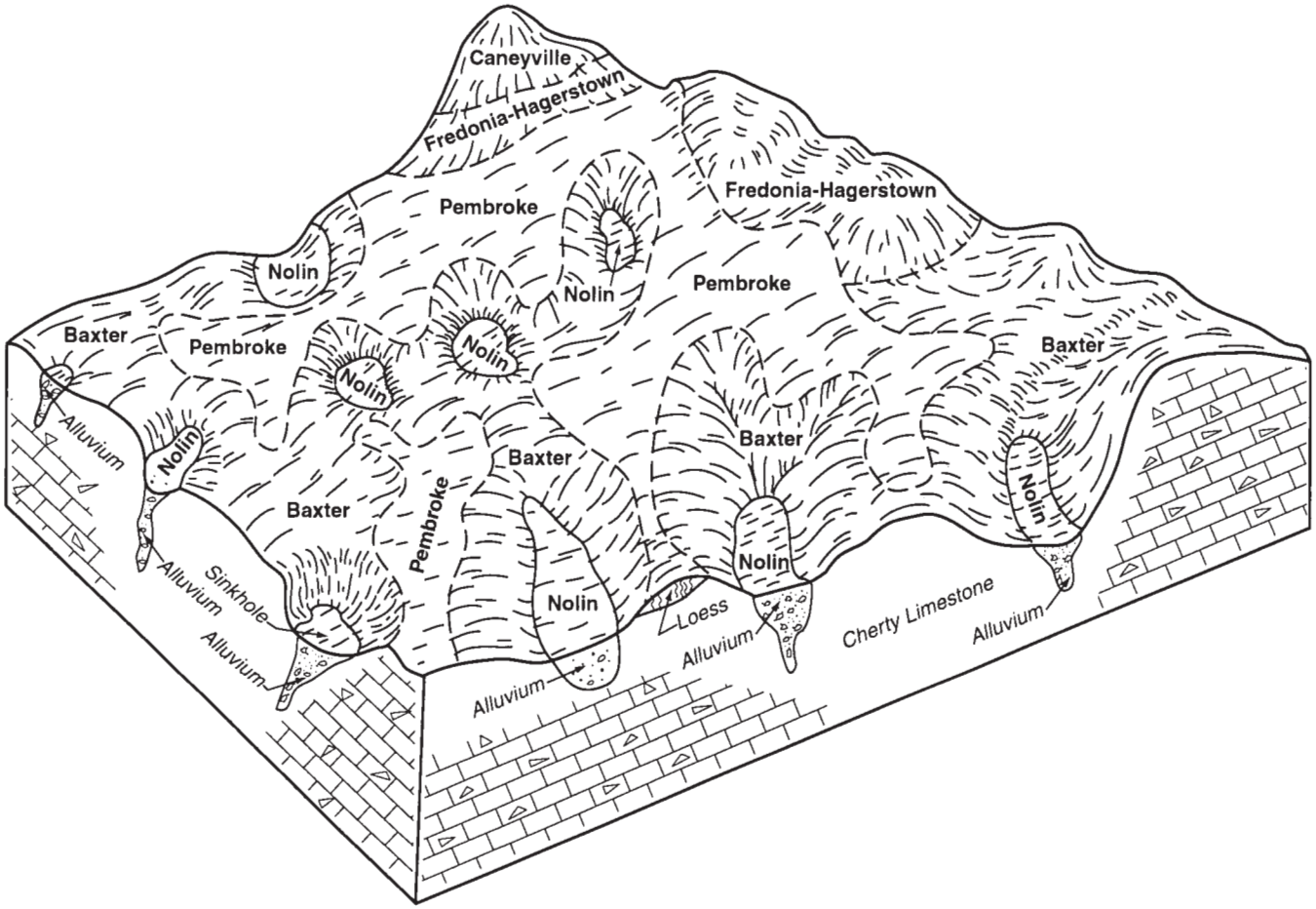

Figure 19.—Relationship of soils to topography and underlying material in the Baxter-Pembroke-Fredonia association.

Soil Properties and Qualities

Baxter

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Ridges and side slopes
Parent material: Residuum derived from limestone
Surface texture: Gravelly silt loam
Slope: 2 to 30 percent

Pembroke

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Landscape position: Ridges and side slopes
Parent material: Residuum derived from limestone
Surface texture: Silt loam
Slope: 2 to 12 percent

Fredonia

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Landscape position: Karst valleys and footslopes below the steeper escarpments
Parent material: Residuum derived from limestone
Surface texture: Silt loam
Slope: 2 to 20 percent

Minor Soils

- Crider soils on the higher ridges and side slopes
- Hagerstown and Caneyville soils on hillsides and in karst valleys
- Nolin soils in sinkholes and depressions

Use and Management

Major uses: Pasture and cropland
Management concerns: Erosion, a high content of clay, and depth to bedrock
Management measures: Conservation tillage, crop residue management, and grassed waterways

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 and potential 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, Wellston silt loam, 2 to 6 percent slopes, is a phase of the Wellston series.

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

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. Wallen-Bledsoe-Donahue complex, 15 to 35 percent slopes, very rocky, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Bethesda-Fairpoint soils, 2 to 6 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. The map unit Pits, quarries, limestone, 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.

AlB—Allegheny loam, 2 to 6 percent slopes

Setting

Landform: High stream terraces
Landscape position: Broad ridges
Shape of areas: Irregular
Size of areas: 3 to 332 acres; average size of 10 acres
Major uses: Cropland and pasture

Composition

Allegheny soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that have more silt in the subsoil than the Allegheny soil

Contrasting components:
- The moderately well drained Sciotoville soils on high terraces
- Soils that have bedrock within a depth of 40 inches and are in landscape positions similar to those of the Allegheny soil

Typical Profile

Surface layer:
0 to 9 inches; dark brown loam

Subsoil:
9 to 20 inches; yellowish brown loam
20 to 36 inches; yellowish brown sandy loam

Substratum:
36 to 46 inches; yellowish red loamy sand
46 to 65 inches; strong brown loam that has yellowish brown and brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slow or medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is well suited to crops.
- Returning crop residue to the soil helps to maintain soil tilth.
- No-till planting and minimum tillage help to reduce the hazard of erosion and maintain productivity.
- The soil is easily tilled throughout a wide range in moisture content.

Pasture and Forage

- This soil is suited to pasture and hay.
- Proper stocking rates, pasture rotation, and deferred grazing help to maximize yields and maintain the good condition of the soil.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white ash, yellow-poplar, black walnut, and eastern white pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.

Urban Uses

- This soil is suited to some kinds of building site development and to sanitary facilities.
- Erosion is a hazard during construction unless precautionary measures are taken.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.
- Proper design and installation and adequate site preparation help to overcome the limitations in some areas.
- A temporary vegetative cover helps to control erosion until a permanent cover can be established.

Interpretive Groups

Land capability classification: 2e

AlC2—Allegheny loam, 6 to 12 percent slopes, eroded

Setting

Landform: High stream terraces
Landscape position: Strongly sloping side slopes and shoulder slopes
Shape of areas: Irregular
Size of areas: 3 to 223 acres; average size of 15 acres
Major uses: Pasture and hay (fig. 20)

Composition

Allegheny soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Wellston soils, which have more silt in the subsoil than the Allegheny soil

Contrasting components:
- The moderately well drained Sciotoville soils on side slopes
- Soils that have bedrock within a depth of 40 inches and are in landscape positions similar to those of the Allegheny soil

Figure 20.—Rolled hay in an area of Allegheny loam, 6 to 12 percent slopes, eroded.

Typical Profile

Surface layer:
0 to 4 inches; dark brown loam

Subsurface layer:
4 to 9 inches; strong brown loam

Subsoil:
9 to 20 inches; yellowish brown loam
20 to 36 inches; yellowish brown sandy loam

Substratum:
36 to 46 inches; yellowish red loamy sand
46 to 65 inches; strong brown loam that has yellowish brown and brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slow or medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is moderately suited to cropland.
- Returning crop residue to the soil helps to maintain soil tilth.
- No-till planting and minimum tillage help to reduce the hazard of erosion and maintain productivity.
- The soil is easily tilled throughout a wide range of moisture content.

Pasture and Forage

- This soil is suited to pasture and hay.
- Proper stocking rates, pasture rotation, and deferred grazing help to maximize yields and maintain the good condition of the soil.

Woodland

- This soil is well suited to woodland.
- Applications of recommended herbicides help to control undergrowth and weeds.
- Native species are red maple, black oak, and American elm.
- The species preferred for planting are white ash, yellow-poplar, black walnut, and eastern white pine.
- See table 7 for specific information related to potential productivity.

Urban Uses

- This soil is suited to most kinds of building site development and to sanitary facilities.
- The slope is a limitation affecting most kinds of building site development.
- The content of clay, slope, and seepage are limitations on sites for some sanitary facilities.

Interpretive Groups

Land capability classification: 3e

AlC3—Allegheny loam, 6 to 12 percent slopes, severely eroded

Setting

Landform: High stream terraces
Landscape position: Strongly sloping side slopes and shoulder slopes
Shape of areas: Irregular
Size of areas: 3 to 37 acres; average size of 10 acres
Major uses: Pasture and cropland

Composition

Allegheny soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that have more silt in the subsoil than that of the Allegheny soil
- Soils that have a thicker surface layer than that of the Allegheny soil

Contrasting components:
- The moderately well drained Sciotoville soils on high terraces
- Soils that have bedrock within a depth of 40 inches and are in landscape positions similar to those of the Allegheny soil

Typical Profile

Surface layer:
0 to 2 inches; dark brown loam

Subsurface layer:
2 to 7 inches; strong brown loam

Subsoil:
7 to 18 inches; yellowish brown loam
18 to 36 inches; yellowish brown sandy loam

Substratum:
36 to 44 inches; yellowish red loamy sand

44 to 65 inches; strong brown loam that has yellowish brown and brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slow or medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cultivated crops because of the effects of past erosion and the hazard of further erosion.
- Species that provide adequate ground cover should be selected for planting.
- Applications of lime and fertilizer, proper stocking rates, and weed control help to maintain the desired plants.

Pasture and Forage

- This soil is suited to pasture and hay.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired species.

Woodland

- This soil is suited to woodland.
- Potential productivity for woodland is high.
- The species preferred for planting are white ash, black walnut, yellow-poplar, and eastern white pine.
- See table 7 for specific information related to potential productivity.

Urban Uses

- This soil is suited to most kinds of building site development and to sanitary facilities.
- The slope is a limitation affecting most kinds of building site development.
- The establishment of grasses is somewhat difficult because erosion has removed most of the topsoil.

Interpretive Groups

Land capability classification: 4e

AID2—Allegheny loam, 12 to 20 percent slopes, eroded

Setting

Landform: High stream terraces
Landscape position: Hillsides and shoulder slopes
Shape of areas: Irregular
Size of areas: 3 to 37 acres; average size of 10 acres
Major uses: Pasture and woodland

Composition

Allegheny soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Wellston soils in landscape positions similar to those of the Allegheny soil
- Soils that formed in 30 inches of loamy alluvium and in the underlying residuum derived from acid shale and acid sandstone

Contrasting components:
- Shelocta and Latham soils in landscape positions similar to those of the Allegheny soil

Typical Profile

Surface layer:
0 to 4 inches; dark brown loam

Subsurface layer:
4 to 9 inches; strong brown loam

Subsoil:
9 to 20 inches; yellowish brown loam
20 to 36 inches; yellowish brown sandy loam

Substratum:
36 to 46 inches; yellowish red loamy sand
46 to 65 inches; strong brown loam that has yellowish brown and brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cropland.
- The slope is the main limitation.
- The hazard of erosion is very severe if conventional tillage methods are used.
- Applying a system of conservation tillage, such as no-till planting, farming on the contour, and stripcropping help to control erosion and runoff.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are white ash, black walnut, yellow-poplar, and eastern white pine.
- Table 7 provides specific information related to potential productivity.

Urban Uses

- This soil is poorly suited to most kinds of building site development and to sanitary facilities.
- The slope is the main limitation.
- Proper design and installation may help to overcome the slope.

Interpretive Groups

Land capability classification: 4e

AID3—Allegheny loam, 12 to 20 percent slopes, severely eroded

Setting

Landform: High stream terraces
Landscape position: The higher side slopes and shoulder slopes
Shape of areas: Irregular
Size of areas: 4 to 38 acres; average size of 15 acres
Major uses: Pasture and woodland

Composition

Allegheny soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Wellston soils in landscape positions similar to those of the Allegheny soil
- Soils that have a thicker surface layer than that of the Allegheny soil

Contrasting components:
- Shelocta and Latham soils in landscape positions similar to those of the Allegheny soil

Typical Profile

Surface layer:
0 to 2 inches; dark brown loam

Subsurface layer:
2 to 7 inches; strong brown loam

Subsoil:
7 to 18 inches; yellowish brown loam
18 to 36 inches; yellowish brown sandy loam

Substratum:
36 to 44 inches; yellowish red loamy sand
44 to 65 inches; strong brown loam that has yellowish brown and brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Moderate
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cropland because of the effects of past erosion and the hazard of further erosion.

Pasture and Forage

- This soil is suited to pasture and hay.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired species.

Woodland

- This soil is suited to woodland.

• The species preferred for planting are yellow-poplar, white oak, and eastern white pine.
• Table 7 provides specific information related to potential productivity.

Urban Uses

• This soil is poorly suited to most kinds of building site development and to sanitary facilities.
• The slope is the main limitation.
• Proper design and installation may help to overcome the slope.

Interpretive Groups

Land capability classification: 6e

BaB—Baxter gravelly silt loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Undulating ridges in areas of karst plains
Shape of areas: Irregular
Size of areas: 3 to 51 acres; average size of 10 acres
Major uses: Cropland, pasture, and hay

Composition

Baxter soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Soils that have fewer fragments in the surface layer and subsoil than the Baxter soil
• Soils that are severely eroded in spots
• Hagerstown soils in landscape positions similar to those of the Baxter soil
Contrasting components:
• Fredonia, Caneyville, Crider, and Pembroke soils in landscape positions similar to those of the Baxter soil

Typical Profile

Surface layer:
0 to 9 inches; dark yellowish brown gravelly silt loam

Subsurface layer:
9 to 14 inches; strong brown gravelly silty clay loam

Subsoil:
14 to 23 inches; yellowish red gravelly silty clay
23 to 37 inches; red gravelly clay
37 to 70 inches; dark red very gravelly clay

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Moderate

Use and Management

Cropland

• This soil is well suited to the commonly grown row crops and small grain.
• The soil is somewhat difficult to till because of the chert fragments in the surface layer.
• Applying a system of conservation tillage, returning crop residue to the soil, and including grasses and legumes in the cropping sequence help to control erosion.

Pasture and Forage

• This soil is well suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well.
• The main management needs are applications of lime and fertilizer, frequent pasture renovation, rotation grazing, proper stocking rates, control of undesirable vegetation, and a well planned clipping and harvest schedule.

Woodland

• This soil is well suited to woodland.
• Native species are black oak, yellow-poplar, and white oak.
• Table 7 provides specific information related to potential productivity.

Urban Uses

• This soil is suited to building site development and most sanitary facilities.
• The moderate permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting most sanitary facilities and building site development.
• Low strength is a limitation on sites for local roads and streets.
• Proper design and installation and adequate site preparation can help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 2e

BaC2—Baxter gravelly silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes below ridges and walls of sinks and depressions
Shape of areas: Irregular
Size of areas: 3 to 400 acres; average size of 30 acres
Major uses: Cropland and pasture

Composition

Baxter soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Soils that have fewer fragments in the surface layer and subsoil than the Baxter soil
- Hagerstown soils in landscape positions similar to those of the Baxter soil
- Soils that are severely eroded in spots

Contrasting components:
- Caneyville, Fredonia, Crider, and Pembroke soils in landscape positions similar to those of the Baxter soil

Typical Profile

Surface layer:
0 to 9 inches; dark yellowish brown gravelly silt loam

Subsurface layer:
9 to 14 inches; strong brown gravelly silty clay loam

Subsoil:
14 to 23 inches; yellowish red gravelly silty clay
23 to 37 inches; red gravelly clay
37 to 70 inches; dark red very gravelly clay

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Fair
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is suited to row crops and small grain.
- If row crops are grown, the hazard of erosion is severe.
- Applying a system of conservation tillage, returning crop residue to the soil, and including grasses and legumes in the cropping sequence help to control erosion.
- The soil is somewhat difficult to till because of the chert fragments in the surface layer and subsoil.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All commonly grown grasses and legumes grow well.
- Maintaining the desired species, controlling weeds, maintaining proper stocking rates, applying a rotation grazing system, and applying lime and fertilizer are suitable management practices.

Woodland

- This soil is well suited to woodland.
- Most areas have been cleared.
- Native species are black oak, yellow-poplar, and white oak.
- Table 7 provides specific information related to potential productivity.

Urban Uses

- This soil is suited to most urban uses.
- The slope, the moderate permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting sanitary facilities and building site development.
- Low strength is a limitation on sites for local roads and streets.
- Proper design and installation and adequate site preparation can help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 3e

BaD2—Baxter gravelly silt loam, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes of deep sinks and depressions

Shape of areas: Oval or irregular
Size of areas: 3 to 261 acres; average size of 16 acres
Major uses: Pasture and hay

Composition

Baxter soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Soils that have fewer fragments in the surface layer and subsoil than the Baxter soil
- Soils that are severely eroded in spots
- Hagerstown soils in landscape positions similar to those of the Baxter soil

Contrasting components:
- Caneyville and Fredonia soils in landscape positions similar to those of the Baxter soil

Typical Profile

Surface layer:
0 to 9 inches; dark yellowish brown gravelly silt loam

Subsurface layer:
9 to 14 inches; strong brown gravelly silty clay loam

Subsoil:
14 to 23 inches; yellowish red gravelly silty clay
23 to 37 inches; red gravelly clay
37 to 70 inches; dark red very gravelly clay

Soil Properties and Qualities

Depth: Very deep
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil has limited suitability for row crops.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- The soil is difficult to till because of chert fragments in the surface layer and subsoil.

Pasture and Forage

- This soil is suited to pasture and hay.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

- This soil is suited to woodland; however, few areas are used for timber production.
- The moderate equipment limitation is a management concern if tree planting equipment is used.
- The species preferred for planting are shortleaf pine, yellow-poplar, and white pine.
- Table 7 provides specific information related to potential productivity.

Urban Uses

- This soil is poorly suited to most urban uses.
- The slope, the moderate permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting sanitary facilities and building site development.
- Low strength is a limitation on sites for local roads and streets.

Interpretive Groups

Land capability classification: 4e

BaE—Baxter gravelly silt loam, 20 to 30 percent slopes

Setting

Landform: Uplands
Landscape position: Hillsides and steep sinkhole walls
Shape of areas: Circular or irregular
Size of areas: 3 to 22 acres; average size of 6 acres
Major uses: Pasture and woodland

Composition

Baxter soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Soils that have fewer fragments in the surface layer and subsoil than the Baxter soil
- Small areas of severely eroded soils along the rim of depressions
- Hagerstown soils in landscape positions similar to those of the Baxter soil

Contrasting components:
• Caneyville and Fredonia soils in landscape positions similar to those of the Baxter soil

Typical Profile

Surface layer:
0 to 9 inches; dark yellowish brown gravelly silt loam

Subsurface layer:
9 to 14 inches; strong brown gravelly silty clay loam

Subsoil:
14 to 23 inches; yellowish red gravelly silty clay
23 to 37 inches; red gravelly clay
37 to 70 inches; dark red very gravelly clay

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Moderate

Use and Management

Cropland

• This soil is poorly suited to cultivated crops because of the slope.
• The soil is difficult to till because of chert fragments in the surface layer and subsoil.

Pasture and Forage

• This soil is suited to pasture and hay.
• The slope and the chert fragments in the surface layer hinder the establishment and maintenance of grasses and legumes.
• Most grasses and legumes grow well.
• The species that require the least amount of renovation should be used in the rotation.

Woodland

• This soil is well suited to woodland.
• Black oak, white oak, and yellow-poplar are the dominant native trees.
• Table 7 provides specific information related to potential productivity.

Urban Uses

• This soil is poorly suited to most urban uses.
• The slope, the moderate permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting sanitary facilities and building site development.
• Low strength is a limitation on sites for local roads and streets.

Interpretive Groups

Land capability classification: 6e

BfB—Bethesda-Fairpoint soils, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Ridges
Shape of areas: Irregular
Size of areas: 3 to 64 acres; average size of 10 acres
Major uses: Wildlife habitat, pasture, and idle land (fig. 21)

Composition

Bethesda soil and similar components: 50 percent
Fairpoint soil and similar components: 40 percent
Contrasting components: 10 percent

Individual areas of each soil are large enough to be mapped separately; however, because of present and predicted uses, the soils were mapped as one unit. Many areas are made up of a combination of the soils, but some areas are made up of only one of the soils.

Minor Components

Similar components:
• Soils that have extremely acid, nonacid, and calcareous layers in the same profile
Contrasting components:
• Areas that have an escarpment of bedrock 30 to 50 feet high
• Clarkrange soils on ridges between areas of Bethesda and Fairpoint soils
• Gilpin soils on narrow ridges that have not been stripped or disturbed
• Small areas where the soils are toxic to plants

Typical Profile

Bethesda

Surface layer:
0 to 6 inches; yellowish brown channery silty clay loam

Substratum:
6 to 21 inches; variegated yellowish brown and brown very channery clay loam
21 to 62 inches; variegated yellowish brown and dark brown very channery clay loam

Figure 21.—A coal tipple surrounded by an area of Bethesda-Fairpoint soils, 2 to 6 percent slopes.

Fairpoint

Surface layer:
0 to 4 inches; brown channery silt loam

Substratum:
4 to 20 inches; dark grayish brown channery silt loam
20 to 25 inches; strong brown very channery silty clay loam that has gray mottles
25 to 60 inches; variegated dark gray and brown channery silt loam

Soil Properties and Qualities

Bethesda

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Very low
Erosion hazard: Moderate
Tilth: Poor
Shrink-swell potential: Low

Fairpoint

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Very low
Erosion hazard: Moderate
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are poorly suited to cultivated crops.
- Most areas need extensive grading and smoothing.
- Rock fragments interfere with tillage and cultivation.

• Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.

Pasture and Forage

• These soils are poorly suited to pasture and hay.
• Rock fragments interfere with tillage and mowing.
• Very heavy applications of fertilizer and, in places, lime are necessary to grow grasses and legumes that help to control erosion.

Woodland

• These soils are well suited to woodland.
• The species preferred for planting are black locust, loblolly pine, and eastern white pine.
• See table 7 for specific information related to potential productivity.

Urban Uses

• These soils are suited to most urban uses.
• The moderately slow permeability is a severe limitation on sites for septic tank absorption fields.
• The rock fragments in the underlying material interfere with excavation.
• If the soils are smoothed and graded and covered with topsoil, they may settle in a few years after mining and grading have been completed.

Interpretive Groups

Land capability classification: Bethesda—6s; Fairpoint—6s

BfC—Bethesda-Fairpoint soils, 6 to 12 percent slopes

Setting

Landform: Uplands
Landscape position: Ridges and side slopes
Shape of areas: Irregular
Size of areas: 3 to 63 acres; average size of 9 acres
Major uses: Wildlife habitat, woodland, and pasture

Composition

Bethesda soil and similar components: 50 percent
Fairpoint soil and similar components: 40 percent
Contrasting components: 10 percent

Individual areas of each soil are large enough to be mapped separately; however, because of present and predicted uses, the soils were mapped as one unit. Many areas are made up of a combination of the soils, but some areas are made up of only one of the soils.

Minor Components

Similar components:
• Soils that have extremely acid, nonacid, and calcareous layers in the same profile
Contrasting components:
• Areas that have an escarpment of bedrock 30 to 50 feet high
• Clarkrange soils on side slopes between areas of Bethesda and Fairpoint soils
• Gilpin soils on side slopes below areas of Bethesda and Fairpoint soils
• Small areas where the soils are toxic to plants

Typical Profile

Bethesda

Surface layer:
0 to 6 inches; yellowish brown channery silty clay loam

Substratum:
6 to 21 inches; variegated yellowish brown and brown very channery clay loam
21 to 62 inches; variegated yellowish brown and dark brown very channery clay loam

Fairpoint

Surface layer:
0 to 4 inches; brown channery silt loam

Substratum:
4 to 20 inches; dark grayish brown channery silt loam
20 to 25 inches; strong brown very channery silty clay loam that has gray mottles
25 to 60 inches; variegated dark gray and brown channery silt loam

Soil Properties and Qualities

Bethesda

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Very low
Erosion hazard: Severe
Tilth: Poor
Shrink-swell potential: Low

Fairpoint

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow

Runoff: Medium
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Very low
Erosion hazard: Severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are poorly suited to cropland.
- Cultivation generally is not practical on these soils.
- Because the thickness of the layer of original soil material that covers the mine spoil varies, cultivation can work rock fragments into the plow layer in places.
- If the soils are cultivated, contour farming, conservation tillage, cover crops, stripcropping, and the addition of organic matter help to control erosion.
- Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.

Pasture and Forage

- These soils are well suited to pasture and hay.
- They are well suited to most commonly grown grasses and legumes.
- The main management needs are proper seeding rates and mixtures, applications of lime and fertilizer, control of weeds, and control of erosion during seedbed preparation.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are eastern white pine, black locust, and loblolly pine.
- See table 7 for specific information related to potential productivity.

Urban Uses

- These soils are suited to some urban uses.
- The moderately slow permeability is a severe limitation on sites for septic tank absorption fields.
- The rock fragments in the underlying material interfere with urban uses.

Interpretive Groups

Land capability classification: Bethesda—6s; Fairpoint—6s

BfD—Bethesda-Fairpoint soils, 12 to 20 percent slopes

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to 199 acres; average size of 18 acres
Major uses: Wildlife habitat, woodland, and pasture

Composition

Bethesda soil and similar components: 50 percent
Fairpoint soil and similar components: 40 percent
Contrasting components: 10 percent

Individual areas of each soil are large enough to be mapped separately; however, because of present and predicted uses, the soils were mapped as one unit. Many areas are made up of a combination of the soils, but some areas are made up of only one of the soils.

Minor Components

Similar components:
- Soils that have extremely acid, nonacid, and calcareous layers in the same profile

Contrasting components:
- Areas that have an escarpment of bedrock 30 to 50 feet high
- Shelocta, Latham, and Gilpin soils between areas of Bethesda and Fairpoint soils

Typical Profile

Bethesda

Surface layer:
0 to 6 inches; yellowish brown channery silty clay loam

Substratum:
6 to 21 inches; variegated yellowish brown and brown very channery clay loam
21 to 62 inches; variegated yellowish brown and dark brown very channery clay loam

Fairpoint

Surface layer:
0 to 4 inches; brown channery silt loam

Substratum:
4 to 20 inches; dark grayish brown channery silt loam
20 to 25 inches; strong brown very channery silty clay loam that has gray mottles
25 to 60 inches; variegated dark gray and brown channery silt loam

Soil Properties and Qualities

Bethesda

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Fairpoint

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are poorly suited to cultivated crops.
- Cultivation generally is not practical on these soils.
- Because the thickness of the layer of original soil material covering the mine spoil varies, cultivation can work rock fragments into the plow layer in places.
- Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.

Pasture and Forage

- These soils are well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Very heavy applications of fertilizer and, in places, lime are necessary to grow grasses and legumes that help to control erosion.

Woodland

- These soils are well suited to woodland.
- The species preferred for planting are eastern white pine, black locust, and loblolly pine.
- See table 7 for specific information related to potential productivity.

Urban Uses

- These soils are poorly suited to most kinds of building site development.
- The moderately slow permeability and the slope are severe limitations on sites for septic tank absorption fields.
- The rock fragments in the underlying material interfere with excavation.

Interpretive Groups

Land capability classification: Bethesda—6s; Fairpoint—6s

BfE—Bethesda-Fairpoint soils, 20 to 35 percent slopes

Setting

Landform: Uplands
Landscape position: Hillsides
Shape of areas: Irregular
Size of areas: 3 to 448 acres; average size of 30 acres
Major uses: Woodland and wildlife habitat

Composition

Bethesda soil and similar components: 50 percent
Fairpoint soil and similar components: 40 percent
Contrasting components: 10 percent

Individual areas of each soil are large enough to be mapped separately; however, because of present and predicted uses, the soils were mapped as one unit. Many areas are made up of a combination of the soils, but some areas are made up of only one of the soils.

Minor Components

Similar components:
- Soils that have extremely acid, nonacid, and calcareous layers in the same profile

Contrasting components:
- Areas that have an escarpment of bedrock 30 to 50 feet high
- Areas of Shelocta, Latham, and Gilpin soils between areas of Bethesda and Fairpoint soils (fig. 22)

Figure 22.—An area of Bethesda-Fairpoint soils, 20 to 35 percent slopes, adjacent to a strip mine pit. The woodland is in an area of Shelocta-Latham-Gilpin complex, 20 to 30 percent slopes.

Typical Profile

Bethesda

Surface layer:
0 to 6 inches; yellowish brown channery silty clay loam

Substratum:
6 to 21 inches; variegated yellowish brown and brown very channery clay loam
21 to 62 inches; variegated yellowish brown and dark brown very channery clay loam

Fairpoint

Surface layer:
0 to 4 inches; brown channery silt loam

Substratum:
4 to 20 inches; dark grayish brown channery silt loam
20 to 25 inches; strong brown very channery silty clay loam that has gray mottles
25 to 60 inches; variegated dark gray and brown channery silt loam

Soil Properties and Qualities

Bethesda

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Fairpoint

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe

Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are unsuited to cultivated crops.
- The very severe erosion hazard restricts these soils to a permanent cover of vegetation.

Pasture and Forage

- These soils are poorly suited to pasture and hay.
- The steep slopes and the rock fragments interfere with tillage and mowing.

Woodland

- These soils are suited to woodland.
- The species preferred for planting are eastern white pine, black locust, and loblolly pine.
- The use of planting and harvesting equipment is limited by the short, steep slopes.
- See table 7 for specific information related to potential productivity.

Urban Uses

- These soils are poorly suited to most urban uses because of the steep slopes, rock fragments, and clayey texture.
- Low strength is a severe limitation on sites for local roads and streets.

Interpretive Groups

Land capability classification: Bethesda—7e; Fairpoint—7e

CaB2—Caneyville silt loam, 2 to 6 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Ridges in limestone valleys
Shape of areas: Irregular
Size of areas: 3 to 27 acres; average size of 6 acres
Major uses: Pasture, cropland, and idle land

Composition

Caneyville soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Fredonia and Lenberg soils in landscape positions similar to those of the Caneyville soil
- Soils that have a severely eroded surface layer

Contrasting components:
- Pembroke and Hagerstown soils in landscape positions similar to those of the Caneyville soil

Typical Profile

Surface layer:
0 to 5 inches; brown silt loam

Subsoil:
5 to 21 inches; yellowish red silty clay
21 to 28 inches; strong brown clay that has reddish brown and grayish brown mottles

Bedrock:
28 inches; hard limestone

Soil Properties and Qualities

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is suited to cropland.
- The moderate available water capacity is a limitation affecting cropland.
- No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
- Tilth can be improved and maintained by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures,

rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are eastern white pine, white oak, and Virginia pine.
- See table 7 for specific information related to potential productivity.

Urban Uses

- This soil is poorly suited to most urban uses.
- The moderately slow permeability, the clayey texture, the depth to bedrock, and the moderate shrink-swell potential are limitations affecting sanitary facilities and building site development.
- Low strength is a limitation on sites for local roads and streets.

Interpretive Groups

Land capability classification: 2e

CaC2—Caneyville silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Ridgetops and side slopes
Shape of areas: Irregular
Size of areas: 3 to 399 acres; average size of 21 acres
Major uses: Pasture

Composition

Caneyville soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Fredonia and Lenberg soils in landscape positions similar to those of the Caneyville soil
- Soils that have a severely eroded surface layer

Contrasting components:
- Pembroke, Hagerstown, and Baxter soils in landscape positions similar to those of the Caneyville soil

Typical Profile

Surface layer:
0 to 5 inches; brown silt loam

Subsoil:
5 to 21 inches; yellowish red silty clay
21 to 28 inches; strong brown clay that has reddish brown and grayish brown mottles

Bedrock:
28 inches; hard limestone

Soil Properties and Qualities

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is poorly suited to cultivated crops and small grain.
- The moderate available water capacity and small size of most mapped areas are limitations affecting cropland.
- Returning crop residue to the soil helps to maintain soil tilth.

Pasture and Forage

- This soil is suited to hay and pasture.
- Maintaining the desired species, controlling weeds, maintaining proper stocking rates, applying a rotation grazing system, and applying lime and fertilizer are suitable management practices.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are eastern redcedar, eastern white pine, and Virginia pine.
- The main concerns in woodland management are the equipment limitation, plant competition, and seedling mortality.

Urban Uses

- This soil is poorly suited to most urban uses.
- The moderately slow permeability, the clayey texture, the depth to bedrock, and the moderate shrink-swell potential are limitations affecting sanitary facilities and building site development.
- Low strength is a limitation on sites for local roads and streets.

Interpretive Groups

Land capability classification: 3e

CcC3—Caneyville silty clay loam, 6 to 12 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Ridges and side slopes on limestone uplands
Shape of areas: Irregular
Size of areas: 3 to 61 acres; average size of 9 acres
Major uses: Pasture and hay

Composition

Caneyville soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Fredonia and Lenberg soils in landscape positions similar to those of the Caneyville soil

Contrasting components:
- Hagerstown, Pembroke, and Crider soils in landscape positions similar to those of the Caneyville soil
- Some soils that have spots where limestone outcrops

Typical Profile

Surface layer:
0 to 2 inches; yellowish brown silty clay loam

Subsoil:
2 to 13 inches; yellowish red silty clay
13 to 28 inches; strong brown clay that has reddish brown and grayish brown mottles

Bedrock:
28 inches; hard limestone

Soil Properties and Qualities

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Poor
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is poorly suited to row crops because of the effects of past erosion.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- The soil crusts and becomes cloddy if cultivated when the moisture content is too high.

Pasture and Forage

- This soil is suited to hay and pasture.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
- The root zone is moderately deep and can be penetrated by plant roots.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are eastern redcedar, Virginia pine, and loblolly pine.
- The erosion hazard, equipment limitation, and seedling mortality rate are management concerns.
- See table 7 for specific information related to potential productivity.

Urban Uses

- This soil is poorly suited to urban uses.
- The moderate depth to bedrock, the shrink-swell potential, and the slope are the main limitations.
- Low strength is a limitation on sites for local roads and streets.

Interpretive Groups

Land capability classification: 4e

CeD—Caneyville-Lenberg complex, 8 to 20 percent slopes

Setting

Landform: Uplands
Landscape position: Hillsides, conical hills, and footslopes
Shape of areas: Irregular

Size of areas: 3 to 562 acres; average size of 49 acres
Major uses: Woodland

Composition

Caneyville soil and similar components: 46 percent
Lenberg soil and similar components: 29 percent
Contrasting components: 25 percent

Minor Components

Similar components:
- Fredonia, Hagerstown, and Bledsoe soils
- Soils that are shallow to bedrock
- Soils that are deeper to shale than the Lenberg soil

Contrasting components:
- Wellston, Rosine, and Epley soils in landscape positions similar to those of the Caneyville and Lenberg soils
- Soils having a black surface layer and subsoil that are higher in clay than those of the Caneyville and Lenberg soils

Typical Profile

Caneyville

Surface layer:
0 to 5 inches; brown silt loam

Subsoil:
5 to 21 inches; yellowish red silty clay
21 to 28 inches; strong brown clay that has reddish brown and grayish brown mottles

Bedrock:
28 inches; hard limestone

Lenberg

Surface layer:
0 to 5 inches; grayish brown silt loam

Subsurface layer:
5 to 9 inches; yellowish brown silty clay that has brown mottles

Subsoil:
9 to 15 inches; yellowish brown silty clay that has brownish yellow and light yellowish brown mottles
15 to 23 inches; variegated light brownish gray and light olive brown clay
23 to 30 inches; variegated light brownish gray and light olive brown channery clay

Bedrock:
30 inches; shale

Soil Properties and Qualities

Caneyville

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Moderate

Lenberg

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Moderate

Use and Management

Cropland

- These soils are poorly suited to cultivated crops because of the slope and the high content of clay.

Pasture and Forage

- These soils are suited to pasture and hay.
- If grasses and legumes can be seeded and maintained, the soils are suited to most of the commonly grown grasses and legumes.

Woodland

- These soils are suited to woodland.
- The species preferred for planting are Virginia pine and eastern redcedar in areas of the Caneyville soil and white oak, shortleaf pine, and loblolly pine in areas of the Lenberg soil.
- The rock outcrop and moderately steep slopes limit the use of harvesting equipment.
- See table 7 for specific information related to potential productivity.

Urban Uses

- These soils are poorly suited to urban uses because of the depth to bedrock, the slope, and the clayey texture in the subsoil.

• The slope is a severe limitation affecting most urban uses.
• Proper design, installation, and site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: Caneyville—4e; Lenberg—4e

CgE—Caneyville-Lenberg-Rock outcrop complex, 20 to 30 percent slopes

Setting

Landform: Uplands
Landscape position: Hillsides, conical hills, and footslopes
Shape of areas: Irregular
Size of areas: 3 to 562 acres; average size of 49 acres
Major uses: Woodland and wildlife habitat

Composition

Caneyville soil and similar components: 46 percent
Lenberg soil and similar components: 29 percent
Rock outcrop: 12 percent
Contrasting components: 13 percent

Minor Components

Similar components:
• Soils that are shallower to bedrock than the Caneyville soil
• Soils that are deeper to shale than the Lenberg soil
Contrasting components:
• Wellston, Rosine, Shelocta, and Gilpin soils in landscape positions similar to those of the Caneyville and Lenberg soils
• Soils that have a black or darker surface layer and subsoil than those of the Caneyville and Lenberg soils and a higher content of clay

Typical Profile

Caneyville

Surface layer:
0 to 5 inches; brown silt loam

Subsoil:
5 to 21 inches; yellowish red silty clay
21 to 28 inches; strong brown clay that has reddish brown and grayish brown mottles

Bedrock:
28 inches; hard limestone

Lenberg

Surface layer:
0 to 5 inches; grayish brown silt loam

Subsurface layer:
5 to 9 inches; yellowish brown silty clay that has brown mottles

Subsoil:
9 to 15 inches; yellowish brown silty clay that has brownish yellow and light yellowish brown mottles
15 to 23 inches; variegated light brownish gray and light olive brown clay
23 to 30 inches; variegated light brownish gray and light olive brown channery clay

Bedrock:
30 inches; shale

Rock outcrop

The Rock outcrop occurs as exposed areas of limestone bedrock. The limestone is dark gray on the fresh surfaces and buff on the weathered surfaces. The Rock outcrop is on footslopes and on benches around the slopes. It occurs as irregularly sized rock shelves or ledges or as boulder-sized rocks.

Soil Properties and Qualities

Caneyville

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Moderate

Lenberg

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Moderate

Use and Management

Cropland

- This map unit is unsuited to cultivated crops because of the slope, the high content of clay, and the rock outcrop.

Pasture and Forage

- This map unit is poorly suited to pasture because of the difficulty in mowing and renovating areas.
- The unit is suited to permanent vegetation.
- If grasses and legumes can be seeded and maintained, the unit is suited to most of the commonly grown grasses and legumes.
- Crops respond to applications of lime and fertilizer.

Woodland

- This map unit is suited to woodland.
- The species preferred for planting in areas of the Caneyville soil include white oak and yellow-poplar on cool slopes and Virginia pine and eastern redcedar on warm slopes.
- The species preferred for planting in areas of the Lenberg soil are Virginia pine and white oak on warm slopes and white oak, shortleaf pine, and loblolly pine on cool slopes.
- The rock outcrop and steep slopes limit the use of harvesting equipment.

Urban Uses

- This map unit is poorly suited to most urban uses because of the depth to bedrock, the slope, the clayey texture of the subsoil, and the rock outcrop.
- The steep slope is a severe limitation affecting most urban uses.
- The shrink-swell potential and low strength are limitations on sites for local roads and streets.
- Proper design, installation, and site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: Caneyville—6e; Lenberg—6e; Rock outcrop—8s

CkD—Caneyville-Rock outcrop complex, 6 to 20 percent slopes

Setting

Landform: Uplands
Landscape position: Karst valleys and hillsides
Shape of areas: Irregular
Size of areas: 4 to 899 acres; average size of 41 acres
Major uses: Pasture and woodland

Composition

Caneyville soil and similar components: 65 percent
Rock outcrop: 10 percent
Contrasting components: 25 percent

Minor Components

Similar components:
- Fredonia, Donahue, and Wallen soils in landscape positions similar to those of the Caneyville soil
- Soils that have more clay and coarse fragments in the surface layer than the Caneyville soil

Contrasting components:
- Bledsoe and Hagerstown soils in landscape positions similar to those of the Caneyville soil
- Soils that are severely eroded in spots

Typical Profile

Caneyville

Surface layer:
0 to 5 inches; brown silt loam

Subsoil:
5 to 21 inches; yellowish red silty clay
21 to 28 inches; strong brown clay that has reddish brown and grayish brown mottles

Bedrock:
28 inches; hard limestone

Soil Properties and Qualities

Caneyville

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Moderate

Rock outcrop

The Rock outcrop occurs as exposed areas of limestone bedrock. It is in scattered areas throughout the map unit. The outcrops are irregular in size and range from 1 to 10 feet in diameter.

Use and Management

Cropland

- This map unit is poorly suited to cropland.
- The hazard of erosion is very severe.

Pasture and Forage

- Most areas are poorly suited to pasture because of the difficulty in mowing and renovating areas.
- This map unit is suited to permanent vegetation.
- If grasses and legumes can be seeded and maintained, the unit is suited to most of the commonly grown grasses and legumes.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are white oak, white ash, and eastern white pine.
- See table 7 for specific information related to potential productivity.

Urban Uses

- This map unit is poorly suited to most urban uses because of the depth to bedrock, the slope, the clayey texture of the subsoil, and the rock outcrop.
- The moderately steep slope is a severe limitation affecting most urban uses.
- The shrink-swell potential and low strength are limitations on sites for local roads and streets.
- Proper design, installation, and site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: Caneyville—6e, Rock outcrop—8s

CkE—Caneyville-Rock outcrop complex, 20 to 35 percent slopes

Setting

Landform: Uplands
Landscape position: Karst valleys and hillsides
Shape of areas: Irregular
Size of areas: 5 to 938 acres; average size of 38 acres
Major uses: Woodland

Composition

Caneyville soil and similar components: 65 percent
Rock outcrop: 20 percent
Contrasting components: 15 percent

Minor Components

Similar components:
- Fredonia, Donahue, and Wallen soils in landscape positions similar to those of the Caneyville soil
- Soils that have more clay and coarse fragments in the surface layer than the Caneyville soil

Contrasting components:
- Bledsoe and Hagerstown soils in landscape positions similar to those of the Caneyville soil
- Soils that are severely eroded in spots

Typical Profile

Caneyville

Surface layer:
0 to 5 inches; brown silt loam

Subsoil:
5 to 21 inches; yellowish red silty clay
21 to 28 inches; strong brown clay that has reddish brown and grayish brown mottles

Bedrock:
28 inches; limestone

Rock outcrop

The Rock outcrop occurs as exposed areas of limestone bedrock. It is in bands around slopes or, in some places, occurs as ledges and cliffs. The areas of Rock outcrop generally range from 2 to 100 square feet in size, but some areas are irregularly shaped and range from 1 to 10 feet in diameter.

Soil Properties and Qualities

Caneyville

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Moderate

Use and Management

Cropland

- This map unit is poorly suited to cropland.
- The hazard of erosion is very severe.

Pasture and Forage

- This map unit is not suited to hay and is limited as a site for pasture.
- Pasture is difficult to manage because of the steepness of slope and the rock outcrop.

Woodland

- The Caneyville soil is suited to yellow-poplar, loblolly pine, and white oak on north-facing slopes and

eastern redcedar, Virginia pine, and loblolly pine on south-facing slopes.
• See table 7 for specific information related to potential productivity.

Urban Uses

• The Caneyville soil is poorly suited to urban uses.
• The moderate depth to bedrock and the steepness of slope are limitations that are difficult to overcome.

Interpretive Groups

Land capability classification: Caneyville—6e, Rock outcrop—8s

CmD—Carpenter-Lenberg complex, 12 to 20 percent slopes

Setting

Landform: Uplands
Landscape position: Footslopes
Shape of areas: Irregular
Size of areas: 3 to 138 acres; average size of 32 acres
Major uses: Woodland

Composition

Carpenter soil and similar components: 58 percent
Lenberg soil and similar components: 33 percent
Contrasting components: 9 percent

Minor Components

Similar components:
• Soils that have a surface layer of silty clay loam
• Soils that are similar to the Carpenter soil but have a sandy loam subsoil and 5 to 15 percent coarse fragments in the surface layer
Contrasting components:
• Soils that are deeper to bedrock than the Lenberg soil
• Gilpin soils in landscape positions similar to those of the Carpenter and Lenberg soils

Typical Profile

Carpenter

Surface layer:
0 to 7 inches; brown silt loam

Subsurface layer:
7 to 16 inches; dark yellowish brown silty clay loam

Subsoil:
16 to 23 inches; strong brown silty clay loam

Substratum:
23 to 40 inches; strong brown very gravelly silty clay loam that has light brownish gray mottles
40 to 42 inches; strong brown silty clay that has olive yellow and light olive brown mottles
42 to 57 inches; olive clay

Bedrock:
57 inches; shale

Lenberg

Surface layer:
0 to 5 inches; grayish brown silt loam

Subsurface layer:
5 to 9 inches; yellowish brown silty clay that has brown mottles

Subsoil:
9 to 15 inches; yellowish brown silty clay that has brownish yellow and light yellowish brown mottles
15 to 23 inches; variegated light brownish gray and light olive brown clay
23 to 30 inches; variegated light brownish gray and light olive brown channery clay

Bedrock:
30 inches; shale

Soil Properties and Qualities

Carpenter

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Lenberg

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Moderate

Use and Management

Cropland

- These soils are poorly suited to cultivated crops.
- Conservation tillage and contour farming help to control runoff and erosion.
- Tilth and the organic matter content can be improved and maintained by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.

Pasture and Forage

- These soils are suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- These soils are suited to woodland.
- The species preferred for planting are white oak, Virginia pine, and loblolly pine.
- The use of planting and harvesting equipment is limited by the short, steep slopes.
- See table 7 for specific information related to potential productivity.

Urban Uses

- These soils are poorly suited to most urban uses.
- The slope, the moderate permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting sanitary facilities and building site development.

Interpretive Groups

Land capability classification: Carpenter—4e, Lenberg—4e

CmE—Carpenter-Lenberg complex, 20 to 30 percent slopes

Setting

Landform: Uplands
Landscape position: Hillsides and footslopes
Shape of areas: Irregular
Size of areas: 5 to 206 acres; average size of 58 acres
Major uses: Woodland and recreation

Composition

Carpenter soil and similar components: 58 percent
Lenberg soil and similar components: 33 percent
Contrasting components: 9 percent

Minor Components

Similar components:
- Soils that have a surface layer of silty clay loam
- Soils that are similar to the Carpenter soil but have a sandy loam subsoil and 5 to 15 percent coarse fragments in the surface layer

Contrasting components:
- Soils that are deeper to bedrock than the Lenberg soil
- Gilpin soils in landscape positions similar to those of the Carpenter and Lenberg soils

Typical Profile

Carpenter

Surface layer:
0 to 7 inches; brown silt loam

Subsurface layer:
7 to 16 inches; dark yellowish brown silty clay loam

Subsoil:
16 to 23 inches; strong brown silty clay loam

Substratum:
23 to 40 inches; strong brown very gravelly silty clay loam that has light brownish gray mottles
40 to 42 inches; strong brown silty clay that has olive yellow and light olive brown mottles
42 to 57 inches; olive clay

Bedrock:
57 inches; shale

Lenberg

Surface layer:
0 to 5 inches; grayish brown silt loam

Subsurface layer:
5 to 9 inches; yellowish brown silty clay that has brown mottles

Subsoil:
9 to 15 inches; yellowish brown silty clay that has brownish yellow and light yellowish brown mottles
15 to 23 inches; variegated light brownish gray and light olive brown clay

23 to 30 inches; variegated light brownish gray and light olive brown channery clay

Bedrock:
30 inches; shale

Soil Properties and Qualities

Carpenter

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Lenberg

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Moderate

Use and Management

Cropland

- These soils are poorly suited to cultivated crops.

Pasture and Forage

- These soils are suited to pasture and forage production.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

- These soils are well suited to woodland.
- The species preferred for planting are white oak, Virginia pine, and loblolly pine.
- The use of planting and harvesting equipment is limited by the short, steep slopes.
- See table 7 for specific information related to potential productivity.

Urban Uses

- This soil is poorly suited to most urban uses.
- The slope, the moderate permeability, the clayey texture, and the moderate shrink-swell potential are limitations affecting sanitary facilities and building site development.

Interpretive Groups

Land capability classification: Carpenter—6e, Lenberg—6e

Cn—Chagrin loam, frequently flooded

Setting

Landform: Flood plains
Landscape position: Along streams and bends in the river
Shape of areas: Irregular
Size of areas: 3 to 88 acres; average size of 13 acres
Major uses: Cropland

Composition

Chagrin soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that are similar to the Chagrin soil but have gravelly and channery layers

Contrasting components:
- Newark and Clifty soils in landscape positions similar to those of the Chagrin soil

Typical Profile

Surface layer:
0 to 7 inches; dark yellowish brown loam

Subsurface layer:
7 to 15 inches; dark brown loam

Subsoil:
15 to 22 inches; dark yellowish brown loam
22 to 28 inches; brown silt loam
28 to 48 inches; dark yellowish brown loam

Substratum:
48 to 65 inches; dark yellowish brown silt loam that has yellowish brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slow or very slow
Available water capacity: High
Seasonal high water table: At a depth of 4 to 6 feet
Organic matter content: Low
Erosion hazard: Slight
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is well suited to cultivated crops.
- The soil is suited to most of the commonly grown crops.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- The soil can be cultivated throughout a wide range in moisture content.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are black walnut, yellow-poplar, eastern white pine, and white ash.
- Machine planting is practical.
- See table 7 for specific information related to potential productivity.

Urban Uses

- This soil is poorly suited to building site development and sanitary facilities because of the flooding.

Interpretive Groups

Land capability classification: 2w

CoB—Clarkrange silt loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Smooth and slightly convex ridges
Shape of areas: Irregular
Size of areas: 5 to 610 acres; average size of 18 acres
Major uses: Cropland

Composition

Clarkrange soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Soils that are similar to the Clarkrange soil but have a higher percentage of bases in the profile

Contrasting components:
- Small spots of Gilpin, Lily, Riney, Rosine, and Wellston soils in landscape positions similar to those of the Clarkrange soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 11 inches; yellowish brown silt loam

Subsoil:
11 to 21 inches; yellowish brown silt loam
21 to 25 inches; yellowish brown silty clay loam
25 to 32 inches; yellowish brown and light yellowish brown silt loam that has strong brown mottles
32 to 48 inches; a fragipan of yellowish brown silty clay loam that has brown and gray mottles

Substratum:
48 to 57 inches; light brownish gray clay loam that has brown and red mottles
57 to 68 inches; mottled light brownish gray, dark yellowish brown, strong brown, and yellowish red clay

Bedrock:
68 to 72 inches; soft shale

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan

Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 2.5 feet
Organic matter content: Low or moderately low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is well suited to most of the commonly grown crops; however, the fragipan restricts the movement of water and air and the penetration of roots.
- Crops respond favorably to applications of lime and fertilizer.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
- The soil can be cultivated throughout a wide range in moisture content.

Pasture and Forage

- This soil is well suited to pasture and hay.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are eastern white pine, shortleaf pine, and loblolly pine.
- See table 7 for specific information related to potential productivity.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable understory plants.

Urban Uses

- This soil is suited to some urban uses, but the wetness, low strength, and the slow permeability are severe limitations.
- The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 2e

CoC—Clarkrange silt loam, 6 to 12 percent slopes

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to 180 acres; average size of 18 acres
Major uses: Cropland

Composition

Clarkrange soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Soils that have a slightly higher level of bases in the lower part than that of the Clarkrange soil

Contrasting components:
- Gilpin, Lily, Latham, Rosine, and Wellston soils in landscape positions similar to those of the Clarkrange soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 11 inches; yellowish brown silt loam

Subsoil:
11 to 21 inches; yellowish brown silt loam
21 to 25 inches; yellowish brown silty clay loam
25 to 32 inches; yellowish brown and light yellowish brown silt loam that has strong brown mottles
32 to 48 inches; a fragipan of yellowish brown silty clay loam that has brown and gray mottles

Substratum:
48 to 57 inches; light brownish gray clay loam that has brown and red mottles
57 to 68 inches; mottled light brownish gray, dark yellowish brown, strong brown, and yellowish red clay

Bedrock:
68 to 72 inches; soft shale

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Moderately well drained

Permeability: Moderate above the fragipan and slow in the fragipan
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 2.5 feet
Organic matter content: Low or moderately low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is moderately suited to cultivated crops; however, the fragipan restricts the movement of water and air and the penetration of roots.
- Erosion is a severe hazard if cultivated crops are grown.
- Crops respond favorably to applications of lime and fertilizer.
- The soil can be cultivated throughout a wide range in moisture content.

Pasture and Forage

- This soil is well suited to pasture and hay.
- Good yields can be expected if the soil is properly managed.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Maintaining the desired species, controlling weeds, maintaining proper stocking rates, applying a rotation grazing system, and applying lime and fertilizer are suitable management practices.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are shortleaf pine, eastern white pine, and loblolly pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to some urban uses, but the wetness, the slope, low strength, and the slow permeability are severe limitations.
- The slow permeability in the compact fragipan is a limitation on sites for septic tank absorption fields.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 3e

Cp—Clifty gravelly silt loam, frequently flooded

Setting

Landform: Flood plains
Landscape position: Along creeks and smaller streams in the upper reaches of the headwaters
Shape of areas: Irregular
Size of areas: 5 to 73 acres; average size of 12 acres
Major uses: Cropland

Composition

Clifty soil and similar components: 90 to 95 percent
Contrasting components: 5 to 10 percent

Minor Components

Similar components:
- Soils that are moderately well drained or somewhat poorly drained
- Soils that have more gravel in the subsoil than the Clifty soil

Contrasting components:
- Grigsby and Nolin soils in landscape positions similar to those of the Clifty soil

Typical Profile

Surface layer:
0 to 9 inches; brown gravelly silt loam

Subsoil:
9 to 18 inches; yellowish brown gravelly silt loam
8 to 38 inches; yellowish brown gravelly silt loam

Substratum:
38 to 67 inches; yellowish brown gravelly loam

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Slow or very slow
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Slight
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops that are planted later in spring.
- Crops respond favorably to applications of lime and fertilizer.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Coarse fragments in the plow layer interfere with tillage in some areas.
- The soil is subject to short periods of flooding; however, the flooding generally occurs in winter or early in spring when row crops are not growing.

Pasture and Forage

- This soil is suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Maintaining the desired species, controlling weeds, maintaining proper stocking rates, applying a rotation grazing system, and applying lime and fertilizer are suitable management practices.
- Grasses and legumes that can withstand the short periods of inundation by floodwater should be selected for planting.
- Restricted grazing during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white oak, white ash, and eastern white pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to many urban uses because of the flooding.
- Because of the moderately rapid permeability, seepage and contamination of wells, watercourses, and other water sources are limitations on sites for sanitary facilities.
- The coarse fragments interfere with some uses if there is foot traffic.

Interpretive Groups

Land capability classification: 2s

CrB—Crider silt loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Smooth ridges
Shape of areas: Irregular
Size of areas: 3 to 135 acres; average size of 10 acres
Major uses: Cropland

Composition

Crider soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Pembroke and Otwell soils in landscape positions similar to those of the Crider soil

Contrasting components:
- Fredonia, Hagerstown, and Baxter soils in landscape positions similar to those of the Crider soil

Typical Profile

Surface layer:
0 to 7 inches; dark yellowish brown silt loam

Subsoil:
7 to 12 inches; yellowish brown silt loam
12 to 18 inches; yellowish brown silt loam
18 to 31 inches; strong brown silt loam
31 to 39 inches; yellowish brown silt loam that has strong brown mottles
39 to 66 inches; red silty clay loam that has brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slow
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is well suited to cultivated crops.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
- Crops respond favorably to applications of lime and fertilizer.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white ash, black walnut, yellow-poplar, and shortleaf pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is well suited to urban uses.
- Low strength is a limitation on sites for local roads and streets.
- Proper design and installation and adequate site preparation can help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 2e

CrC2—Crider silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to 99 acres; average size of 13 acres
Major uses: Cropland

Composition

Crider soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Pembroke and Otwell soils in landscape positions similar to those of the Crider soil

Contrasting components:
- Fredonia, Hagerstown, and Baxter soils in landscape positions similar to those of the Crider soil

Typical Profile

Surface layer:
0 to 7 inches; dark yellowish brown silt loam

Subsoil:
7 to 12 inches; yellowish brown silt loam
12 to 18 inches; yellowish brown silt loam
18 to 31 inches; strong brown silt loam
31 to 39 inches; yellowish brown silt loam that has strong brown mottles
39 to 66 inches; red silty clay loam that has brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the

cropping sequence help to control runoff and erosion and maintain productivity.
- Crops respond favorably to applications of lime and fertilizer.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white ash, black walnut, yellow-poplar, and shortleaf pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to some urban uses.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.
- Proper design and installation and adequate site preparation can help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 3e

DAM—Large dam

Setting

This map unit consists of areas of medium- to large-sized earthen fills that have been constructed across natural drainageways. It is along small tributaries, creeks, and major streams. It occurs in small watersheds in the southern and eastern parts of Butler County and the western part of Edmonson County and along the Nolin River. Mapped areas are irregular in shape. They range from 3 to 10 acres in size, with an average size of 6 acres. The unit is used for prevention and control of floods and for wildlife habitat.

Composition

This unit consists of earthen or rock material, or both, excavated from the dam site and compacted. Many dams in the unit have been compacted to 95 percent of maximum density. The average height of small watershed dams ranges from 30 to 40 feet. Nolin Dam, which is a larger dam constructed by the U.S. Army Corps of Engineers, has a maximum height of 166 feet and is 908 feet long. The slopes on most dams are steep and are permanently vegetated. Most dams have a good percentage of clay separates within the fill material.

Use and Management

Dams have been constructed by private landowners throughout the survey area. The impoundments provide water for flood prevention and control, municipal uses, fire protection, fishing, and recreation. Some dams were constructed through the efforts of the U.S. Army Corps of Engineers, Natural Resources Conservation Service, and private landowners.

Interpretive Groups

Land capability classification: 7s

Dt—Dumps, mine; tailings; and tipples

Setting

Landform: Uplands
Landscape position: Ridges and broad flats
Shape of areas: Irregular
Size of areas: 18 to 29 acres; average size of 13 acres

Composition

This map unit consists of areas of waste material, coal-grading equipment, and abandoned mines. The waste material consists of coal, shale, and other materials that have been dug up with coal and have been separated from the coal as impurities at the tipple. It is several feet thick and has been graded so that slopes range from 0 to 6 percent.

The waste material ranges from extremely acid to alkaline and contains substances that are toxic to plants. In most places there is no vegetation. Most of

the waste material contains substances that are corrosive to metal.

Use and Management

This map unit is used as a site for temporary buildings, roads, and parking lots. Some areas have been abandoned. Rusting tipples and other equipment remain in these areas.

Urban Uses

The map unit is severely limited as a site for urban development because of the rock fragments, toxicity, and corrosiveness. Runoff of water is rapid on the unit. As a result, some soils in adjacent, lower lying areas are subject to contamination by toxic water and to sedimentation.

Interpretive Groups

Land capability classification: 8s

Du—Dunning silty clay loam, occasionally flooded

Setting

Landform: Flood plains and ponded areas
Landscape position: Flat and level areas
Slope: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 3 to 18 acres; average size of 6 acres
Major uses: Cropland

Composition

Dunning soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
• Karnak soils in landscape positions similar to those of the Dunning soil
Contrasting components:
• Johnsburg, Mullins, Lawrence, Newark, and Melvin soils in landscape positions similar to those of the Dunning soil

Typical Profile

Surface layer:
0 to 4 inches; very dark gray silty clay loam

Subsurface layer:
4 to 9 inches; black silty clay loam

Subsoil:
9 to 19 inches; very dark gray silty clay that has yellowish brown mottles
19 to 27 inches; very dark gray silty clay that has yellowish brown mottles
27 to 33 inches; dark gray silty clay that has yellowish brown iron mottles
33 to 45 inches; dark gray silty clay that has yellowish brown mottles

Substratum:
45 to 71 inches; gray silty clay that has yellowish brown and brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Very poorly drained
Permeability: Moderately slow
Runoff: Slow
Available water capacity: High
Seasonal high water table: At the surface or within a depth of 0.5 foot
Organic matter content: Moderate or high
Erosion hazard: Slight
Tilth: Fair
Shrink-swell potential: Moderate

Use and Management

Cropland

• Where previously cultivated, the soil is suited to crops if a drainage system has been installed and the soil is protected from flooding.
• The soil crusts and becomes cloddy if cultivated when the moisture content is too high.
• The root zone is very deep and can be easily penetrated by plant roots.
• Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.
• Planting and harvesting operations may be delayed in most years because of the wetness and the flooding.

Pasture and Forage

• This soil is suited to pasture.
• Pasture and hay plants that are tolerant of the seasonal wetness and the flooding should be selected for planting.
• A drainage system, rotation grazing, weed control, and applications of fertilizer and lime are suitable management practices.
• Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are sweetgum, pin oak, and American sycamore.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to urban uses because of the wetness and the flooding.
- The limitations are difficult to overcome.

Interpretive Groups

Land capability classification: 4w

EkB—Elk silt loam, 2 to 6 percent slopes, rarely flooded

Setting

Landform: Stream terraces
Landscape position: Narrow ridges that are slightly above the first bottom
Shape of areas: Irregular
Size of areas: 3 to 16 acres; average size of 4 acres
Major uses: Cropland

Composition

Elk soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Nolin and Newark soils at the slightly lower elevations

Contrasting components:
- Clarkrange and Sciotoville soils on broad ridges

Typical Profile

Surface layer:
0 to 10 inches; brown silt loam

Subsoil:
10 to 14 inches; yellowish brown silt loam
14 to 18 inches; yellowish brown silt loam that has brown mottles
18 to 28 inches; dark yellowish brown silty clay loam that has brown mottles
28 to 38 inches; dark yellowish brown silty clay loam

Substratum:
38 to 52 inches; brown silt loam that has mottles in shades of brown
52 to 64 inches; dark yellowish brown loam that has mottles in shades of brown

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is well suited to cultivated crops.
- Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.
- The soil can be cultivated throughout a wide range in moisture content
- Contour farming, stripcropping, and conservation tillage help to control runoff and erosion.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are black walnut,

yellow-poplar, and shortleaf pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to most urban uses because of the flooding and low strength.
- Proper design, installation, and site preparation on sites for local roads and streets may help to reduce or overcome some limitations.

Interpretive Groups

Land capability classification: 2e

EkC—Elk silt loam, 6 to 12 percent slopes, rarely flooded

Setting

Landform: Stream terraces
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to 13 acres; average size of 5 acres
Major uses: Cropland

Composition

Elk soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Allegheny and Crider soils in landscape positions similar to those of the Elk soil

Contrasting components:
- Clarkrange and Sciotoville soils on side slopes

Typical Profile

Surface layer:
0 to 10 inches; brown silt loam

Subsoil:
10 to 14 inches; yellowish brown silt loam
14 to 18 inches; yellowish brown silt loam that has brown mottles
18 to 28 inches; dark yellowish brown silty clay loam that has brown mottles
28 to 38 inches; dark yellowish brown silty clay loam

Substratum:
38 to 52 inches; brown silt loam that is mottled in shades of brown
52 to 64 inches; dark yellowish brown loam that is mottled in shades of brown

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is well suited to cultivated crops.
- Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.
- The soil can be cultivated throughout a wide range in moisture content.
- Contour farming, stripcropping, and conservation tillage help to control runoff and erosion.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are black walnut, yellow-poplar, and shortleaf pine.
- See table 7 for specific information related to potential productivity.

- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to most urban uses because of the flooding and low strength.
- Proper design, installation, and site preparation on sites for local roads and streets help to overcome some limitations.

Interpretive Groups

Land capability classification: 3e

EpB—Epley silt loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Ridges
Shape of areas: Irregular
Size of areas: 3 to 142 acres; average size of 8 acres
Major uses: Cropland

Composition

Epley soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Lenberg and Rosine soils in landscape positions similar to those of the Epley soil

Contrasting components:
- Lawrence, Zanesville, and Otwell soils in landscape positions similar to those of the Epley soil

Typical Profile

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 16 inches; brown silt loam
16 to 21 inches; strong brown silt loam
21 to 28 inches; yellowish brown silt loam that has light brownish gray mottles
28 to 32 inches; dark yellowish brown silty clay that has light brownish gray, pale brown, and light gray mottles

Substratum:
32 to 45 inches; yellowish brown clay that has brownish gray mottles
45 to 65 inches; light olive brown clay that has light brownish gray mottles

Soil Properties and Qualities

Depth: Deep and very deep (more than 40 inches)
Drainage class: Moderately well drained
Permeability: Slow or very slow
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 2.5 feet
Organic matter content: Low or moderate
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low or medium

Use and Management

Cropland

- This soil is suited to cultivated crops.
- No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
- Crops respond favorably to applications of lime and fertilizer.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white oak, shortleaf pine, and eastern white pine.

- See table 7 for specific information related to potential productivity.
- Machine planting is practical.

Urban Uses

- This soil is suited to some urban uses; however, it is limited by the wetness and low strength.
- The slow permeability in the subsoil is a severe limitation on sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: 2e

EpC—Epley silt loam, 6 to 12 percent slopes

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to 33 acres; average size of 7 acres
Major uses: Cropland

Composition

Epley soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Lenberg and Rosine soils in landscape positions similar to those of the Epley soil

Contrasting components:
- Zanesville soils on uplands
- Otwell soils on high stream terraces

Typical Profile

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 16 inches; brown silt loam
16 to 21 inches; strong brown silt loam
21 to 28 inches; yellowish brown silt loam that has light brownish gray mottles
28 to 32 inches; dark yellowish brown silty clay that has light brownish gray, pale brown, and light gray mottles

Substratum:
32 to 45 inches; yellowish brown clay that has brownish gray mottles
45 to 65 inches; light olive brown clay that has light brownish gray mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Moderately well drained
Permeability: Slow or very slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 2.5 feet
Organic matter content: Low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low or medium

Use and Management

Cropland

- This soil is suited to cultivated crops; however, erosion is a very severe hazard if cultivated crops are grown.
- No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

- This soil is suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white ash, shortleaf pine, and eastern white pine.

• See table 7 for specific information related to potential productivity.
• Machine planting is practical.

Urban Uses

• This soil is suited to some urban uses.
• The slope, the wetness, and low strength are limitations affecting urban development.
• The slow permeability in the subsoil is a severe limitation on sites for septic tank absorption fields.

Interpretive Groups

Land capability classification: 3e

FaB—Fredonia-Hagerstown complex, 2 to 6 percent slopes, rocky

Setting

Landform: Upland karst valleys
Landscape position: Gently sloping ridges
Shape of areas: Irregular
Size of areas: 5 to 67 acres; average size of 8 acres
Major uses: Cropland

Composition

Fredonia soil and similar components: 45 percent
Hagerstown soil and similar components: 34 percent
Contrasting components: 21 percent (includes 1 percent rock outcrop)

Minor Components

Similar components:
• Caneyville and Baxter soils in landscape positions similar to those of the Fredonia and Hagerstown soils
Contrasting components:
• Pembroke and Crider soils in landscape positions similar to those of the Fredonia and Hagerstown soils

Typical Profile

Fredonia

Surface layer:
0 to 5 inches; brown silt loam

Subsoil:
5 to 11 inches; yellowish brown silty clay loam
11 to 19 inches; reddish brown silty clay
19 to 26 inches; dark yellowish brown clay

Bedrock:
26 inches; hard limestone

Hagerstown

Surface layer:
0 to 6 inches; dark brown silt loam

Subsurface layer:
6 to 9 inches; dark reddish brown silt loam

Subsoil:
9 to 16 inches; reddish brown silty clay
16 to 26 inches; dark red silty clay
26 to 30 inches; dark reddish brown silty clay
30 to 50 inches; dark yellowish brown silty clay

Substratum:
50 to 55 inches; dark reddish brown clay

Bedrock:
55 inches; hard limestone

Soil Properties and Qualities

Fredonia

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow or moderately slow
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Fair
Shrink-swell potential: Low

Hagerstown

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

• These soils are suited to cultivated crops.
• Erosion is a severe hazard if cultivated crops are grown.
• Contour farming, stripcropping, and conservation tillage help to control runoff and erosion.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
• Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.

Pasture and Forage

- These soils are well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- These soils are well suited to woodland.
- Most trees that grow in the survey area will grow on these soils.
- The species preferred for planting are white ash, white oak, and eastern white pine in areas of the Fredonia soil and yellow-poplar, black walnut, and eastern white pine in areas of the Hagerstown soil.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This map unit is limited as a site for most urban uses because of the depth to bedrock and the slow or moderately slow permeability in areas of the Fredonia soil.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soils are used as a source of roadfill.
- Proper design and installation and adequate site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: Fredonia—3s, Hagerstown—3s

FaC2—Fredonia-Hagerstown complex, 6 to 20 percent slopes, rocky, eroded

Setting

Landform: Upland karst valleys
Landscape position: Karst side slopes and sides of depressions
Shape of areas: Irregular
Size of areas: 3 to 67 acres; average size of 8 acres
Major uses: Cropland and pasture

Composition

Fredonia soil and similar components: 45 percent
Hagerstown soil and similar components: 34 percent
Contrasting components: 21 percent (includes 1 percent rock outcrop)

Minor Components

Similar components:
- Baxter and Caneyville soils in landscape positions similar to those of the Fredonia and Hagerstown soils

Contrasting components:
- Crider and Pembroke soils in landscape positions similar to those of the Fredonia and Hagerstown soils
- Small areas of soils that are less than 20 inches deep over limestone bedrock
- Scattered areas where 1 percent of the surface is limestone rock outcrop

Typical Profile

Fredonia

Surface layer:
0 to 5 inches; brown silt loam

Subsoil:
5 to 11 inches; yellowish brown silty clay loam
11 to 19 inches; reddish brown silty clay
19 to 26 inches; dark yellowish brown clay

Bedrock:
26 inches; hard limestone

Hagerstown

Surface layer:
0 to 6 inches; dark brown silt loam

Subsurface layer:
6 to 9 inches; dark reddish brown silt loam

Subsoil:
9 to 16 inches; reddish brown silty clay
16 to 26 inches; dark red silty clay
26 to 30 inches; dark reddish brown silty clay
30 to 50 inches; dark yellowish brown silty clay

Substratum:
50 to 55 inches; dark reddish brown clay

Bedrock:
55 inches; hard limestone

Soil Properties and Qualities

Fredonia

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow or moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Fair
Shrink-swell potential: Low

Hagerstown

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are suited to cultivated crops.
- Contour farming, stripcropping, and conservation tillage help to control runoff and erosion.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.

Pasture and Forage

- These soils are well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Crops respond favorably to applications of lime and fertilizer.

Woodland

- These soils are well suited to woodland.
- Most trees that grow in the survey area will grow on these soils.
- The species preferred for planting are white ash, white oak, and eastern white pine in areas of the Fredonia soil and yellow-poplar, black walnut, and eastern white pine in areas of the Hagerstown soil.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This map unit is limited as a site for most urban development because of the depth to bedrock and the slope in areas of both soils and the slow or moderately slow permeability in areas of the Fredonia soil.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soils are used as a source of roadfill.
- Proper design and installation and adequate site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: Fredonia—4e, Hagerstown—4e

FaC3—Fredonia-Hagerstown complex, 6 to 20 percent slopes, rocky, severely eroded

Setting

Landform: Upland karst valleys
Landscape position: Side slopes and rims of depressions
Shape of areas: Irregular
Size of areas: 3 to 9 acres; average size of 25 acres
Major uses: Cropland and pasture

Composition

Fredonia soil and similar components: 45 percent
Hagerstown soil and similar components: 34 percent
Contrasting components: 21 percent (includes 1 percent rock outcrop)

Minor Components

Similar components:
• Caneyville and Baxter soils in landscape positions similar to those of the Fredonia and Hagerstown soils
Contrasting components:
• Pembroke and Crider soils in landscape positions similar to those of the Fredonia and Hagerstown soils
• Small areas of soils that are less than 20 inches deep over limestone bedrock
• Scattered areas where 1 percent of the surface is limestone rock outcrop

Typical Profile

Fredonia

Surface layer:
0 to 2 inches; brown silt loam

Subsoil:
2 to 11 inches; yellowish brown silty clay loam
11 to 19 inches; reddish brown silty clay
19 to 26 inches; dark yellowish brown clay

Bedrock:
26 inches; hard limestone

Hagerstown

Surface layer:
0 to 2 inches; dark brown silt loam
2 to 9 inches; dark reddish brown silty clay loam

Subsoil:
9 to 16 inches; reddish brown silty clay
16 to 26 inches; dark red silty clay
26 to 30 inches; dark reddish brown silty clay
30 to 50 inches; dark yellowish brown silty clay

Substratum:
50 to 55 inches; dark reddish brown clay

Bedrock:
55 inches; hard limestone

Soil Properties and Qualities

Fredonia

Depth: 20 to 40 inches (moderately deep)
Drainage class: Well drained
Permeability: Moderately slow or slow
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Low
Tilth: Poor
Shrink-swell potential: Low

Hagerstown

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

• These soils are poorly suited to row crops because of the effects of past erosion, the slope, and the outcrops of limestone.
• The hazard of erosion is very severe if conventional tillage methods are used.
• Contour farming, stripcropping, and conservation tillage help to control erosion and runoff.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• These soils are suited to hay and pasture.
• Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
• Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
• Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
• Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

• These soils are well suited to woodland.
• The species preferred for planting are white ash, white oak, and eastern white pine in areas of the Fredonia soil and yellow-poplar, black walnut, and eastern white pine in areas of the Hagerstown soil.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- These soils are limited as a site for most urban uses because of the depth to bedrock and the slope in areas of both soils and the slow or moderately slow permeability in areas of the Fredonia soil.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soils are used as a source of roadfill.
- Proper design and installation and adequate site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: Fredonia—6e, Hagerstown—6e

FdC2—Frondorf silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to 110 acres; average size of 9 acres
Major uses: Cropland and pasture

Composition

Frondorf soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Wellston soils on ridges and in landscape positions similar to those of the Frondorf soil

Contrasting components:
- Sadler and Zanesville soils on broad ridges and in landscape positions similar to those of the Frondorf soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 12 inches; dark yellowish brown silt loam

Subsoil:
12 to 17 inches; dark brown silt loam
17 to 25 inches; dark yellowish brown channery silt loam

Substratum:
25 to 37 inches; yellowish brown gravelly silt loam

Bedrock:
37 inches; sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- Erosion is a severe hazard if cultivated crops are grown.
- No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Measures that reduce the runoff rate and help to control erosion are needed.
- Crops respond favorably to applications of lime and fertilizer.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are yellow-poplar,

white oak, and eastern white pine.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.

Urban Uses

• This soil is limited as a site for some urban uses.
• The slope and the depth to bedrock are limitations affecting urban development.
• Proper design and installation may reduce or help to overcome some of the limitations.

Interpretive Groups

Land capability classification: 3e

FdD2—Frondorf silt loam, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Upper part of hillsides
Shape of areas: Irregular
Size of areas: 3 to 107 acres; average size of 14 acres
Major uses: Pasture and woodland

Composition

Frondorf soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
• Wellston soils in landscape positions similar to those of the Frondorf soil
Contrasting components:
• Lenberg and Caneyville soils in landscape positions similar to those of the Frondorf soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 12 inches; dark yellowish brown silt loam

Subsoil:
12 to 17 inches; dark brown silt loam
17 to 25 inches; dark yellowish brown channery silt loam

Substratum:
25 to 37 inches; yellowish brown gravelly silt loam

Bedrock:
37 inches; sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is poorly suited to cropland.
• Erosion is a very severe hazard if cultivated crops are grown.
• No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

• This soil is well suited to woodland.
• The species preferred for planting are yellow-poplar, white oak, and eastern white pine.
• See table 7 for specific information related to potential productivity.
• The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

• This soil is poorly suited to urban uses.
• The slope and the depth to bedrock are limitations.

- The limitations are difficult to overcome.

Interpretive Groups

Land capability classification: 4e

FoD3—Frondorf silty clay loam, 12 to 20 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Upper part of hillsides
Shape of areas: Irregular
Size of areas: 3 to 18 acres; average size of 14 acres
Major uses: Woodland

Composition

Frondorf soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Wellston soils in landscape positions similar to those of the Frondorf soil

Contrasting components:
- Lenberg and Caneyville soils in landscape positions similar to those of the Frondorf soil

Typical Profile

Surface layer:
0 to 2 inches; brown silty clay loam

Subsurface layer:
2 to 12 inches; dark yellowish brown silty clay loam

Subsoil:
12 to 17 inches; dark yellowish brown silt loam
17 to 25 inches; dark yellowish brown channery silt loam

Substratum:
25 to 37 inches; yellowish brown gravelly silt loam

Bedrock:
37 inches; sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is unsuited to cultivated crops because of the effects of past erosion.
- The soil is best suited to permanent vegetation.

Pasture and Forage

- This soil is suited to hay and pasture.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are loblolly pine, white oak, and shortleaf pine.
- See table 7 for specific information related to potential productivity.
- The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

- This soil is poorly suited to urban uses.
- The slope and the depth to bedrock are limitations.
- The limitations are difficult to overcome.

Interpretive Groups

Land capability classification: 6e

FwF—Frondorf-Weikert complex, 20 to 50 percent slopes

Setting

Landform: Uplands
Landscape position: Steep hillsides and footslopes
Shape of areas: Irregular
Size of areas: 3 to 67 acres; average size of 7 acres
Major uses: Woodland

Composition

Frondorf soil and similar components: 40 percent
Weikert soil and similar components: 35 percent

Contrasting components: 25 percent

Minor Components

Similar components:
- Soils that are similar to the Frondorf soil but are deeper to sandstone bedrock

Contrasting components:
- Lenberg and Caneyville soils on the lower hillsides and toeslopes

Typical Profile

Frondorf

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 12 inches; dark yellowish brown silt loam

Subsoil:
12 to 17 inches; dark brown silt loam
17 to 25 inches; dark yellowish brown channery silt loam

Substratum:
25 to 37 inches; yellowish brown gravelly silt loam

Bedrock:
37 inches; sandstone

Weikert

Surface layer:
0 to 6 inches; yellowish brown very gravelly silt loam

Subsoil:
6 to 11 inches; yellowish brown very gravelly loam
11 to 17 inches; yellowish brown very channery loam

Soft bedrock:
17 to 20 inches; yellowish red, weathered sandstone

Bedrock:
20 inches; hard sandstone

Soil Properties and Qualities

Frondorf

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Weikert

Depth: Shallow (10 to 20 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are poorly suited to cropland.
- The soils are best suited to permanent vegetation.

Pasture and Forage

- These soils are suited to grasses and legumes grown for hay and pasture.
- Crops respond well to applications of lime and fertilizer.
- Erosion-control measures are needed during seedbed preparation and pasture renovation.
- Controlled grazing helps to maintain a good plant cover.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

- These soils are well suited to woodland.
- The species preferred for planting are yellow-poplar and white oak on north aspects and shortleaf pine, eastern white pine, and loblolly pine on south aspects.
- See table 7 for specific information related to potential productivity.

Urban Uses

- These soils are poorly suited to most urban uses because of the depth to bedrock and the slope.
- For most urban uses, a considerable amount of grading and leveling is needed to help overcome the slope.

Interpretive Groups

Land capability classification: Frondorf—7e, Weikert—7e

GnB2—Gilpin loam, 2 to 6 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Moderately broad ridges
Shape of areas: Irregular
Size of areas: 3 to 29 acres; average size of 8 acres
Major uses: Cropland

Composition

Gilpin soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Wellston and Clarkrange soils

Contrasting components:
- Latham and Rosine soils

Typical Profile

Surface layer:
0 to 5 inches; very dark grayish brown loam

Subsurface layer:
5 to 9 inches; yellowish brown silt loam

Subsoil:
9 to 14 inches; light yellowish brown silt loam
14 to 21 inches; yellowish brown very channery silt loam
21 to 28 inches; strong brown channery clay loam
28 to 35 inches; yellowish brown channery clay loam that has pockets of strong brown mottles

Bedrock:
35 inches; weathered, pink sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- The hazard of erosion is moderate if cultivated crops are grown.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
- Crops respond favorably to applications of lime and fertilizer.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are yellow-poplar, eastern white pine, and Virginia pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to urban uses.
- The slope and the depth to bedrock are the main limitations.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 2e

GnC2—Gilpin loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 5 to 540 acres; average size of 13 acres
Major uses: Cropland and pasture

Composition

Gilpin soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Wellston, Rosine, and Clarkrange soils
Contrasting components:
• Latham soils and moderately deep, clayey soils on the lower side slopes

Typical Profile

Surface layer:
0 to 5 inches; very dark grayish brown loam

Subsurface layer:
5 to 9 inches; yellowish brown silt loam

Subsoil:
9 to 14 inches; light yellowish brown silt loam
14 to 21 inches; yellowish brown very channery silt loam
21 to 28 inches; strong brown channery clay loam
28 to 35 inches; yellowish brown channery clay loam that has pockets of strong brown mottles

Bedrock:
35 inches; weathered, pink sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is suited to cultivated crops.
• The slope and the depth to bedrock are limitations affecting some crops.
• Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
• The soil can be cultivated throughout a wide range in moisture content.
• Crops respond favorably to applications of lime and fertilizer.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is well suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• Pasture renovation should be frequent enough to maintain the desired plants.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

• This soil is well suited to woodland.
• The species preferred for planting are yellow-poplar, eastern white pine, and Virginia pine.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is suited to urban uses.
• The steepness of slope and the depth to bedrock are the main limitations.
• Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 3e

GnC3—Gilpin loam, 6 to 12 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to 44 acres; average size of 11 acres
Major uses: Pasture and hay

Composition

Gilpin soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Wellston, Lily, and Rosine soils

Contrasting components:
- Latham soils and moderately deep, clayey soils on the lower side slopes

Typical Profile

Surface layer:
0 to 2 inches; very dark grayish brown loam

Subsurface layer:
2 to 9 inches; yellowish brown silt loam

Subsoil:
9 to 14 inches; light yellowish brown silt loam
14 to 21 inches; yellowish brown very channery silt loam
21 to 28 inches; strong brown channery clay loam

Substratum:
28 to 35 inches; yellowish brown channery clay loam that has pockets of strong brown mottles

Bedrock:
35 inches; weathered, pink sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to row crops because of the effects of past erosion.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Erosion is a very severe hazard if cultivated crops are grown.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is suited to hay and pasture.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are yellow-poplar, eastern white pine, and shortleaf pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to urban uses.
- The steepness of slope and the depth to bedrock are the main limitations.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 4e

GnD2—Gilpin loam, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Moderately steep hillsides
Shape of areas: Irregular
Size of areas: 3 to 429 acres; average size of 17 acres
Major uses: Woodland

Composition

Gilpin soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Wellston, Rosine, and Lily soils
Contrasting components:
• Latham and Shelocta soils and moderately deep, clayey soils on hillsides

Typical Profile

Surface layer:
0 to 5 inches; very dark grayish brown loam

Subsurface layer:
5 to 9 inches; yellowish brown silt loam

Subsoil:
9 to 14 inches; light yellowish brown silt loam
14 to 21 inches; yellowish brown very channery silt loam
21 to 28 inches; strong brown channery clay loam
28 to 35 inches; yellowish brown channery clay loam that has pockets of strong brown mottles

Bedrock:
35 inches; pink sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is poorly suited to cropland.
• Erosion is a very severe hazard if cultivated crops are grown.
• The soil is best suited to a permanent cover of vegetation.
• Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
• Measures that reduce the runoff rate and help to control erosion are needed.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is suited to hay and pasture.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Pasture renovation should be frequent enough to maintain the desired plants.

Woodland

• This soil is well suited to woodland.
• The species preferred for planting are yellow-poplar, eastern white pine, and shortleaf pine.
• See table 7 for specific information related to potential productivity.
• The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

• This soil is poorly suited to urban uses because of the steepness of slope and the depth to bedrock.
• The limitations are difficult to overcome.
• Proper design and installation may reduce or help to overcome the limitations affecting some uses.

Interpretive Groups

Land capability classification: 4e

GnD3—Gilpin loam, 12 to 20 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Moderately steep hillsides
Shape of areas: Irregular
Size of areas: 3 to 77 acres; average size of 14 acres
Major uses: Woodland and pasture

Composition

Gilpin soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Wellston, Lily, and Rosine soils
Contrasting components:
• Latham soils and moderately deep, clayey soils on hillsides

Typical Profile

Surface layer:
0 to 2 inches; very dark grayish brown loam

Subsurface layer:
2 to 9 inches; yellowish brown silt loam

Subsoil:
9 to 14 inches; light yellowish brown silt loam
14 to 21 inches; yellowish brown very gravelly silt loam
21 to 28 inches; strong brown channery clay loam

Substratum:
28 to 35 inches; yellowish brown channery clay loam that has pockets of strong brown mottles

Bedrock:
35 inches; pink sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is poorly suited to cropland.
• Erosion is a very severe hazard if cultivated crops are grown.
• The soil is best suited to permanent vegetation.
• Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
• Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
• Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is suited to hay and pasture.
• Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
• Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
• Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
• Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

• This soil is suited to woodland.
• The species preferred for planting are yellow-poplar, eastern white pine, and shortleaf pine.
• See table 7 for specific information related to potential productivity.
• The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

• This soil is poorly suited to urban uses because of the steepness of slope and the depth to bedrock.
• The limitations are difficult to overcome.
• Proper design and installation may reduce or help to overcome the limitations affecting some uses.

Interpretive Groups

Land capability classification: 6e

Gr—Grigsby fine sandy loam, frequently flooded

Setting

Landform: Flood plains
Landscape position: Along streams and major drainageways
Slope: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 5 to 265 acres; average size of 30 acres
Major uses: Cropland

Composition

Grigsby soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Chagrin and Nolin soils in landscape positions similar to those of the Grigsby soil
Contrasting components:
• Newark soils in landscape positions similar to those of the Grigsby soil

Typical Profile

Surface layer:
0 to 8 inches; dark yellowish brown fine sandy loam

Subsoil:
8 to 19 inches; dark yellowish brown sandy loam
19 to 25 inches; yellowish brown fine sandy loam
25 to 32 inches; dark yellowish brown loam
32 to 42 inches; brown loam that has dark yellowish brown mottles
42 to 56 inches; light yellowish brown silt loam that has brown and gray mottles

Substratum:
56 to 64 inches; light yellowish brown loam that has light brownish yellow and light gray mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Slow or very slow
Available water capacity: Moderate
Seasonal high water table: At a depth of 3.5 to 6.0 feet
Organic matter content: Low to moderate
Erosion hazard: Slight
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is suited to cropland.
• The soil is subject to flooding in late winter and early spring; however, the duration of the flooding is short, and cultivated crops generally are not damaged if they are planted later in spring.
• Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.
• The soil can be cultivated throughout a wide range in moisture content.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is well suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• Pasture renovation should be frequent enough to maintain the desired plants.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
• Grasses and legumes that can withstand short periods of inundation by floodwater should be selected for planting.
• Restricted grazing during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

• This soil is well suited to woodland.
• The species preferred for planting are black walnut, yellow-poplar, and white oak.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to urban uses because of the flooding and the wetness.
- The limitations are difficult to overcome.

Interpretive Groups

Land capability classification: 2w

JfD—Jefferson-Lily-Rock outcrop complex, 12 to 20 percent slopes

Setting

Landform: Uplands
Landscape position: Backslopes and footslopes
Shape of areas: Irregular
Size of areas: 14 to 339 acres; average size of 25 acres
Major uses: Woodland

Composition

Jefferson soil and similar components: 44 percent
Lily soil and similar components: 24 percent
Rock outcrop: 14 percent
Contrasting components: 18 percent

Minor Components

Similar components:
- Wellston and Riney soils in landscape positions similar to those of the Jefferson and Lily soils

Contrasting components:
- Caneyville and Donahue soils in landscape positions similar to those of the Jefferson and Lily soils

Typical Profile

Jefferson

Surface layer:
0 to 4 inches; dark grayish brown loam

Subsurface layer:
4 to 13 inches; brown loam

Subsoil:
13 to 20 inches; dark yellowish brown loam
20 to 32 inches; strong brown gravelly loam
32 to 37 inches; strong brown gravelly sandy loam
37 to 61 inches; strong brown gravelly sandy loam

Lily

Surface layer:
0 to 7 inches; yellowish brown loam

Subsurface layer:
7 to 12 inches; yellowish brown fine sandy loam

Subsoil:
12 to 21 inches; strong brown loam that has brownish yellow mottles
21 to 27 inches; yellowish red loam that has brownish yellow mottles
27 to 33 inches; strong brown loam that has brownish yellow mottles

Bedrock:
33 to 36 inches; sandstone

Rock outcrop

The Rock outcrop occurs as scattered cliffs and bluffs formed by exposed bedrock. House-sized boulders have migrated downslope in some areas.

Soil Properties and Qualities

Jefferson

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Low

Lily

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This map unit is poorly suited to cultivated crops.
- Erosion is a very severe hazard if the soils are cultivated.

Pasture and Forage

- This map unit has limited suitability for pasture and hay because of the slope and the rock outcrop.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

• Maintaining the desired species, controlling weeds, maintaining proper stocking rates, rotation grazing, and applying lime and fertilizer are suitable management practices.

Woodland

• This map unit is suited to woodland.
• The species preferred for planting are yellow-poplar, shortleaf pine, eastern white pine, and white oak.
• See table 7 for specific information related to potential productivity.
• The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

• This map unit is poorly suited to urban uses because of the steepness of slope and the depth to bedrock.
• The limitations are difficult to overcome.

Interpretive Groups

Land capability classification: Jefferson and Lily—4e, Rock outcrop—8s

JfE—Jefferson-Lily-Rock outcrop complex, 20 to 35 percent slopes

Setting

Landform: Uplands
Landscape position: Hillsides and footslopes
Shape of areas: Irregular
Size of areas: 4 to 2,700 acres; average size of 71 acres
Major uses: Woodland

Composition

Jefferson soil and similar components: 44 percent
Lily soil and similar components: 24 percent
Rock outcrop: 14 percent
Contrasting components: 18 percent

Minor Components

Similar components:
• Wellston, Gilpin, and Riney soils in landscape positions similar to those of the Jefferson and Lily soils
Contrasting components:
• Caneyville, Bledsoe, and Donahue soils in landscape positions similar to those of the Jefferson and Lily soils

Typical Profile

Jefferson

Surface layer:
0 to 4 inches; dark grayish brown loam

Subsurface layer:
4 to 13 inches; brown loam

Subsoil:
13 to 20 inches; dark yellowish brown loam
20 to 32 inches; strong brown gravelly loam
32 to 37 inches; strong brown gravelly sandy loam
37 to 61 inches; strong brown gravelly sandy loam

Lily

Surface layer:
0 to 7 inches; yellowish brown loam

Subsurface layer:
7 to 12 inches; yellowish brown fine sandy loam

Subsoil:
12 to 21 inches; strong brown loam that has brownish yellow mottles
21 to 27 inches; yellowish red loam that has brownish yellow mottles
27 to 33 inches; strong brown loam that has brownish yellow mottles

Bedrock:
33 to 36 inches; sandstone

Rock outcrop

The Rock outcrop occurs as scattered cliffs and bluffs formed by exposed bedrock. House-sized boulders have migrated downslope in some areas.

Soil Properties and Qualities

Jefferson

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Lily

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained

Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- This map unit is unsuited to cultivated crops because of the steepness of slope and the rock outcrop.

Pasture and Forage

- This map unit has limited suitability for pasture and hay.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This map unit is well suited to woodland.
- The steepness of slope and the hazard of erosion severely limit the use of equipment.
- The species preferred for planting are shortleaf pine, eastern white pine, and yellow-poplar on north aspects and shortleaf pine and white pine on south aspects.
- See table 7 for specific information related to potential productivity.

Urban Uses

- This unit is poorly suited to urban uses because of the steepness of slope and the depth to bedrock.
- The limitations are difficult to overcome.

Interpretive Groups

Land capability classification: Jefferson and Lily—6e, Rock outcrop—8s

Jo—Johnsburg silt loam

Setting

Landform: Uplands
Landscape position: Flats and slightly depressed areas on broad ridges
Slope: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 4 to 1,473 acres; average size of 71 acres
Major uses: Cropland

Composition

Johnsburg soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Clarkrange and Zanesville soils in landscape positions similar to those of the Johnsburg soil

Contrasting components:
- Mullins soils in concave areas
- Soils that are similar to the Johnsburg soil but have a grayer subsoil

Typical Profile

Surface layer:
0 to 2 inches; dark grayish brown silt loam

Subsurface layer:
2 to 7 inches; grayish brown silt loam that has pale brown and yellowish brown mottles

Subsoil:
7 to 14 inches; yellowish brown silt loam that has brownish gray mottles
14 to 21 inches; yellowish brown silt loam that has light brownish gray and yellowish brown mottles
21 to 34 inches; a fragipan of light yellowish brown silt loam that has gray and brown mottles
34 to 54 inches; a fragipan of yellowish brown silt loam that has brownish gray and yellowish brown mottles

Substratum:
54 to 62 inches; yellowish brown loam

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Somewhat poorly drained
Permeability: Very slow
Runoff: Slow or very slow
Available water capacity: Moderate
Seasonal high water table: At a depth of 1 to 3 feet
Organic matter content: Low
Erosion hazard: Slight
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- The limited rooting depth, the wetness, and the limited available water capacity are the main management concerns.
- The wetness generally delays planting and harvesting operations in most years.
- The dense fragipan limits the rooting depth and the available water capacity.
- Where adequate outlets are available, a subsurface drainage system helps to increase the length of the growing season and improve the suitability of the soil to crops planted in early spring.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to hay and pasture.
- Grasses and legumes that are tolerant of the seasonal wetness should be selected for planting.
- The dense fragipan limits the growth of some deep-rooted crops.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plant population.
- Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are the main management concerns.
- Restricted grazing by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white oak, yellow-poplar, and sweetgum.
- See table 7 for specific information related to potential productivity.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to most urban uses.
- The wetness, the seasonal high water table, and the slow permeability are severe limitations affecting building site development and sanitary facilities.

Interpretive Groups

Land capability classification: 3w

Ka—Karnak silty clay loam, frequently flooded

Setting

Landform: Flood plains
Landscape position: Wide, level areas away from the main channel, adjacent to toeslopes and footslopes
Slope: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 4 to 106 acres; average size of 22 acres
Major uses: Cropland

Composition

Karnak soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that are similar to the Karnak soil but have a clayey surface layer
- Soils that have a darker surface layer than that of the Karnak soil

Contrasting components:
- Melvin and Newark soils in landscape positions similar to those of the Karnak soil

Typical Profile

Surface layer:
0 to 4 inches; dark grayish brown silty clay loam that has strong brown mottles

Subsurface layer:
4 to 9 inches; dark grayish brown silty clay loam that has strong brown mottles

Subsoil:
9 to 14 inches; grayish brown silty clay that has strong brown and gray mottles
14 to 23 inches; gray silty clay that has strong brown mottles
23 to 40 inches; gray silty clay that has brown and yellow mottles
40 to 46 inches; light gray clay that has pale brown and strong brown mottles
46 to 62 inches; light gray clay that has reddish yellow and pale brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow
Runoff: Slow or very slow

Available water capacity: High
Seasonal high water table: At the surface or within a depth of 3 feet
Organic matter content: Low to moderate
Erosion hazard: Slight
Tilth: Poor
Shrink-swell potential: High

Use and Management

Cropland

- Where drained, this soil is suited to cultivated crops.
- Planting and harvesting operations may be delayed because of the wetness and the flooding.
- Where adequate outlets are available, a subsurface drainage system helps to increase the length of the growing season and improve the suitability of the soil to crops planted in early spring.
- The soil crusts and becomes cloddy if cultivated when the moisture content is too high.
- The root zone is very deep and can be easily penetrated by plant roots.

Pasture and Forage

- This soil is suited to pasture and hay.
- Pasture and hay plants that are tolerant of the seasonal wetness and the flooding should be selected for planting.
- A drainage system, rotation grazing, weed control, and applications of fertilizer and lime are suitable management practices.
- Restricted grazing during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are green ash, pin oak, and sweetgum.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to urban uses because of the wetness and the flooding.
- The high content of clay and the high shrink-swell potential are additional limitations affecting some urban uses.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.

Interpretive Groups

Land capability classification: 4w

Kb—Karnak silty clay loam, overwash, frequently flooded

Setting

Landform: Flood plains
Landscape position: Level areas and slightly lower areas on the upper reaches of Dullam, Muddy, and Little Muddy Creeks
Slope: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 3 to 242 acres; average size of 31 acres
Major uses: Cropland

Composition

Karnak soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that are similar to the Karnak soil but have a darker surface layer and are clayey in the plow layer

Contrasting components:
- Melvin and Newark soils in landscape positions that are similar to those of the Karnak soil

Typical Profile

Surface layer:
0 to 4 inches; light olive brown silty clay loam

Subsoil:
4 to 12 inches; brown silty clay
12 to 34 inches; light brownish gray silty clay that has brown mottles
34 to 46 inches; gray silty clay that has brown mottles

Substratum:
46 to 65 inches; yellowish brown silty clay that has gray and brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Slow
Runoff: Slow or very slow
Available water capacity: High
Seasonal high water table: At the surface or within a depth of 3 feet
Organic matter content: Low to moderate
Erosion hazard: Slight
Tilth: Poor
Shrink-swell potential: High

Use and Management

Cropland

- Where drained, this soil is suited to cultivated crops.
- Planting and harvesting operations may be delayed because of the wetness and the flooding.
- Crops respond favorably to applications of lime and fertilizer.
- The plow layer is sticky and plastic when wet and is hard and cloddy when dry.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.

Pasture and Forage

- This soil is suited to pasture and hay.
- Pasture and hay plants that are tolerant of the seasonal wetness and the flooding should be selected for planting.
- A drainage system helps to lower the water table and thus improves the suitability of the soil to plants.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are green ash, sweetgum, and pin oak.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to urban uses because of the seasonal high water table and the flooding.
- The high content of clay and the high shrink-swell potential are additional limitations affecting some urban uses.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.

Interpretive Groups

Land capability classification: 4w

LaC2—Latham silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes and narrow ridges
Shape of areas: Irregular
Size of areas: 4 to 66 acres; average size of 10 acres
Major uses: Cropland

Composition

Latham soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that are deeper to bedrock than the Latham soil
- Small areas of severely eroded soils that have a surface layer of silty clay loam

Contrasting components:
- Wellston, Rosine, and Lily soils in landscape positions similar to those of the Latham soil

Typical Profile

Surface layer:
0 to 3 inches; brown silt loam

Subsoil:
3 to 9 inches; strong brown silty clay that has brown mottles
9 to 13 inches; reddish yellow silty clay that has mottles in shades of yellowish red
13 to 22 inches; strong brown silty clay that has mottles in shades of gray and red
22 to 33 inches; mottled gray and strong brown silty clay

Bedrock:
33 inches; weathered shale

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 3.0 feet

Organic matter content: Moderately low
Erosion hazard: Severe
Tilth: Poor
Shrink-swell potential: High

Use and Management

Cropland

- This soil is suited to cultivated crops.
- The hazard of erosion is severe if cultivated crops are grown.
- No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

- This soil is well suited to pasture and hay.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are shortleaf pine, white oak, and eastern white pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to most urban uses; however, the slope and the depth to bedrock are limitations affecting some uses.
- The moderate shrink-swell potential and low strength are additional limitations affecting some uses.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 3e

LaD2—Latham silt loam, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Backslopes and the upper part of hillsides
Shape of areas: Irregular
Size of areas: 4 to 110 acres; average size of 19 acres
Major uses: Pasture and woodland

Composition

Latham soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that are deeper to bedrock than the Latham soil
- Small areas of severely eroded soils that have a surface layer of silty clay loam

Contrasting components:
- Wellston, Rosine, and Lily soils in landscape positions similar to those of the Latham soil

Typical Profile

Surface layer:
0 to 3 inches; brown silt loam

Subsoil:
3 to 9 inches; strong brown silty clay that has brown mottles
9 to 13 inches; reddish yellow silty clay that has mottles in shades of yellowish red
13 to 22 inches; strong brown silty clay that has mottles in shades of gray and red
22 to 33 inches; mottled gray and strong brown silty clay

Bedrock:
33 inches; weathered shale

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 3.0 feet
Organic matter content: Moderately low or moderate
Erosion hazard: Very severe

Tilth: Poor
Shrink-swell potential: High

Use and Management

Cropland

- This soil is poorly suited to cropland.
- Erosion is a very severe hazard if cultivated crops are grown.
- No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are shortleaf pine, white oak, and eastern white pine.
- See table 7 for specific information related to potential productivity.
- Erosion is a hazard during harvest and planting operations because of the moderately steep slopes.
- In places the slope limits the use of equipment.

Urban Uses

- This soil is poorly suited to urban uses because of the steepness of slope and the depth to bedrock.
- The high shrink-swell potential and low strength are limitations affecting some uses.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 4e

Le—Lawrence silt loam, occasionally flooded

Setting

Landform: Terraces and uplands
Landscape position: Slightly depressed and concave areas on broad flats; some areas subject to occasional flooding
Slope: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 4 to 268 acres; average size of 22 acres
Major uses: Cropland

Composition

Lawrence soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Melvin, Newark, and Otwell soils in landscape positions similar to those of the Lawrence soil

Contrasting components:
- Nolin and Elk soils in landscape positions similar to those of the Lawrence soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 14 inches; pale brown silt loam that has yellowish brown mottles

Subsoil:
14 to 24 inches; yellowish brown silt loam that has light brownish gray mottles
24 to 35 inches; a fragipan of yellowish brown silt loam that has gray and brown mottles
35 to 49 inches; a fragipan of light brownish gray silt loam that has brown mottles

Substratum:
49 to 61 inches; dark yellowish brown silt loam that has gray mottles
61 to 76 inches; yellowish brown silty clay loam that has gray mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Slow
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: At a depth of 1 to 2 feet
Organic matter content: Low to moderate
Erosion hazard: Slight
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops that are tolerant of the wetness.
- In areas where adequate outlets are available, a subsurface drainage system helps to increase the length of the growing season and improve the suitability of the soil to some crops.
- The dense fragipan limits the rooting depth and the available water capacity.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is suited to pasture and hay.
- The main management needs include applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are sweetgum, yellow-poplar, and white oak.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to urban uses because of the occasional flooding and the seasonal wetness.
- The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
- Low strength is a limitation on sites for local roads and streets.

Interpretive Groups

Land capability classification: 3w

LnC2—Lenberg silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes and ridges
Shape of areas: Irregular
Size of areas: 4 to 74 acres; average size of 16 acres
Major uses: Cropland and pasture

Composition

Lenberg soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that are deeper to bedrock than the Lenberg soil
- Small areas of severely eroded soils that have a surface layer of silty clay loam

Contrasting components:
- Rosine, Epley, and Wellston soils in landscape positions similar to those of the Lenberg soil

Typical Profile

Surface layer:
0 to 5 inches; grayish brown silt loam

Subsurface layer:
5 to 9 inches; yellowish brown silty clay loam that has brown mottles

Subsoil:
9 to 15 inches; yellowish brown silty clay loam that has mottles in shades of brown and yellow
15 to 23 inches; gray and brown clay

Substratum:
23 to 30 inches; gray and brown channery clay

Bedrock:
30 inches; shale

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low

Erosion hazard: Severe
Tilth: Poor
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is suited to cultivated crops.
- The hazard of erosion is very severe if conventional tillage methods are used.
- No-till planting, minimum tillage, cover crops, a crop rotation that includes grasses and legumes, contour farming, and stripcropping help to control runoff and erosion.
- The soil crusts and becomes cloddy if cultivated when wet.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Pasture renovation should be frequent enough to maintain the desired plants.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are shortleaf pine and white oak.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to only some urban uses because of the slope and the depth to bedrock.
- The moderate shrink-swell potential and low strength are additional limitations affecting some uses.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 3e

LnD2—Lenberg silt loam, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Backslopes and the upper part of hillsides
Shape of areas: Irregular
Size of areas: 3 to 44 acres; average size of 16 acres
Major uses: Pasture

Composition

Lenberg soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Soils that are deeper to bedrock than the Latham soil
- Small areas of severely eroded soils that have a surface layer of silty clay loam

Contrasting components:
- Wellston, Rosine, and Frondorf soils in landscape positions similar to those of the Lenberg soil

Typical Profile

Surface layer:
0 to 5 inches; grayish brown silt loam

Subsurface layer:
5 to 9 inches; yellowish brown silty clay loam that has brown mottles

Subsoil:
9 to 15 inches; yellowish brown silty clay loam that has mottles in shades of brown and yellow
15 to 23 inches; gray and brown clay

Substratum:
23 to 30 inches; gray and brown channery clay

Bedrock:
30 inches; shale

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Very severe

Tilth: Poor
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is poorly suited to cropland.
- Erosion is a very severe hazard if cultivated crops are grown.

Pasture and Forage

- This soil is well suited to pasture and hay.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Pasture renovation should be frequent enough to maintain the desired plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white oak and shortleaf pine.
- See table 7 for specific information related to potential productivity.
- Erosion is a hazard during harvest and planting operations because of the moderately steep slopes.
- In places the slope limits the use of equipment.

Urban Uses

- This soil is poorly suited to urban uses because of the steepness of slope and the depth to bedrock.
- The moderate shrink-swell potential and low strength are limitations affecting some uses.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 4e

LyB—Lily loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: On ridges and ridgetops in the sandstone and shale uplands
Shape of areas: Irregular
Size of areas: 4 to 22 acres; average size of 5 acres
Major uses: Cropland

Composition

Lily soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Moderately deep soils that are similar to the Lily soil but have a thin, red, clayey subsoil

Contrasting components:
- Clarkrange and Wellston soils in landscape positions similar to those of the Lily soil

Typical Profile

Surface layer:
0 to 7 inches; yellowish brown loam

Subsurface layer:
7 to 12 inches; yellowish brown fine sandy loam

Subsoil:
12 to 21 inches; strong brown loam that has brownish yellow mottles
21 to 27 inches; yellowish red loam that has brownish yellow mottles
27 to 33 inches; strong brown loam that has mottles in shades of brown

Bedrock:
33 inches; sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Moderate
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.
- Conservation tillage and contour farming help to control runoff and erosion.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

- This soil is well suited to pasture and hay.

- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Pasture renovation should be frequent enough to maintain the desired plants.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are yellow-poplar, shortleaf pine, and white oak.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to some urban uses.
- The depth to bedrock is a limitation on sites for dwellings with basements and shallow excavations.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 2e

LyC2—Lily loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes and shoulder slopes in the sandstone and shale uplands
Shape of areas: Irregular
Size of areas: 3 to 259 acres; average size of 14 acres
Major uses: Cropland and pasture

Composition

Lily soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Gilpin soils
- Moderately deep soils that are similar to the Lily soil but have a thin, red, clayey subsoil

Contrasting components:
- Clarkrange and Wellston soils in landscape positions similar to those of the Lily soil

Typical Profile

Surface layer:
0 to 7 inches; yellowish brown loam

Subsurface layer:
7 to 12 inches; yellowish brown fine sandy loam

Subsoil:
12 to 21 inches; strong brown loam that has brownish yellow mottles
21 to 27 inches; yellowish red loam that has brownish yellow mottles
27 to 33 inches; strong brown loam that has mottles in shades of brown

Bedrock:
33 inches; sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- Measures that reduce the runoff rate and help to control erosion are needed.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Crops respond favorably to applications of lime and fertilizer.

• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is well suited to hay.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Pasture renovation should be frequent enough to maintain the desired plants.

Woodland

• This soil is well suited to woodland.
• The species preferred for planting are eastern white pine, shortleaf pine, and white oak.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is suited to some urban uses.
• The slope and the depth to bedrock are limitations affecting urban development.
• The limitations are difficult to overcome.

Interpretive Groups

Land capability classification: 3e

LyD2—Lily loam, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Shoulder slopes and backslopes
Shape of areas: Irregular
Size of areas: 4 to 255 acres; average size of 23 acres
Major uses: Woodland

Composition

Lily soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Gilpin soils
• Soils that are similar to the Lily soil but have a thin, red, clayey subsoil
Contrasting components:
• Jefferson and Wellston soils in landscape positions similar to those of the Lily soil

Typical Profile

Surface layer:
0 to 7 inches; yellowish brown loam

Subsurface layer:
7 to 12 inches; yellowish brown fine sandy loam

Subsoil:
12 to 21 inches; strong brown loam that has brownish yellow mottles
21 to 27 inches; yellowish red loam that has brownish yellow mottles
27 to 33 inches; strong brown loam that has mottles in shades of brown

Bedrock:
33 inches; sandstone

Soil Properties and Qualities

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is poorly suited to cropland.
• Measures that reduce the runoff rate and help to control erosion are needed if the soil is cultivated.

Pasture and Forage

• This soil is better suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.

• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Pasture renovation should be frequent enough to maintain the desired plants.
• Crops respond favorably to applications of lime and fertilizer.

Woodland

• This soil is suited to woodland.
• The species preferred for planting are eastern white pine, shortleaf pine, and white oak.
• See table 7 for specific information related to potential productivity.
• The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

• This soil is poorly suited to most urban uses.
• The slope, the moderate permeability, and the depth to bedrock are limitations affecting sanitary facilities and building site development.

Interpretive Groups

Land capability classification: 4e

Me—Melvin silt loam, frequently flooded

Setting

Landform: Flood plains
Landscape position: Slightly depressed areas along drainageways
Slope: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 4 to 939 acres; average size of 33 acres
Major uses: Cropland

Composition

Melvin soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Newark soils in landscape positions similar to those of the Melvin soil
Contrasting components:
• Nolin and Chagrin soils in landscape positions similar to those of the Melvin soil

Typical Profile

Surface layer:
0 to 8 inches; grayish brown silt loam

Subsurface layer:
8 to 18 inches; light grayish brown silt loam that has brown mottles

Subsoil:
18 to 38 inches; grayish brown silt loam that has brown mottles

Substratum:
38 to 65 inches; light brownish gray silt loam that has brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderate
Runoff: Slow
Available water capacity: High
Seasonal high water table: At the surface or within a depth of 1 foot
Organic matter content: Low to moderate
Erosion hazard: Slight
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• Where drained and protected from flooding, this soil is suited to row crops.
• In areas where adequate outlets are available, a subsurface drainage system helps to increase the length of the growing season and improve the suitability of the soil to some crops.
• The wetness and the flooding generally delay planting and harvesting operations.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is suited to hay and pasture.
• Pasture and hay plants that are tolerant of the seasonal wetness and the flooding should be selected for planting.
• The main management needs are surface drainage systems, applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Pasture renovation should be frequent enough to maintain the desired plants.

Woodland

• This soil is well suited to woodland.

- The species preferred for planting are sweetgum, pin oak, and American sycamore.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to urban uses because of the flooding, the wetness, and low strength.
- The limitations are difficult to overcome.

Interpretive Groups

Land capability classification: 4w

Mu—Mullins silt loam

Setting

Landform: Upland flats and stream terraces
Landscape position: Slightly depressed basins
Slope: 0 to 2 percent
Shape of areas: Irregular
Size of areas: 3 to 166 acres; average size of 33 acres
Major uses: Cropland and woodland

Composition

Mullins soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Johnsburg and Clarkrange soils in landscape positions similar to those of the Mullins soil

Contrasting components:
- Dunning soils in landscape positions similar to those of the Mullins soil

Typical Profile

Surface layer:
0 to 5 inches; light olive gray silt loam

Subsurface layer:
5 to 11 inches; dark gray silt loam that has yellowish red mottles

Subsoil:
11 to 23 inches; gray silt loam that has brown mottles
23 to 31 inches; a fragipan of gray silty clay loam that has reddish yellow mottles
31 to 39 inches; a fragipan of gray silty clay loam that has reddish yellow mottles

Substratum:
39 to 51 inches; dark gray silty clay loam that has gray, brown, and yellow mottles
51 to 62 inches; very dark gray silty clay that is mottled in shades of gray

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Poorly drained
Permeability: Moderate above the fragipan and slow in the fragipan
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: At the surface or within a depth of 1 foot
Organic matter content: Low
Erosion hazard: Slight
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cultivated crops and small grain because of the wetness.
- In areas where adequate outlets are available, a subsurface drainage system helps to increase the length of the growing season and improve the suitability of the soil to some crops.
- The wetness generally delays planting and harvesting operations.

Pasture and Forage

- This soil is poorly suited to hay and pasture.
- The wetness and the ponding limit the suitable plant varieties and the length of time that livestock can graze.

Woodland

- This soil is well suited to woodland.
- The preferred trees for planting are sweetgum, pin oak, and shortleaf pine.

Urban Uses

- This soil is poorly suited to urban uses.
- The wetness and the ponding are severe limitations.
- The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.

Interpretive Groups

Land capability classification: 4w

Ne—Newark silt loam, frequently flooded

Setting

Landform: Flood plains
Landscape position: Along rivers and streams
Slope: 0 to 2 percent
Shape of areas: Linear
Size of areas: 3 to 1,500 acres; average size of 66 acres
Major uses: Cropland

Composition

Newark soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Melvin, Lawrence, and Otwell soils in landscape positions similar to those of the Newark soil
Contrasting components:
• Grigsby, Chagrin, and Nolin soils in landscape positions similar to those of the Newark soil

Typical Profile

Surface layer:
0 to 8 inches; brown silt loam

Subsurface layer:
8 to 16 inches; brown silt loam that has light brownish gray mottles

Subsoil:
16 to 32 inches; light brownish gray silt loam that has brown mottles

Substratum:
32 to 42 inches; light brownish gray silt loam that has dark brown mottles
42 to 63 inches; light brownish gray silt loam that has brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Somewhat poorly drained
Permeability: Moderate
Runoff: Slow
Available water capacity: High
Seasonal high water table: At a depth of 0.5 to 1.0 foot
Organic matter content: Moderately low or moderate
Erosion hazard: Slight
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• Where drained and protected from flooding, this soil is suited to cultivated crops.
• In areas where adequate outlets are available, surface and subsurface drainage systems help to overcome the wetness.
• In areas that are not drained, planting crops later in the year or planting water-tolerant crops minimizes the damage caused by wetness and flooding.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is suited to pasture and hay.
• Pasture and hay plants that are tolerant of the seasonal wetness and the flooding should be selected for planting.
• A drainage system, rotation grazing, weed control, and applications of fertilizer and lime are suitable management practices.
• Crops respond favorably to applications of lime and fertilizer.

Woodland

• This soil is suited to woodland.
• The species preferred for planting are eastern cottonwood, sweetgum, and American sycamore.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is not suited to urban uses because of the flooding and the wetness.
• The limitations are very difficult to overcome.

Interpretive Groups

Land capability classification: 3w

No—Nolin silt loam, frequently flooded

Setting

Landform: Flood plains
Landscape position: Adjacent to streams
Slope: 0 to 2 percent

Shape of areas: Linear
Size of areas: 5 to 356 acres; average size of 24 acres
Major uses: Cropland

Composition

Nolin soil and similar components: 90 to 95 percent
Contrasting components: 5 to 10 percent

Minor Components

Similar components:
• Grigsby and Chagrin soils in landscape positions similar to those of the Nolin soil
Contrasting components:
• Newark and Melvin soils in landscape positions similar to those of the Nolin soil

Typical Profile

Surface layer:
0 to 7 inches; dark brown silt loam

Subsoil:
7 to 25 inches; brown silt loam
25 to 63 inches; yellowish brown silt loam that has pale brown and dark brown mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slow
Available water capacity: High
Seasonal high water table: At a depth of 4 to 6 feet
Organic matter content: Moderate
Erosion hazard: Slight
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is well suited to cultivated crops.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
• Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
• Crops respond favorably to applications of lime and fertilizer.
• The soil is subject to flooding during late winter and early spring.
• The flooding sometimes delays planting.

Pasture and Forage

• This soil is well suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• Pasture renovation should be frequent enough to maintain the desired plants.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
• Pasture and hay plants that are tolerant of the seasonal wetness and the flooding should be selected for planting.

Woodland

• This soil is well suited to woodland.
• Most trees that grow in the survey area will grow in areas of this soil.
• The species preferred for planting are black walnut, yellow-poplar, and eastern white pine.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is poorly suited to urban uses because of the flooding.
• The flooding is very difficult to overcome.

Interpretive Groups

Land capability classification: 2w

OtC—Otwell silt loam, 6 to 12 percent slopes, rarely flooded

Setting

Landform: Stream terraces
Landscape position: Rolling side slopes
Shape of areas: Irregular
Size of areas: 3 to 77 acres; average size of 12 acres
Major uses: Cropland

Composition

Otwell soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Sciotoville and Clarkrange soils in landscape positions similar to those of the Otwell soil

Contrasting components:
- Wellston, Allegheny, Gilpin, and Elk soils in landscape positions similar to those of the Otwell soil

Typical Profile

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 14 inches; dark yellowish brown silt loam
14 to 19 inches; yellowish brown silt loam
19 to 26 inches; dark yellowish brown silt loam
26 to 33 inches; a fragipan of dark yellowish brown silty clay loam that has gray and brown mottles
33 to 42 inches; dark yellowish brown silty clay loam that has gray mottles

Substratum:
42 to 52 inches; dark yellowish brown silty clay loam that has pale brown and gray mottles
52 to 68 inches; dark yellowish brown silt loam that has gray mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Very slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 2.0 to 3.5 feet
Organic matter content: Low or moderately low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to most of the crops commonly grown in the survey area.
- The soil can be cultivated throughout a wide range in moisture content.
- Planting and harvesting operations may be delayed in some years because of the wetness and the flooding.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- The fragipan restricts the penetration of roots and the downward movement of air and water.

Pasture and Forage

- This soil is suited to hay and pasture.
- Pasture and hay plants that are tolerant of the seasonal wetness and the flooding should be selected for planting.
- A drainage system, rotation grazing, weed control, and applications of fertilizer and lime are suitable management practices.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Restricted grazing during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are yellow-poplar, loblolly pine, and eastern white pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is limited as a site for urban uses because of the flooding and the wetness.
- The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.
- Proper design and installation and adequate site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 3e

OwB—Otwell silt loam, 2 to 6 percent slopes, occasionally flooded

Setting

Landform: Terraces
Landscape position: Slightly elevated ridges

Shape of areas: Irregular
Size of areas: 3 to 162 acres; average size of 12 acres
Major uses: Cropland

Composition

Otwell soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Lawrence and Sciotoville soils in landscape positions similar to those of the Otwell soil

Contrasting components:
- Wellston, Allegheny, Gilpin, and Elk soils in landscape positions similar to those of the Otwell soil

Typical Profile

Surface layer:
0 to 7 inches; brown silt loam

Subsoil:
7 to 14 inches; dark yellowish brown silt loam
14 to 19 inches; yellowish brown silt loam
19 to 26 inches; dark yellowish brown silt loam
26 to 33 inches; a fragipan of dark yellowish brown silty clay loam that has gray and brown mottles
33 to 42 inches; dark yellowish brown silty clay loam that has gray mottles

Substratum:
42 to 52 inches; dark yellowish brown silty clay loam that has pale brown and gray mottles
52 to 68 inches; dark yellowish brown silt loam that has gray mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Very slow
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: At a depth of 2.0 to 3.5 feet
Organic matter content: Low or moderately low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is well suited to most of the crops commonly grown in the survey area.
- The soil can be cultivated throughout a wide range in moisture content.
- Planting and harvesting operations may be delayed in some years because of the wetness and the flooding.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- The fragipan restricts the penetration of roots and the downward movement of air and water.

Pasture and Forage

- This soil is well suited to pasture and hay.
- Pasture and hay plants that are tolerant of the seasonal wetness and the flooding should be selected for planting.
- A drainage system, rotation grazing, weed control, and applications of fertilizer and lime are suitable management practices.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- In areas where adequate outlets are available, a subsurface drainage system helps to increase the length of the growing season and improve the suitability of the soil to some crops.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are yellow-poplar, loblolly pine, and eastern white pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to urban uses because of the flooding and the wetness.
- The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.
- Proper design and installation and adequate site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 2e

PeB—Pembroke silt loam, 2 to 6 percent slopes

Setting

Landform: Karst plains
Landscape position: Smooth and undulating ridges
Shape of areas: Irregular
Size of areas: 4 to 428 acres; average size of 40 acres
Major uses: Cropland

Composition

Pembroke soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
• Crider soils in landscape positions similar to those of the Pembroke soil
Contrasting components:
• Baxter, Fredonia, and Hagerstown soils on rolling ridges
• Nolin soils in upland depressions

Typical Profile

Surface layer:
0 to 6 inches; dark brown silt loam

Subsurface layer:
6 to 12 inches; strong brown silt loam

Subsoil:
12 to 17 inches; yellowish red silty clay loam
17 to 26 inches; dark red silty clay loam
26 to 39 inches; dark red silty clay loam
39 to 54 inches; dark yellowish brown silty clay that has brown mottles
54 to 70 inches; dark yellowish brown clay
70 to 73 inches; dark red clay

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slight
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is well suited to cultivated crops.
• No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
• Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.
• Crops respond favorably to applications of lime and fertilizer.
• The organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
• The soil can be cultivated throughout a wide range in moisture content.

Pasture and Forage

• This soil is well suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Pasture renovation should be frequent enough to maintain the desired plants.

Woodland

• This soil is well suited to woodland; however, most areas have been cleared and are used as cropland.
• The species preferred for planting are white ash, yellow-poplar, and black walnut.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is suited to most urban uses.
• Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.

• Proper design and installation may reduce or help to overcome the low strength.

Interpretive Groups

Land capability classification: 2e

PeC2—Pembroke silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Karst plains
Landscape position: Sloping side slopes and around the rims of depressions
Shape of areas: Irregular
Size of areas: 4 to 33 acres; average size of 7 acres
Major uses: Cropland

Composition

Pembroke soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
• Crider soils in landscape positions similar to those of the Pembroke soil
Contrasting components:
• Baxter, Fredonia, and Hagerstown soils on rolling ridges and side slopes
• Nolin soils in depressions

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam that has strong brown mottles

Subsurface layer:
6 to 12 inches; strong brown silt loam that has yellowish red mottles

Subsoil:
12 to 17 inches; yellowish red silty clay loam
17 to 26 inches; dark red silty clay loam
26 to 39 inches; dark red silty clay loam
39 to 54 inches; dark yellowish brown silty clay that has brown mottles
54 to 70 inches; dark yellowish brown clay
70 to 73 inches; dark red clay

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is suited to cultivated crops; however, measures that help to control runoff and erosion are needed.
• Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
• Crops respond favorably to applications of lime and fertilizer.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is well suited to hay and pasture.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Pasture renovation should be frequent enough to maintain the desired plants.

Woodland

• This soil is well suited to woodland.
• The species preferred for planting are white ash, yellow-poplar, and black walnut.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is suited to some urban uses.
• Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.

• Proper design and installation may reduce or help to overcome low strength.

Interpretive Groups

Land capability classification: 3e

Ps—Pits, quarries, asphalt

Setting

Landform: Uplands
Landscape position: Rolling ridges and side slopes underlain by sandstone, shale, and tar sands
Shape of areas: Irregular
Size of areas: 15 to 131 acres; average size of 59 acres
Major uses: Quarried for paving material; tar sand deposits explored as a source of petroleum in recent years

Composition

About 90 percent of this map unit consists of areas of excavated pits that have been backfilled with overburden and with sandstone and shale bedrock. Most pits have uneven terrain and are difficult to traverse. Some pits are 20 or more feet deep.

About 10 percent of the unit consists of areas that have not been disturbed or areas where sandstone bedrock has been exposed.

Use and Management

This map unit has no active quarries. It was mined for roadfill and paving material. The bitumen content of the basal Pennsylvanian asphaltic sandstone generally ranged from 7 to 8 percent. Three major abandoned pits are located south of the community of Bee Springs in Edmonson County. Tar sand deposits are throughout the northern part of Edmonson County. They could be a source of petroleum if an economical way of extracting the petroleum were developed.

Interpretive Groups

Land capability classification: None assigned

Pt—Pits, quarries, limestone

Setting

Landform: Uplands
Landscape position: Rolling limestone valleys adjacent to dissected areas that have sandstone-capped hills and ridges
Shape of areas: Circular
Size of areas: 20 to 98 acres; average size of 29 acres
Major uses: Most pits abandoned; active quarries produce road gravel, riprap, agricultural lime, and other materials for commercial use

Composition

About 90 percent of this map unit consists of areas of excavated pits having walls of exposed limestone. Most of the pits have vertical walls that are at least 50 feet high.

About 10 percent of this map unit consists of areas of spoil piles of sandstone, shale, and limestone bedrock. The spoil piles vary in size. Piles of soil overburden are in some areas of the unit.

Use and Management

There is one active limestone quarry in the survey area. The quarry is between Dripping Springs and Park City in Edmonson County. A few large abandoned quarries are scattered throughout the survey area.

Interpretive Groups

Land capability classification: None assigned

ReB2—Riney silt loam, 2 to 6 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Narrow ridges
Shape of areas: Irregular
Size of areas: 4 to 47 acres; average size of 9 acres
Major uses: Woodland and idle land

Composition

Riney soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
• Soils that are similar to the Riney soil but have weathered sandstone bedrock at a depth of 25 to 40 inches
• Soils that have quartz pebbles in the surface layer
Contrasting components:
• Wellston and Clarkrange soils in landscape positions similar to those of the Riney soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 10 inches; dark yellowish brown silt loam

Subsoil:
10 to 21 inches; dark brown clay loam
21 to 40 inches; dark brown loam
40 to 43 inches; strong brown gravelly sandy loam
43 to 50 inches; strong brown loamy sand

Substratum:
50 to 56 inches; strong brown sandy loam
56 to 70 inches; red gravelly sandy clay loam that has brownish yellow mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Slow
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- The hazard of erosion is moderate if cultivated crops are grown.
- Measures that reduce the runoff rate and help to control erosion are needed.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is suited to pasture and hay.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are yellow-poplar, white ash, and black walnut.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.

Urban Uses

- This soil is suited to most urban uses.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.
- Proper design and installation and adequate site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 2e

ReC2—Riney silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes and shoulder slopes
Shape of areas: Irregular
Size of areas: 4 to 151 acres; average size of 17 acres
Major uses: Woodland

Composition

Riney soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Lily soils in landscape positions similar to those of the Riney soil
- Soils that are similar to the Riney soil but have weathered sandstone at a depth of 20 to 40 inches

Contrasting components:
- Wellston and Clarkrange soils in landscape positions similar to those of the Riney soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 10 inches; dark yellowish brown silt loam

Subsoil:
10 to 21 inches; dark brown clay loam
21 to 40 inches; dark brown loam
40 to 43 inches; strong brown gravelly sandy loam
43 to 50 inches; strong brown loamy sand

Substratum:
50 to 56 inches; strong brown sandy loam
56 to 72 inches; red gravelly sandy clay loam that has brownish yellow mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil has limited suitability for cultivated crops.
- The hazard of erosion is severe if cultivated crops are grown and very severe if conventional tillage methods are used.
- Measures that reduce the runoff rate and help to control erosion are needed.
- Contour farming, stripcropping, and conservation tillage help to control erosion and runoff.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Pasture renovation should be frequent enough to maintain the desired plants.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are yellow-poplar, white ash, and black walnut.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to urban uses.
- The slope is a moderate limitation affecting most urban uses. It is a severe limitation on sites for commercial buildings.
- Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.
- Proper design and installation and adequate site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 3e

ReD2—Riney silt loam, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Shoulder slopes and toeslopes
Shape of areas: Irregular
Size of areas: 4 to 165 acres; average size of 25 acres
Major uses: Woodland

Composition

Riney soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Lily soils in landscape positions similar to those of the Riney soil
- Soils that are similar to the Riney soil but have weathered sandstone bedrock at a depth of 20 to 40 inches

Contrasting components:
- Wellston soils
- Small areas of severely eroded soils that are similar to the Riney soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 10 inches; dark yellowish brown silt loam

Subsoil:
10 to 21 inches; dark brown clay loam
21 to 40 inches; dark brown loam
40 to 43 inches; strong brown gravelly sandy loam
43 to 50 inches; strong brown loamy sand

Substratum:
50 to 56 inches; strong brown sandy loam
56 to 72 inches; red gravelly sandy clay loam that has brownish yellow mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cultivated crops.
- If cultivated crops are grown, measures that reduce the runoff rate and help to control erosion are needed.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is suited to pasture and hay.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Pasture renovation should be frequent enough to maintain the desired plants.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are yellow-poplar, white ash, and black walnut.
- See table 7 for specific information related to potential productivity.
- The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

- This soil is poorly suited to most urban uses.
- The moderately steep slope is a severe limitation affecting building site development and sanitary facilities.
- Proper design and installation may help to overcome the slope.

Interpretive Groups

Land capability classification: 4e

ReE—Riney silt loam, 20 to 30 percent slopes

Setting

Landform: Uplands
Landscape position: Backslopes
Shape of areas: Irregular
Size of areas: 3 to 31 acres; average size of 10 acres
Major uses: Woodland

Composition

Riney soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
- Small areas of Lily soils
- Soils that are similar to the Riney soil but have bedrock at a depth of 20 to 40 inches

Contrasting components:
- Small areas of Wellston soils
- Small areas of severely eroded soils that are similar to the Riney soil

Typical Profile

Surface layer:
0 to 6 inches; brown silt loam

Subsurface layer:
6 to 10 inches; dark yellowish brown silt loam

Subsoil:
10 to 21 inches; dark brown clay loam
21 to 40 inches; dark brown loam
40 to 43 inches; strong brown gravelly sandy loam
43 to 50 inches; strong brown loamy sand

Substratum:
50 to 56 inches; strong brown sandy loam
56 to 72 inches; red gravelly sandy clay loam that has brownish yellow mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cultivated crops.
- Erosion is a very severe hazard.
- The soil is best suited to hay, pasture, and woodland.

Pasture and Forage

- This soil is suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Pasture renovation should be frequent enough to maintain the desired plants.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are yellow-poplar, white ash, and black walnut.
- See table 7 for specific information related to potential productivity.
- Machine planting is not practical.

Urban Uses

- This soil is poorly suited to most urban uses.
- The steep slope is a severe limitation affecting building site development and sanitary facilities.

Interpretive Groups

Land capability classification: 6e

RoB—Rosine silt loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Ridgetops
Shape of areas: Irregular
Size of areas: 4 to 41 acres; average size of 14 acres
Major uses: Cropland and pasture

Composition

Rosine soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Clarkrange and Wellston soils
- Small areas of severely eroded soils that are similar to the Rosine soil

Contrasting components:
- Gilpin and Caneyville soils in landscape positions similar to those of the Rosine soil

Typical Profile

Surface layer:
0 to 7 inches; yellowish brown silt loam

Subsurface layer:
7 to 14 inches; yellowish brown silt loam

Subsoil:
14 to 22 inches; yellowish brown silty clay loam
22 to 33 inches; brownish yellow silty clay loam that has mottles in shades of brown

33 to 52 inches; red clay that has brown and gray mottles

Substratum:
52 to 55 inches; mottled gray, brown, and red clay
55 to 65 inches; mottled light red, yellow, and gray clay

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Slow
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is suited to most crops that are grown in the survey area.
- Measures that reduce the runoff rate and help to control erosion are needed.
- The soil can be cultivated throughout a wide range in moisture content.
- Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

- This soil is suited to pasture and hay.
- Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are the main management concerns.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white ash, yellow-poplar, and white oak.
- Machine planting is practical

Urban Uses

- The slope and the clayey subsoil are limitations affecting most urban uses.
- The moderately slow permeability is a limitation on sites for septic tank absorption fields.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 2e

RoC2—Rosine silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Shoulder slopes and narrow ridges
Shape of areas: Irregular
Size of areas: 4 to 1,014 acres; average size of 16 acres
Major uses: Cropland

Composition

Rosine soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Wellston and Clarkrange soils
- Small areas of severely eroded soils that are similar to the Rosine soil

Contrasting components:
- Gilpin, Latham, and Caneyville soils in landscape positions similar to those of the Rosine soil

Typical Profile

Surface layer:
0 to 7 inches; yellowish brown silt loam

Subsurface layer:
7 to 14 inches; yellowish brown silt loam

Subsoil:
14 to 22 inches; yellowish brown silty clay loam
22 to 33 inches; brownish yellow silty clay loam that has mottles in shades of brown
33 to 52 inches; red clay that has brown and gray mottles

Substratum:
52 to 55 inches; mottled gray, brown, and red clay
55 to 65 inches; mottled light red, yellow, and gray clay shale

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is suited to most crops that are grown in the survey area.
- Erosion is a severe hazard if the soil is cultivated.
- The soil can be cultivated throughout a wide range in moisture content.
- Measures that reduce the runoff rate and help to control erosion are needed.

Pasture and Forage

- This soil is well suited to pasture and hay.
- Proper seeding mixtures and rates, applications of lime and fertilizer, weed control, and controlled grazing are the main management concerns.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white ash, yellow-poplar, and white oak.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- The slope and the clayey subsoil are limitations affecting most urban uses.
- The moderately slow permeability is a limitation on sites for septic tank absorption fields.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 3e

RoD2—Rosine silt loam, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Hillsides and backslopes
Shape of areas: Irregular
Size of areas: 4 to 32 acres; average size of 12 acres
Major uses: Pasture and woodland

Composition

Rosine soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Wellston soils in landscape positions similar to those of the Rosine soil

Contrasting components:
- Gilpin and Latham soils in landscape positions similar to those of the Rosine soil

Typical Profile

Surface layer:
0 to 7 inches; yellowish brown silt loam

Subsurface layer:
7 to 14 inches; yellowish brown silt loam

Subsoil:
14 to 22 inches; yellowish brown silty clay loam
22 to 33 inches; brownish yellow silty clay loam that has mottles in shades of brown
33 to 52 inches; red clay that has brown and gray mottles

Substratum:
52 to 55 inches; mottled gray, brown, and red clay
55 to 65 inches; mottled light red, yellow, and gray clay

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Moderate

Use and Management

Cropland

- This soil is poorly suited to cultivated crops.
- Erosion is a very severe hazard if cultivated crops are grown.
- Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

- This soil is well suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.

• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

• This soil is suited to woodland.
• The species preferred for planting are white ash, yellow-poplar, and white oak.
• See table 7 for specific information related to potential productivity.
• The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

• This soil is poorly suited to urban uses because of the slope and the clayey subsoil.
• The shrink-swell potential and low strength are limitations on sites for local roads and streets.
• Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 4e

RsC3—Rosine silty clay loam, 6 to 12 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Side slopes and shoulder slopes
Shape of areas: Irregular
Size of areas: 3 to 90 acres; average size of 14 acres
Major uses: Cropland and pasture

Composition

Rosine soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
• Wellston and Clarkrange soils in landscape positions similar to those of the Rosine soil
Contrasting components:
• Gilpin, Lily, and Latham soils in landscape positions similar to those of the Rosine soil

Typical Profile

Surface layer:
0 to 4 inches; strong brown silty clay loam

Subsoil:
4 to 12 inches; strong brown silty clay loam
12 to 22 inches; yellowish brown silty clay that has brownish gray mottles
22 to 52 inches; strong brown silty clay that has gray and pale brown mottles

Substratum:
52 to 65 inches; gray and strong brown shaly silty clay loam

Bedrock:
65 inches; gray shale

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Poor
Shrink-swell potential: Moderate

Use and Management

Cropland

• This soil is poorly suited to row crops because of the effects of past erosion.
• Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.

Pasture and Forage

• This soil is suited to pasture and hay.
• Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
• Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
• Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
• Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

• This soil is suited to woodland.
• The species preferred for planting are white ash, yellow-poplar, and white oak.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.

• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• The slope and the clayey subsoil are limitations affecting most urban uses.
• The moderately slow permeability is a limitation on sites for septic tank absorption fields.
• Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 4e

RsD3—Rosine silty clay loam, 12 to 20 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Hillsides and backslopes
Shape of areas: Irregular
Size of areas: 3 to 11 acres; average size of 6 acres
Major uses: Pasture and hay

Composition

Rosine soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
• Wellston soils in landscape positions similar to those of the Rosine soil
Contrasting components:
• Gilpin, Shelocta, and Latham soils in landscape positions similar to those of the Rosine soil

Typical Profile

Surface layer:
0 to 4 inches; strong brown silty clay loam

Subsoil:
4 to 12 inches; strong brown silty clay
12 to 22 inches; yellowish brown silty clay that has brownish gray mottles
22 to 52 inches; strong brown silty clay that has gray and pale brown mottles

Substratum:
52 to 65 inches; gray and strong brown shaly silty clay loam

Bedrock:
65 inches; gray shale

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low
Erosion hazard: Severe
Tilth: Poor
Shrink-swell potential: Moderate

Use and Management

Cropland

• This soil is poorly suited to row crops because of the effects of past erosion.
• The hazard of erosion is very severe if conventional tillage methods are used.
• Contour farming, stripcropping, and conservation tillage help to control erosion and runoff.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is suited to pasture and hay.
• Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
• Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
• Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
• Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

• This soil is suited to woodland.
• The species preferred for planting are white ash, yellow-poplar, and white oak.
• See table 7 for specific information related to potential productivity.
• The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

• This soil is poorly suited to most urban uses.
• The slope, the moderately slow permeability, the clayey texture, and the moderate shrink-swell potential

are limitations affecting sanitary facilities and building site development.
• Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 6e

SaB—Sadler silt loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Broad hilltops, saddles, and ridges
Shape of areas: Irregular
Size of areas: 4 to 77 acres; average size of 14 acres
Major uses: Cropland

Composition

Sadler soil and similar components: 80 to 85 percent
Contrasting components: 15 to 20 percent

Minor Components

Similar components:
• Zanesville and Clarkrange soils in landscape positions similar to those of the Sadler soil
• Small areas of eroded soils near slope breaks
Contrasting components:
• Wellston and Rosine soils in landscape positions similar to those of the Sadler soil

Typical Profile

Surface layer:
0 to 6 inches; yellowish brown silt loam

Subsoil:
6 to 12 inches; yellowish brown silt loam
12 to 17 inches; brownish yellow silt loam that has pale brown mottles
17 to 23 inches; light yellowish brown silt loam that has gray and white mottles
23 to 38 inches; a fragipan of yellowish brown silt loam that has gray and brown mottles
38 to 53 inches; a fragipan of light yellowish brown loam that has brown and gray mottles

Substratum:
53 to 61 inches; light yellowish brown silt loam that has gray and yellow mottles

Bedrock:
61 inches; sandstone

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in fragipan
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 2.0 feet
Organic matter content: Low to moderate
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is suited to cultivated crops; however, erosion is a moderate hazard.
• The soil can be cultivated throughout a wide range in moisture content.
• Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is well suited to pasture and hay.
• The soil is suited to most of the grasses and legumes commonly grown in the survey area; however, some deep-rooted crops are short lived.
• The fragipan restricts the downward movement of water.

Woodland

• This soil is suited to woodland.
• The species preferred for planting are yellow-poplar, white oak, and eastern white pine.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed.

Urban Uses

• This soil is poorly suited to most urban uses.
• The slow permeability and the perched seasonal high water table are severe limitations on sites for septic tank absorption fields.
• Proper design, installation, and site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 2e

ScB—Sciotoville silt loam, 2 to 6 percent slopes

Setting

Landform: High terraces
Landscape position: Ridgetops
Shape of areas: Irregular
Size of areas: 4 to 233 acres; average size of 30 acres
Major uses: Cropland

Composition

Sciotoville soil and similar components: 75 to 80 percent
Contrasting components: 20 to 25 percent

Minor Components

Similar components:
- Clarkrange and Zanesville soils in landscape positions similar to those of the Sciotoville soil

Contrasting components:
- Soils underlain by weathered bedrock
- Soils that have a clayey substratum
- Wellston and Allegheny soils in landscape positions similar to those of the Sciotoville soil

Typical Profile

Surface layer:
0 to 3 inches; brown silt loam

Subsurface layer:
3 to 8 inches; brown loam

Subsoil:
8 to 17 inches; yellowish brown clay loam
17 to 22 inches; yellowish brown clay loam
22 to 32 inches; yellowish brown clay loam that has brown mottles
32 to 48 inches; a fragipan of loam, 50 percent yellowish brown and 50 percent brownish yellow; common gray mottles

Substratum:
48 to 66 inches; light yellowish brown sandy clay loam that has yellow and gray mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 3.0 feet
Organic matter content: Low to moderate
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is well suited to cultivated crops.
- If cultivated crops are grown, the hazard of erosion is moderate.
- The fragipan restricts the penetration of roots and the downward movement of air and water.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
- Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.
- Crops respond favorably to applications of lime and fertilizer.
- The organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- The main management needs include applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are white ash, yellow-poplar, and eastern white pine.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed.

• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is poorly suited to most urban uses.
• The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
• The perched water table, which is high mostly in winter and early spring, is a limitation affecting some uses.
• Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 2e

ScC2—Sciotoville silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: High terraces
Landscape position: Side slopes and shoulder slopes
Shape of areas: Irregular
Size of areas: 3 to 12 acres; average size of 7 acres
Major uses: Cropland and pasture

Composition

Sciotoville soil and similar components: 75 to 80 percent
Contrasting components: 20 to 25 percent

Minor Components

Similar components:
• Clarkrange and Zanesville soils in landscape positions similar to those of the Sciotoville soil
Contrasting components:
• Soils underlain by weathered bedrock
• Soils that have a clayey substratum
• Wellston and Allegheny soils in landscape positions similar to those of the Sciotoville soil

Typical Profile

Surface layer:
0 to 3 inches; brown silt loam

Subsurface layer:
3 to 8 inches; brown loam

Subsoil:
8 to 17 inches; yellowish brown clay loam
17 to 22 inches; yellowish brown clay loam
22 to 32 inches; yellowish brown clay loam that has brown mottles
32 to 48 inches; a fragipan of loam, 50 percent yellowish brown and 50 percent brownish yellow; common gray mottles

Substratum:
48 to 66 inches; light yellowish brown sandy clay loam that has yellow and gray mottles

Soil Properties and Qualities

Depth: Very deep (more than 60 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 3.0 feet
Organic matter content: Low to moderate
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is suited to cultivated crops.
• The hazard of erosion is severe if conventional tillage methods are used.
• Contour farming, stripcropping, and conservation tillage help to control erosion and runoff.
• The fragipan restricts the movement of water and air and the penetration of roots.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
• Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

• This soil is suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well; however, some deep-rooted crops are short lived.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.

Woodland

• This soil is suited to woodland.
• The species preferred for planting are white ash, yellow-poplar, and eastern white pine.

- Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to most urban uses.
- The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
- The perched water table, which is high mostly in winter and early spring, is a limitation affecting some uses.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 3e

SgD2—Shelocta-Latham-Gilpin complex, 12 to 20 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Backslopes and hillslopes
Shape of areas: Irregular
Size of areas: 3 to 625 acres; average size of 26 acres
Major uses: Woodland

Composition

Shelocta soil and similar components: 29 percent
Latham soil and similar components: 25 percent
Gilpin soil and similar components: 21 percent
Contrasting components: 25 percent

Minor Components

Similar components:
- Lily, Rosine, and Jefferson soils in landscape positions similar to those of the Shelocta, Latham, and Gilpin soils

Contrasting components:
- Weikert and Wallen soils in landscape positions similar to those of the Shelocta, Latham, and Gilpin soils

Typical Profile

Shelocta

Surface layer:
0 to 3 inches; dark grayish brown silt loam

Subsoil:
3 to 8 inches; brownish yellow silt loam
8 to 14 inches; brownish yellow silty clay loam
14 to 20 inches; strong brown silty clay loam
20 to 27 inches; strong brown silty clay loam

Substratum:
27 to 40 inches; strong brown clay that has gray and yellow mottles
40 to 62 inches; reddish yellow clay that has gray and red mottles

Latham

Surface layer:
0 to 3 inches; brown silt loam

Subsoil:
3 to 9 inches; strong brown silty clay that has brown mottles
9 to 13 inches; reddish yellow silty clay that has mottles in shades of yellowish red
13 to 22 inches; strong brown silty clay that has mottles in shades of gray and red
22 to 33 inches; mottled gray and strong brown silty clay

Bedrock:
33 inches; weathered shale

Gilpin

Surface layer:
0 to 5 inches; very dark grayish brown loam

Subsurface layer:
5 to 9 inches; yellowish brown silt loam

Subsoil:
9 to 14 inches; light yellowish brown silt loam
14 to 21 inches; yellowish brown very channery silt loam
21 to 28 inches; strong brown channery clay loam
28 to 35 inches; yellowish brown channery clay loam that has pockets of strong brown mottles

Bedrock:
35 inches; sandstone

Soil Properties and Qualities

Shelocta

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to high
Erosion hazard: Very severe

Tilth: Good
Shrink-swell potential: Low

Latham

Depth: Moderately deep (20 to 40 inches)
Drainage class: Moderately well drained
Permeability: Slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 3.0 feet
Organic matter content: Moderately low or moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: High

Gilpin

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are poorly suited to cultivated crops because of the slope.
- If cultivated crops are grown, the hazard of erosion is very severe.

Pasture and Forage

- These soils are suited to pasture. In some areas they may have limited suitability for hay.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- These soils are suited to woodland.
- The species preferred for planting are yellow-poplar, shortleaf pine, and white oak in areas of the Shelocta soil; shortleaf pine and white oak in areas of the Latham soil; and yellow-poplar, white oak, and eastern white pine in areas of the Gilpin soil.
- See table 7 for specific information related to potential productivity.
- The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

- These soils are poorly suited to most urban uses because of the slope and the depth to bedrock.
- For most urban uses, considerable cutting and filling are necessary but are limited by bedrock at a depth of 20 to 40 inches in areas of the Latham and Gilpin soils.
- In most places the bedrock can be excavated with earthmoving equipment.
- The slow permeability, the high shrink-swell potential, and low strength are additional limitations affecting some uses in areas of the Latham soil.

Interpretive Groups

Land capability classification: Shelocta, Latham, and Gilpin—4e

SgD3—Shelocta-Latham-Gilpin complex, 12 to 20 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Hillsides and backslopes
Shape of areas: Irregular
Size of areas: 4 to 56 acres; average size of 10 acres
Major uses: Unimproved pastures or idle land

Composition

Shelocta soil and similar components: 29 percent
Latham soil and similar components: 25 percent
Gilpin soil and similar components: 21 percent
Contrasting components: 25 percent

Minor Components

Similar components:
- Lily, Rosine, and Jefferson soils in landscape positions similar to those of the Shelocta, Latham, and Gilpin soils

Contrasting components:
- Weikert and Wallen soils in landscape positions similar to those of the Shelocta, Latham, and Gilpin soils

Typical Profile

Shelocta

Surface layer:
0 to 3 inches; dark grayish brown silt loam

Subsoil:
3 to 14 inches; brownish yellow silt loam
14 to 20 inches; strong brown silty clay loam

20 to 27 inches; strong brown silty clay loam

Substratum:
27 to 40 inches; strong brown clay that has gray and yellow mottles
40 to 62 inches; reddish yellow clay that has gray and red mottles

Latham

Surface layer:
0 to 3 inches; brown silt loam

Subsoil:
3 to 9 inches; strong brown silty clay that has brown mottles
9 to 13 inches; reddish yellow silty clay that has mottles in shades of yellowish red
13 to 22 inches; strong brown silty clay that has mottles in shades of gray and red
22 to 33 inches; mottled gray and strong brown silty clay

Bedrock:
33 inches; weathered shale

Gilpin

Surface layer:
0 to 5 inches; very dark grayish brown loam

Subsurface layer:
5 to 9 inches; yellowish brown silt loam

Subsoil:
9 to 14 inches; light yellowish brown silt loam
14 to 21 inches; yellowish brown very channery silt loam
21 to 28 inches; strong brown channery clay loam
28 to 35 inches; yellowish brown channery clay loam that has pockets of strong brown mottles

Bedrock:
35 inches; sandstone

Soil Properties and Qualities

Shelocta

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Low to high
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Low

Latham

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 3.0 feet
Organic matter content: Moderately low or moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: High

Gilpin

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are poorly suited to row crops because of the slope and the effects of past erosion.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Erosion is a very severe hazard if cultivated crops are grown.

Pasture and Forage

- These soils are suited to pasture and hay.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- These soils are suited to woodland.

- The species preferred for planting are yellow-poplar, shortleaf pine, and white oak in areas of the Shelocta soil; shortleaf pine and white oak in areas of the Latham soil; and yellow-poplar, white oak, and eastern white pine in areas of the Gilpin soil.
- See table 7 for specific information related to potential productivity.
- The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

- These soils are poorly suited to most urban uses because of the slope and the depth to bedrock.
- For most urban uses, considerable cutting and filling are necessary but are limited by bedrock at a depth of 20 to 40 inches in areas of the Latham and Gilpin soils.
- In most places bedrock can be excavated with earthmoving equipment.
- The slow permeability, the high shrink-swell potential, and low strength are additional limitations affecting some uses in areas of the Latham soil.

Interpretive Groups

Land capability classification: Shelocta, Latham, and Gilpin—6e

SgE—Shelocta-Latham-Gilpin complex, 20 to 30 percent slopes

Setting

Landform: Uplands
Landscape position: Hillsides and backslopes
Shape of areas: Irregular
Size of areas: 4 to 1,100 acres; average size of 116 acres
Major uses: Woodland

Composition

Shelocta soil and similar components: 29 percent
Latham soil and similar components: 25 percent
Gilpin soil and similar components: 21 percent
Contrasting components: 25 percent

Minor Components

Similar components:
- Lily, Rosine, and Jefferson soils in landscape positions similar to those of the Shelocta, Latham, and Gilpin soils

Contrasting components:
- Weikert and Wallen soils in landscape positions similar to those of the Shelocta, Latham, and Gilpin soils

Typical Profile

Shelocta

Surface layer:
0 to 3 inches; dark grayish brown silt loam

Subsoil:
3 to 8 inches; brownish yellow silt loam
8 to 14 inches; brownish yellow silty clay loam
14 to 20 inches; strong brown silty clay loam
20 to 27 inches; strong brown silty clay loam

Substratum:
27 to 40 inches; strong brown clay that has gray and yellow mottles
40 to 62 inches; reddish yellow clay that has gray and red mottles

Latham

Surface layer:
0 to 3 inches; brown silt loam

Subsoil:
3 to 9 inches; strong brown silty clay that has brown iron accumulations
9 to 13 inches; reddish yellow silty clay that has mottles in shades of yellowish red
13 to 22 inches; strong brown silty clay that has mottles in shades of gray and red
22 to 33 inches; mottled gray and strong brown silty clay

Bedrock:
33 inches; weathered shale

Gilpin

Surface layer:
0 to 5 inches; very dark grayish brown loam

Subsurface layer:
5 to 9 inches; yellowish brown silt loam

Subsoil:
9 to 14 inches; light yellowish brown silt loam
14 to 21 inches; yellowish brown very channery silt loam
21 to 28 inches; strong brown channery clay loam
28 to 35 inches; yellowish brown channery clay loam that has pockets of strong brown mottles

Bedrock:
35 inches; sandstone

Soil Properties and Qualities

Shelocta

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained

Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to high
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Low

Latham

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: At a depth of 1.5 to 3.0 feet
Organic matter content: Moderately low or moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: High

Gilpin

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- These soils are poorly suited to cultivated crops because of the slope and the hazard of erosion.

Pasture and Forage

- These soils are suited to pasture.
- Most grasses and legumes will grow on these soils.
- Crops respond to the applications of lime and fertilizer.
- Erosion-control measures during seedbed preparation and pasture renovation, weed control, and proper seeding rates and mixtures are management needs.
- Controlled grazing helps to maintain a good plant cover.

Woodland

- These soils are suited to woodland.
- Most trees that grow in the survey area will grow on these soils.
- The species preferred for planting are yellow-poplar, shortleaf pine, and white oak in areas of the Shelocta soil; shortleaf pine and white oak in areas of the Latham soil; and yellow-poplar, white oak, and eastern white pine in areas of the Gilpin soil.
- See table 7 for specific information related to potential productivity.
- The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

- These soils are poorly suited to most urban uses because of the slope and the depth to bedrock.
- For most urban uses, considerable cutting and filling are necessary but are limited by bedrock at a depth of 20 to 40 inches in areas of the Latham and Gilpin soils.
- In most places the bedrock can be excavated with earthmoving equipment.
- The slow permeability, the high shrink-swell potential, and low strength are additional limitations affecting some uses in areas of the Latham soil.

Interpretive Groups

Land capability classification: Shelocta, Latham, and Gilpin—6e

W—Water

Setting

This map unit consists of small to large, constructed or natural bodies of water. It includes small tributaries, creeks, and rivers and water areas at the head of drainageways and in depressions. It occurs throughout the survey area. The unit makes up 6,325 acres in the survey area—2,022 acres in Butler County and 4,303 acres in Edmonson County. Individual areas are irregular in shape and range from 3 to more than 200 acres in size.

Composition

This map unit includes small ponds, lakes, and large impoundments, such as Nolin Lake, which was a project of the U.S. Army Corps of Engineers. Three major streams flow through the survey area. They are the Green, Mud, and Nolin Rivers. Numerous creeks and tributaries feed the river system.

Use and Management

This map unit is used for fishing, canoeing, and other recreational activities; as a source of municipal, rural, and irrigation water; and for flood and fire protection.

Interpretive Groups

Land capability classification: None assigned

WbE—Wallen-Bledsoe-Donahue complex, 15 to 35 percent slopes, very rocky

Setting

Landform: Uplands
Landscape position: Hillsides and footslopes
Shape of areas: Irregular
Size of areas: 3 to 1,100 acres; average size of 69 acres
Major uses: Woodland

Composition

Wallen soil and similar components: 31 percent
Bledsoe soil and similar components: 28 percent
Donahue soil and similar components: 14 percent
Contrasting components: 27 percent (includes 7 percent rock outcrop)

Minor Components

Similar components:
• Caneyville, Gilpin, Lily, and Jefferson soils in landscape positions similar to those of the Wallen, Bledsoe, and Donahue soils
Contrasting components:
• Sandstone rock outcrop on the upper part of hillsides
• Nolin soils and loamy alluvial soils in depressions in coves and closed karst valleys

Typical Profile

Wallen

Surface layer:
0 to 6 inches; brown gravelly loam

Subsurface layer:
6 to 11 inches; dark yellowish brown very gravelly loam

Subsoil:
11 to 17 inches; dark brown very stony loam
17 to 25 inches; dark yellowish brown very stony loam

Bedrock:
25 inches; sandstone

Bledsoe

Surface layer:
0 to 3 inches; brown loam

Subsurface layer:
3 to 10 inches; yellowish brown loam

Subsoil:
10 to 17 inches; dark brown clay that has yellowish red mottles
17 to 25 inches; strong brown clay that has yellowish red mottles
25 to 37 inches; yellowish red sandy clay that has yellowish brown mottles
37 to 52 inches; yellowish brown clay that has mottles in shades of red
52 to 60 inches; yellowish red clay that has mottles in shades of brown
60 to 79 inches; yellowish red very channery sandy clay loam

Donahue

Surface layer:
0 to 4 inches; dark yellowish brown loam

Subsurface layer:
4 to 9 inches; strong brown loam that has dark yellowish brown intrusions

Subsoil:
9 to 16 inches; strong brown clay loam
16 to 24 inches; strong brown gravelly silty clay
24 to 31 inches; strong brown channery clay that has mottles in shades of brown

Substratum:
31 to 34 inches; yellowish brown channery clay that has mottles in shades of brown

Bedrock:
34 inches; limestone

Soil Properties and Qualities

Wallen

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Moderately low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Bledsoe

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Moderately low or moderate

Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Moderate

Donahue

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Moderate

Use and Management

Cropland

- These soils are not suited to cultivated crops because of the steep slopes and the rock outcrop.

Pasture and Forage

- These soils are poorly suited to pasture and hay because of the steepness of slope and the rock outcrop.

Woodland

- These soils are suited to woodland.
- The species preferred for planting are shortleaf pine, Virginia pine, and loblolly pine in areas of the Wallen soil; white ash, yellow-poplar, and white oak in areas of the Bledsoe soil; and yellow-poplar, white oak, and northern red oak in areas of the Donahue soil.
- See table 7 for specific information related to potential productivity.
- The rock outcrop and bluffs restrict the use of wheeled and track equipment.

Urban Uses

- These soils are poorly suited to most urban uses because of the steepness of slope and the depth to bedrock.

Interpretive Groups

Land capability classification: Wallen, Bledsoe, and Donahue—6e

WbF—Wallen-Bledsoe-Donahue complex, 35 to 50 percent slopes, very rocky

Setting

Landform: Uplands
Landscape position: Hillsides and backslopes
Shape of areas: Irregular
Size of areas: 4 to 616 acres; average size of 103 acres
Major uses: Woodland

Composition

Wallen soil and similar components: 31 percent
Bledsoe soil and similar components: 28 percent
Donahue soil and similar components: 14 percent
Contrasting components: 27 percent (includes 7 percent rock outcrop)

Minor Components

Similar components:
- Caneyville, Gilpin, Lily, and Jefferson soils in landscape positions similar to those of the Wallen, Bledsoe, and Donahue soils

Contrasting components:
- Sandstone outcrops and bluffs on the upper part of hillsides
- Small areas of Nolin and Chagrin soils in closed karst valleys

Typical Profile

Wallen

Surface layer:
0 to 6 inches; brown gravelly loam

Subsurface layer:
6 to 11 inches; dark yellowish brown very gravelly loam

Subsoil:
11 to 17 inches; dark brown very stony loam
17 to 25 inches; dark yellowish brown very stony loam

Bedrock:
25 inches; sandstone

Bledsoe

Surface layer:
0 to 3 inches; brown loam

Subsurface layer:
3 to 10 inches; yellowish brown loam

Subsoil:
10 to 17 inches; dark brown clay that has yellowish red mottles
17 to 25 inches; strong brown clay that has yellowish red mottles
25 to 37 inches; yellowish red sandy clay that has yellowish brown mottles
37 to 52 inches; yellowish brown clay that has mottles in shades of red

52 to 60 inches; yellowish red clay that has mottles in shades of brown
60 to 79 inches; yellowish red very channery sandy clay loam

Donahue

Surface layer:
0 to 4 inches; dark yellowish brown loam

Subsurface layer:
4 to 9 inches; strong brown loam that has dark yellowish brown mottles

Subsoil:
9 to 16 inches; strong brown clay loam
16 to 24 inches; strong brown gravelly silty clay
24 to 31 inches; strong brown channery clay that has mottles in shades of brown

Substratum:
31 to 34 inches; yellowish brown channery clay that has mottles in shades of brown

Bedrock:
34 inches; limestone

Soil Properties and Qualities

Wallen

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately rapid
Runoff: Rapid
Available water capacity: Low
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Bledsoe

Depth: Very deep (more than 60 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Moderately low or moderate
Erosion hazard: Very severe
Tilth: Fair
Shrink-swell potential: Moderate

Donahue

Depth: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Permeability: Moderately slow
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: None
Organic matter content: Low to moderate
Erosion hazard: Very severe
Tilth: Good
Shrink-swell potential: Moderate

Use and Management

Cropland

- These soils are poorly suited to cultivated crops because of the steepness of slope and the rock outcrop.

Pasture and Forage

- These soils are poorly suited to pasture and hay because of the steepness of slope and the rock outcrop.

Woodland

- These soils are suited to woodland.
- The species preferred for planting are shortleaf pine, Virginia pine, and loblolly pine in areas of the Wallen soil; white ash, yellow-poplar, and white oak in areas of the Bledsoe soil; and yellow-poplar, white oak, and northern red oak in areas of the Donahue soil.
- See table 7 for specific information related to potential productivity.
- The rock outcrop and bluffs restrict the use of wheeled and track vehicles.

Urban Uses

These soils are poorly suited to most urban uses because of the steepness of slope and the depth to bedrock.

Interpretive Groups

Land capability classification: Wallen, Bledsoe, and Donahue—7e

WeB—Wellston silt loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Ridges
Shape of areas: Irregular
Size of areas: 3 to 99 acres; average size of 10 acres
Major uses: Cropland

Composition

Wellston soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
• Rosine and Riney soils in landscape positions similar to those of the Wellston soil
Contrasting components:
• Clarkrange, Gilpin, and Lily soils in landscape positions similar to those of the Wellston soil

Typical Profile

Surface layer:
0 to 4 inches; brown silt loam

Subsurface layer:
4 to 11 inches; dark brown silt loam

Subsoil:
11 to 16 inches; strong brown silt loam
16 to 26 inches; dark brown silt loam
26 to 40 inches; strong brown silt loam

Substratum:
40 to 49 inches; yellowish brown clay loam that has brownish yellow mottles
49 to 60 inches; strong brown sandy loam that has pale brown, pink, and brownish yellow mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Slow
Available water capacity: High
Seasonal high water table: None
Organic matter content: Moderately low or moderate
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is well suited to cultivated crops.
• Conservation tillage and contour farming help to control runoff and erosion.
• Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.
• Crops respond favorably to applications of lime and fertilizer.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is well suited to pasture and hay.
• All of the commonly grown grasses and legumes grow well.
• If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
• The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.
• Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

• This soil is well suited to woodland.
• The species preferred for planting are white ash, black walnut, and yellow-poplar.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is well suited to most urban uses.
• The slope is a moderate limitation on sites for septic tank absorption fields and dwellings with basements.
• Low strength is a limitation on sites for local roads and streets. It also is a limitation when the soil is used as a source of roadfill.
• Proper design and installation and adequate site preparation help to overcome the limitations in some areas.

Interpretive Groups

Land capability classification: 2e

WeC2—Wellston silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to 392 acres; average size of 19 acres
Major uses: Pasture and woodland

Composition

Wellston soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
• Rosine and Riney soils in landscape positions similar to those of the Wellston soil
Contrasting components:
• Clarkrange, Gilpin, and Lily soils on the lower side slopes and slope breaks

Typical Profile

Surface layer:
0 to 4 inches; brown silt loam

Subsurface layer:
4 to 11 inches; dark brown silt loam

Subsoil:
11 to 16 inches; strong brown silt loam
16 to 26 inches; dark brown silt loam
26 to 40 inches; strong brown silt loam

Substratum:
40 to 49 inches; yellowish brown clay loam that has brownish yellow mottles
49 to 60 inches; strong brown sandy loam that has pale brown, pink, and brownish yellow mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Moderately low or moderate
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

• This soil is suited to some cultivated crops.
• Measures that reduce the runoff rate and help to control erosion are needed.
• Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.
• The soil can be cultivated throughout a wide range in moisture content.
• Crops respond favorably to applications of lime and fertilizer.
• Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

• This soil is suited to pasture and hay.
• Maintaining the desired species, controlling weeds, maintaining proper stocking rates, applying a rotation grazing system, and applying lime and fertilizer are suitable management practices.
• Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.
• Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

• This soil is well suited to woodland.
• The species preferred for planting are white ash, black walnut, and yellow-poplar.
• See table 7 for specific information related to potential productivity.
• Machine planting is practical.
• Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

• This soil is suited to urban uses.
• Grading and leveling are needed on sites for some urban uses because of the steepness of slope.
• Erosion is a hazard during construction unless precautionary measures are taken.
• A temporary vegetative cover helps to control erosion until a permanent cover can be established.

Interpretive Groups

Land capability classification: 3e

WeD—Wellston silt loam, 12 to 20 percent slopes

Setting

Landform: Uplands
Landscape position: Hillsides and shoulder slopes
Shape of areas: Irregular
Size of areas: 4 to 40 acres; average size of 9 acres
Major uses: Pasture and idle land

Composition

Wellston soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
• Gilpin, Rosine, and Lily soils in landscape positions

similar to those of the Wellston soil
- Soils that have a surface layer of silty clay loam
- Soils underlain by weathered sandstone

Contrasting components:
- A few small areas of eroded soils on slope breaks

Typical Profile

Surface layer:
0 to 4 inches; brown silt loam

Subsurface layer:
4 to 11 inches; dark brown silt loam

Subsoil:
11 to 16 inches; strong brown silt loam
16 to 26 inches; dark brown silt loam
26 to 40 inches; strong brown silt loam

Substratum:
40 to 49 inches; yellowish brown clay loam that has brownish yellow mottles
49 to 60 inches; strong brown sandy loam that has pale brown, pink, and brownish yellow mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Rapid
Available water capacity: High
Seasonal high water table: None
Organic matter content: Moderately low or moderate
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cultivated crops.
- If the soil is cultivated, erosion is a very severe hazard.
- Applying a system of conservation tillage, planting cover crops, and including grasses and legumes in the cropping sequence help to control runoff and erosion and maintain productivity.

Pasture and Forage

- This soil is suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- Pasture renovation should be frequent enough to maintain the desired plants.
- The main management needs are applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are white ash, black walnut, and yellow-poplar.
- See table 7 for specific information related to potential productivity.
- The use of planting and harvesting equipment is limited by the short, steep slopes.

Urban Uses

- This soil is poorly suited to some urban uses.
- Grading and leveling are needed on sites for some urban uses because of the steepness of slope.
- Erosion is a hazard during construction unless precautionary measures are taken.
- A temporary vegetative cover helps to control erosion until a permanent cover can be established.

Interpretive Groups

Land capability classification: 4e

WsC3—Wellston silty clay loam, 6 to 12 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Side slopes
Shape of areas: Irregular
Size of areas: 4 to 38 acres; average size of 9 acres
Major uses: Idle land

Composition

Wellston soil and similar components: 80 to 90 percent
Contrasting components: 10 to 20 percent

Minor Components

Similar components:
- Rosine and Riney soils in landscape positions similar to those of the Wellston soil

Contrasting components:
- Clarkrange, Gilpin, and Lily soils on the lower side slopes and slope breaks

Typical Profile

Surface layer:
0 to 3 inches; brown silty clay loam

Subsoil:
3 to 16 inches; strong brown silty clay loam
16 to 26 inches; brown silt loam
26 to 40 inches; strong brown silt loam

Substratum:
40 to 49 inches; yellowish brown clay loam that has brownish yellow mottles
49 to 60 inches; strong brown sandy loam that has mottles in shades of brown and yellow

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Well drained
Permeability: Moderate
Runoff: Medium
Available water capacity: High
Seasonal high water table: None
Organic matter content: Moderately low or moderate
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cultivated crops because of the effects of past erosion.
- The hazard of erosion is very severe if conventional tillage methods are used.
- Contour farming, stripcropping, and conservation tillage help to control erosion and runoff.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- Crop residue management increases the content of organic matter and thus improves fertility, minimizes crusting, and increases the rate of water infiltration.

Pasture and Forage

- This soil is suited to pasture and hay.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.
- Restricted use by livestock during wet periods helps to prevent soil compaction and excessive damage to plants.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are white ash, black walnut, yellow-poplar, and white oak.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to most urban uses.
- Grading and leveling are needed on sites for some urban uses because of the steepness of slope.
- A temporary vegetative cover helps to control erosion until a permanent cover can be established.

Interpretive Groups

Land capability classification: 4e

ZaB—Zanesville silt loam, 2 to 6 percent slopes

Setting

Landform: Uplands
Landscape position: Ridges and hilltops
Shape of areas: Irregular
Size of areas: 3 to 196 acres; average size of 16 acres
Major uses: Cropland

Composition

Zanesville soil and similar components: 85 to 90 percent
Contrasting components: 10 to 15 percent

Minor Components

Similar components:
- Clarkrange and Sadler soils in landscape positions similar to those of the Zanesville soil

Contrasting components:
- Wellston soils on points and ridges
- Soils underlain by soft bedrock

Typical Profile

Surface layer:
0 to 7 inches; yellowish brown silt loam

Subsurface layer:
7 to 11 inches; yellowish brown silt loam

Subsoil:
11 to 18 inches; dark yellowish brown silty clay loam
18 to 24 inches; yellowish brown silt loam

24 to 31 inches; a fragipan of yellowish brown silt loam that has brown and gray mottles
31 to 40 inches; a fragipan of yellowish brown silt loam that has gray mottles

Substratum:
40 to 51 inches; strong brown silt loam that has yellowish brown mottles
51 to 60 inches; brownish yellow silt loam that has gray mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 2 to 3 feet
Organic matter content: Moderately low
Erosion hazard: Moderate
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- Erosion is a moderate hazard if cultivated crops are grown.
- Crops respond favorably to applications of lime and fertilizer.
- The soil can be cultivated throughout a wide range in moisture content.
- No-till planting, minimum tillage, cover crops, and a crop rotation that includes grasses and legumes help to control runoff and erosion.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.

Pasture and Forage

- This soil is well suited to pasture and hay.
- The soil is suited to most grasses and legumes grown in the survey area; however, some deep-rooted crops are short lived.
- The main management needs include applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are yellow-poplar, white pine, and white oak.
- Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to some urban uses.
- The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
- Erosion is a hazard during construction unless precautionary measures are taken.
- A temporary vegetative cover helps to control erosion until a permanent cover can be established.
- Proper design and installation may reduce or help to overcome the limitations.

Interpretive Groups

Land capability classification: 2e

ZaC2—Zanesville silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Uplands
Landscape position: Hilltops, side slopes, and toeslopes
Shape of areas: Irregular
Size of areas: 4 to 88 acres; average size of 13 acres
Major uses: Cropland

Composition

Zanesville soil and similar components: 75 to 80 percent
Contrasting components: 20 to 25 percent

Minor Components

Similar components:
- Clarkrange soils in landscape positions similar to those of the Zanesville soil

Contrasting components:
- Frondorf and Rosine soils and soils underlain by soft bedrock; in landscape positions similar to those of the Zanesville soil

Typical Profile

Surface layer:
0 to 7 inches; yellowish brown silt loam

Subsurface layer:
7 to 11 inches; yellowish brown silt loam

Subsoil:
11 to 18 inches; dark yellowish brown silty clay loam
18 to 24 inches; yellowish brown silt loam
24 to 31 inches; a fragipan of yellowish brown silt loam that has brown and gray mottles
31 to 40 inches; a fragipan of yellowish brown silt loam that has gray mottles

Substratum:
40 to 51 inches; strong brown silt loam that has yellowish brown mottles
51 to 60 inches; brownish yellow silt loam that has gray mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 2 to 3 feet
Organic matter content: Moderately low
Erosion hazard: Severe
Tilth: Good
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is suited to cultivated crops.
- The hazard of erosion is severe if conventional tillage methods are used.
- Contour farming, stripcropping, and conservation tillage help to control erosion and runoff.
- Tilth and the organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- Crops respond favorably to applications of lime and fertilizer.
- The soil can be cultivated throughout a wide range in moisture content.

Pasture and Forage

- This soil is suited to pasture and hay.
- All of the commonly grown grasses and legumes grow well; however, some deep-rooted plants are short lived.
- If pasture is to be established, the species selected for planting and the seeding rates should be those that result in high-quality forage and provide adequate ground cover.
- The main management needs include applications of lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule.

Woodland

- This soil is well suited to woodland.
- The species preferred for planting are yellow-poplar, eastern white pine, and white oak.
- Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is suited to some urban uses.
- Grading and leveling are needed on sites for some urban uses.
- Erosion is a hazard during construction unless precautionary measures are taken.
- A temporary vegetative cover helps to control erosion until a permanent cover can be established.

Interpretive Groups

Land capability classification: 3e

ZnC3—Zanesville silty clay loam, 6 to 12 percent slopes, severely eroded

Setting

Landform: Uplands
Landscape position: Hilltops, side slopes, and toeslopes
Shape of areas: Irregular
Size of areas: 3 to 77 acres; average size of 20 acres
Major uses: Woodland

Composition

Zanesville soil and similar components: 75 to 80 percent
Contrasting components: 20 to 25 percent

Minor Components

Similar components:
- Clarkrange soils in landscape positions similar to those of the Zanesville soil

Contrasting components:
- Frondorf, Rosine, and Wellston soils
- Soils underlain by soft bedrock

Typical Profile

Surface layer:
0 to 2 inches; yellowish brown silty clay loam

Subsurface layer:
2 to 6 inches; yellowish brown silty clay loam

Subsoil:
6 to 18 inches; dark yellowish brown silt loam
18 to 24 inches; yellowish brown silty clay loam
24 to 31 inches; a fragipan of yellowish brown silt loam that has brown and gray mottles
31 to 40 inches; a fragipan of yellowish brown silt loam that has gray mottles

Substratum:
40 to 51 inches; strong brown silt loam that has yellowish brown mottles
51 to 60 inches; brownish yellow silt loam that has gray mottles

Soil Properties and Qualities

Depth: Deep or very deep (more than 40 inches)
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Runoff: Medium
Available water capacity: Moderate
Seasonal high water table: At a depth of 2 to 3 feet
Organic matter content: Moderately low
Erosion hazard: Very severe
Tilth: Poor
Shrink-swell potential: Low

Use and Management

Cropland

- This soil is poorly suited to cultivated crops because of the effects of past erosion.
- The hazard of erosion is very severe if conventional tillage methods are used.
- Contour farming, stripcropping, and conservation tillage help to control erosion and runoff.
- The organic matter content can be maintained or improved by implementing crop residue management techniques and including grasses and legumes in the cropping sequence.
- Tilth can be improved by implementing crop residue management techniques, tilling under proper moisture conditions, and including grasses and legumes in the cropping sequence.
- Crops respond favorably to applications of lime and fertilizer.

Pasture and Forage

- This soil is suited to pasture and hay.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control help to maintain the desired plants.
- Maintaining good stands of grasses and legumes and maintaining a high fertility level can help to control erosion in pastured areas.

Woodland

- This soil is suited to woodland.
- The species preferred for planting are yellow-poplar, eastern white pine, and white oak.
- Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed.
- See table 7 for specific information related to potential productivity.
- Machine planting is practical.
- Reforestation after harvesting must be carefully managed to reduce competition from undesirable plants.

Urban Uses

- This soil is poorly suited to most urban uses.
- Establishing vegetation is somewhat difficult because erosion has removed most of the original surface layer.
- Grading and leveling are needed in areas used for some urban development because of the steepness of slope.
- A temporary vegetative cover helps to control erosion until a permanent cover can be established.
- The restricted permeability in the compact and brittle fragipan is a limitation on sites for septic tank absorption fields.
- Proper design and site preparation help to overcome some of the limitations.

Interpretive Groups

Land capability classification: 4e

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 potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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

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

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

Crops and Pasture

Sam VanMeter, district conservationist, Natural Resources Conservation Service, help 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.

The acreage of land in the survey area that has potential for cropland or pasture has been somewhat reduced in the past by strip mining and various kinds of development. Some of the soils in strip-mined areas have good potential for either cropland or pasture, and the soils in most of the developed areas have good potential for both cropland and pasture. More than 15,000 acres has been strip mined in the survey area. Some soils, especially soils that can be drained, are being converted from woodland to cropland or pasture, but there is still an overall net loss of cropland and pasture in the survey area. This soil survey should help in making the correct land use decisions for the soils of the survey area.

The soils in the survey area have good potential for increased food production. About 67,806 acres of potential cropland in the survey area is currently being used as privately owned woodland, and about 65,000 acres is being used as pasture.

In 1993, about 210,365 acres in the survey area was used as cropland or as hay and pasture. Of this total, 42,657 acres was harvested cropland, 38,130 acres was used for hay, and 129,578 acres was idle cropland or pasture.

The principal row crops in the county are corn, soybeans, and tobacco. The field crops suited to the soils and climate of Butler and Edmonson Counties include many that are not commonly grown. Grain sorghum, sunflowers, and potatoes can be grown, for example, if economic conditions are favorable. Wheat is the most common close-growing crop, and a small acreage of cropland is used for oats. Rye, barley, buckwheat, and flax could be grown, and grass seed

could be produced from orchardgrass, fescue, and timothy.

About 2,300 acres of alfalfa is grown in the survey area. If properly managed, this high-quality legume thrives in areas of deep, well drained soils in the limestone uplands, such as on the Crider and Pembroke soils. It may also be adaptable to less favorable soils if a high level of management is applied.

The specialty crops grown in the survey area are vegetables and nursery stock. A small acreage of land is used for melons, strawberries, sweet corn, tomatoes, peppers, or small fruits.

Deep and very deep soils that are characterized by good natural drainage and warm up early in spring are especially well suited to vegetables and fruits. Pembroke and Crider soils are examples of these soils. Crops generally can be planted and harvested earlier on these soils than on other soils in the survey area.

The main management needs on the cropland and pasture in the survey area are measures that control erosion, reduce wetness, and maintain or improve fertility and tilth.

Water erosion is a concern on nearly a third of the cropland and pasture in the survey area. It is a hazard where slopes are more than 2 percent.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Fredonia soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone, such as the fragipan in the Otwell and Clarkrange soils and the bedrock underlying the Caneyville and Lily soils. Second, erosion on farmland results in the pollution of streams. Control of erosion minimizes this pollution and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

A cropping sequence that keeps a plant cover on the surface for extended periods generally can keep soil losses to an amount that does not reduce the productivity of the soil. In sloping areas on livestock farms, which require pasture and hay, including forage crops of grasses and legumes in the cropping sequence helps to control erosion. The forage crops also add nitrogen to the soil and improve soil tilth.

Minimizing tillage and leaving crop residue on the surface increase the rate of water infiltration and reduce the hazards of runoff and erosion. These practices can be effective on most of the upland soils in the survey area.

Terraces and diversions reduce the length of slopes and thus help to control runoff and erosion. These measures are less effective on soils that have irregular slopes, are excessively wet in the terrace channels, have a clayey subsoil that would be exposed in the terrace channels, or have bedrock within a depth of 40 inches.

Contour farming and contour stripcropping help to control erosion in the survey area. They are best suited to soils that have smooth, uniform slopes, including most areas of Allegheny, Crider, Elk, Clarkrange, Sadler, Wellston, and Zanesville soils. Soils in areas characterized by karst topography, such as Pembroke, Baxter, Crider, and Fredonia soils, have irregular slopes that make contour farming and terraces unfeasible.

Information about erosion-control measures for each kind of soil in the survey area is available at the local office of the Natural Resources Conservation Service.

Some soils in the survey area, such as Melvin, Dunning, and Mullins soils, have a seasonal high water table that affects some uses. Information regarding management measures, such as tiling or installing a subsurface drainage system, needed in areas of these soils can be obtained at the local office of the Natural Resources Conservation Service.

Many soils on uplands are very strongly acid unless the surface has been limed. Applications of ground limestone are needed to raise the pH level sufficiently for optimum yields of most crops. The levels of available phosphorus and potash are naturally low in most of these soils. Additions of lime and fertilizer should be based on the results of soil tests, the needs of the crop, and the expected level of yields. The Cooperative Extension Service can help to determine the kind and amount of fertilizer and lime needed and the proper method of application.

Soil tilth is an important factor affecting seed germination and the infiltration of water into the soil. Soils with good tilth are granular and porous.

Most of the soils in the survey area that are used for crops have a surface layer of silt loam that is light in color and low in organic matter content. Generally, the structure of such soils is weak. A surface crust forms during periods of heavy rainfall. The crust is hard when dry and nearly impervious to water. It reduces the rate of water infiltration and increases the runoff rate. Germinating seeds have difficulty penetrating this crusted surface. Crop rotations that include grasses and legumes or a conservation tillage system can improve soil structure and minimize crusting.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The 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 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the 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. Only class and subclass are used in this survey (USDA 1961).

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, rangeland, woodland, wildlife habitat, or recreation.

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

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial and commercial sites, sites for institutions or public buildings, parks, golf courses, sanitary landfills, cemeteries, or water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks. In part of the survey area, 8,000 acres of land in Mammoth Cave National Park would be considered prime farmland if it were not a National park and available for farming.

Nearly 27 percent of the total acreage in the survey area, or 127,009 acres, meets the soil requirements for prime farmland. Of this total, 86,273 acres is in Butler County and 40,736 acres is in Edmonson County. In Butler County the prime farmland is mainly in associations 1, 2, 4, 6, and 8, and in Edmonson County it is mainly in associations 1, 2, 4, 6, and 9, which are described under the heading "General Soil Map Units."

In 1994, about 81,000 acres of farmland was harvested for crops. Most harvested crops are grown in areas of prime farmland. The harvested crops, which are mainly corn, soybeans, and tobacco, account for an estimated 46 percent of Butler and Edmonson Counties' total agricultural income each year (Kentucky Agricultural Statistics Service 1994).

The map units in the survey area that are considered prime farmland are listed at the end of this section. 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."

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

AlB Allegheny loam, 2 to 6 percent slopes
BaB Baxter gravelly silt loam, 2 to 6 percent slopes
CaB2 Caneyville silt loam, 2 to 6 percent slopes, eroded
Cn Chagrin loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
CoB Clarkrange silt loam, 2 to 6 percent slopes
Cp Clifty gravelly silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
CrB Crider silt loam, 2 to 6 percent slopes
Du Dunning silty clay loam, occasionally flooded (where drained)
EkB Elk silt loam, 2 to 6 percent slopes, rarely flooded
EpB Epley silt loam, 2 to 6 percent slopes
GnB2 Gilpin loam, 2 to 6 percent slopes, eroded
Gr Grigsby fine sandy loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
Jo Johnsburg silt loam (where drained)

Ka Karnak silty clay loam, frequently flooded (where drained and protected from flooding or not frequently flooded during the growing season)
Kb Karnak silty clay loam, overwash, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
Le Lawrence silt loam, occasionally flooded (where drained)
LyB Lily loam, 2 to 6 percent slopes
Me Melvin silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
Ne 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 either protected from flooding or not frequently flooded during the growing season)
OwB Otwell silt loam, 2 to 6 percent slopes, occasionally flooded
PeB Pembroke silt loam, 2 to 6 percent slopes
ReB2 Riney silt loam, 2 to 6 percent slopes, eroded
RoB Rosine silt loam, 2 to 6 percent slopes
SaB Sadler silt loam, 2 to 6 percent slopes
ScB Sciotoville silt loam, 2 to 6 percent slopes
WeB Wellston silt loam, 2 to 6 percent slopes
ZaB Zanesville silt loam, 2 to 6 percent slopes

Woodland Management and Productivity

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed.

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.

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

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

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 species that is followed by an asterisk under *common trees* 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.

Recreation

The soils of the survey area are rated in table 8 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 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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 (Anderson 1951).

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife (Allan, Garland, and Dugan 1963). This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

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

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

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

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

Hardwood trees produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry.

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 smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

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

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

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. 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, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, 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, 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 10 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. 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 11 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 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 groundwater 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 12 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. 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.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

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

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

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

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

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and 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. These results are reported in table 20.

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 (University of Kentucky 1988a, 1988b; USDA 1996). 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 14 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. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (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 15 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 water movement when the soil is saturated (Uhland and O'Neal 1951). 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*, 6 to 9 percent; and *very high*, more 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 16 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.

If a soil is assigned to two hydrologic groups in the table, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, 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 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.

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

The results of physical analysis of several typical pedons in the survey area are given in table 17 and the results of chemical analysis in table 18. The data are for soils sampled at carefully selected sites. Unless otherwise indicated, the pedons are typical of the series. They are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Soil Survey Laboratory, Natural Resources Conservation Service, at Lincoln, Nebraska, and the Kentucky Agricultural Experiment Station, Lexington, Kentucky.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in obtaining the data are indicated in the list that follows. Unless otherwise indicated, the codes in parentheses refer to methods used by the Soil Survey Laboratory in Lincoln, Nebraska (USDA 1996).

Coarse materials—(2-75 mm fraction) weight estimates of the percentages of all material less than 75 mm (3B1).
Sand—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).
Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).
Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).
Organic carbon—acid-dichromate digestion, ferric sulfate titration (6A1a).
Extractable cations—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b).
Extractable acidity—barium chloride-triethanolamine IV (6H5a).
Cation-exchange capacity—ammonium acetate, pH 7.0, steam distillation (5A8b).
Cation-exchange capacity—sum of cations (5A3a).
Base saturation—ammonium acetate, pH 7.0 (5C1).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1a).
Reaction (pH)—SMP buffer (Kentucky Agricultural Experiment Station method 8D7).
Available phosphorus—Bray P-1 (6S3).
Field sampling—site selection (1A1).
Field sampling—soil sampling (1A2).
Laboratory preparation—standard (air-dry) material (1B1).
Data sheet symbols (2B).
Particles—greater than 2 mm by field or laboratory weighing (3B1a).
Particles—(specified size) 2 mm (2A2).
Particles—less than 2 mm (2A1).
Extractable bases (5B1a).
Calcium carbonate equivalent—gravimetric (6E1c).
Potassium—ammonium acetate extraction, atomic absorption II (6Q2c).

Mineralogy of Selected Soils

The results of mineralogy determinations of a typical pedon are given in table 19. The pedon is typical of the series and is described in the section "Soil Series and Their Morphology." The soil was tested by the Kentucky Agricultural Experiment Station, Lexington, Kentucky.

Engineering Index Test Data

Table 20 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soil Mechanics Laboratory, Natural Resources Conservation Service, Fort Worth, Texas.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); Moisture density—T 99 (AASHTO), D 698 (ASTM); and Specific gravity—T 100 (AASHTO), D 854 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff 1975, 1992). 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 21 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 Alfisol.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; 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 Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic 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 Hapludalfs.

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 fine, mixed, mesic Typic Hapludalfs.

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. The Caneyville series is an example of a fine, mixed, mesic Typic Hapludalf.

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" (Soil Survey Division Staff 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff 1975) and in "Keys to Soil Taxonomy" (Soil Survey Staff 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."

Allegheny Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: High terraces and footslopes
Parent material: Loamy alluvium derived from sandstone, siltstone, and shale

Slope: 2 to 20 percent
Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludults
Taxadjunct statement: The Allegheny soils in this survey area are taxadjuncts to the series because they have hue of 5YR in the part of the subsoil below a depth of 36 inches. The use, management, and behavior of the soils are similar to those of the Allegheny series.

Associated Soils

Allegheny soils are adjacent to Wellston, Clarkrange, and Gilpin soils on the higher parts of the landscape and Newark, Johnsburg, Melvin, and Nolin soils on flood plains and low terraces. Wellston soils have a fine-silty control section, Clarkrange soils have a fragipan, and Gilpin soils have a fine-loamy control section and are moderately deep. Newark soils are somewhat poorly drained. Johnsburg soils have a fragipan, Melvin soils are poorly drained, and Nolin soils have a fine-silty control section and are well drained.

Typical Pedon

Allegheny loam, 12 to 20 percent slopes, eroded, in Butler County; about 1.5 miles south of Rochester, 0.5 mile west of Kentucky Highway 70 on a farm road to a farmstead, 200 feet east in a wooded area; long. 86 degrees 52 minutes 57 seconds and lat. 37 degrees 08 minutes 36 seconds:

A—0 to 4 inches; dark brown (10YR 4/3) loam; weak fine and moderate medium granular structure; very friable; many fine roots; moderately acid; abrupt smooth boundary.
BE—4 to 9 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky and weak fine granular structure; friable; common fine roots; very strongly acid; gradual smooth boundary.
Bt1—9 to 20 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; many fine roots; few faint clay films; very strongly acid; clear smooth boundary.
Bt2—20 to 36 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium granular structure parting to weak fine granular; very friable; few faint clay films; very strongly acid; clear smooth boundary.
CB—36 to 46 inches; yellowish red (5YR 4/6) loamy sand; weak fine granular structure parting to single grain; very strongly acid; clear smooth boundary.
C—46 to 65 inches; strong brown (7.5YR 5/8) loam; moderate medium subangular blocky structure; friable; yellowish brown (10YR 5/6) and brown (7.5YR 4/4) mottles; 10 to 15 percent sandstone fragments; very strongly acid.

Range in Characteristics

Thickness of the solum: 30 to 60 inches
Kind of rock fragments: Rounded quartz pebbles
Reaction: Extremely acid to strongly acid

Ap or A horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—loam
Content of rock fragments—0 to 15 percent

BE horizon (and E horizon if it occurs):
Hue—7.5YR to 2.5Y
Value—4 or 5
Chroma—3 to 8
Texture of the fine-earth fraction—loam

Bt horizon:
Hue—5YR or 10YR
Value—4 or 5
Chroma—3 to 8
Lithochromic mottles—in shades of brown or yellow
Content of rock fragments—0 to 30 percent
Texture of the fine-earth fraction—loam or sandy clay loam

CB and C horizons:
Hue—5YR, 7.5YR, or 10YR
Value—4 or 5
Chroma—6 to 8
Lithochromic mottles—in shades of brown, yellow, gray, or olive
Content of rock fragments—0 to 35 percent
Texture—loamy sand, loam, sandy clay loam, clay loam, or the gravelly analogs of those textures

Baxter Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Karst plains
Parent material: Clayey residuum derived from cherty limestone
Slope: 2 to 30 percent
Taxonomic class: Fine, mixed, mesic Typic Paleudalfs

Associated Soils

Baxter soils are associated with Crider and Pembroke soils, which have a fine-silty control section.

Typical Pedon

Baxter gravelly silt loam, 6 to 12 percent slopes, eroded, in Edmonson County; about 0.89 mile south of the intersection of U.S. Highway 31-W and Cedar Hill-Sinking Road, then 0.56 mile east of Cedar Hill-Sinking Road in a pasture; long. 86 degrees 04 minutes 39 seconds and lat. 37 degrees 04 minutes 54 seconds:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) gravelly silt loam; weak and moderate fine granular structure; friable; common fine roots; 16 percent rock fragments; neutral; abrupt smooth boundary.

BA—9 to 14 inches; strong brown (7.5YR 4/6) gravelly silty clay loam; weak fine and medium subangular blocky structure; friable; few fine roots; 18 percent angular chert pebbles ½ inch to 6 inches in diameter, 5 percent less than 3 inches in diameter; slightly acid; clear smooth boundary.

Bt1—14 to 23 inches; yellowish red (5YR 4/6) gravelly silty clay; moderate medium and coarse subangular blocky structure parting to weak fine subangular blocky; firm; many fine roots; many prominent clay films on faces of peds; 18 percent angular chert pebbles; slightly acid; gradual wavy boundary.

Bt2—23 to 37 inches; red (2.5YR 4/6) gravelly clay; moderate coarse subangular blocky structure parting to weak fine subangular and angular blocky; firm; few fine roots; many prominent clay films on faces of peds; 25 percent angular chert pebbles; strongly acid; gradual smooth boundary.

Bt3—37 to 60 inches; dark red (2.5YR 3/6) very gravelly clay; moderate medium angular blocky structure parting to moderate fine angular blocky; firm, plastic and sticky; many prominent clay films on faces of peds; 40 percent rock fragments, 50 percent of which are as much as 3 inches in diameter; very strongly acid; gradual smooth boundary.

Range in Characteristics

Thickness of the solum: 60 to 100 inches
Kind of rock fragments: Chert
Reaction: Strongly acid or very strongly acid, except where the surface layer has been limed

A or Ap horizon:
- Hue—10YR or 7.5YR
- Value—4 or 5
- Chroma—2 to 4
- Content of rock fragments—10 to 30 percent
- Texture of the fine-earth fraction—silt loam or silty clay loam

BA horizon:
- Hue—10YR to 2.5YR
- Value—4 to 6
- Chroma—4 to 6
- Texture—silt loam, silty clay loam, or the gravelly analogs of those textures

Upper part of the Bt horizon:
- Hue—10YR to 2.5YR
- Value—4 to 6
- Chroma—4 to 6
- Texture—silt loam, silty clay loam, or the gravelly analogs of those textures
- Content of rock fragments—15 to 30 percent

Lower part of the Bt horizon:
- Hue—5YR to 10R
- Value—3 to 5
- Chroma—4 to 8
- Texture—silty clay, clay, or the gravelly analogs of those textures
- Content of rock fragments—5 to 30 percent
- Lithochromic mottles—in shades of red, brown, olive, or gray
- Relict redoximorphic concentrations and stains—in shades of black or brown

C horizon (if it occurs):
- Colors and textures similar to those in the lower part of the Bt horizon

Bethesda Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Material that has been moved in the surface mining of coal (soil material containing broken or crushed pieces of bedrock, which was above the coal, and broken pieces of coal)
Slope: 2 to 35 percent
Taxonomic class: Loamy-skeletal, mixed, acid, mesic Typic Udorthents

Associated Soils

Bethesda soils are associated with Clarkrange, Latham, Gilpin, Shelocta, and Fairpoint soils. Clarkrange soils have a fragipan and are moderately well drained. Latham soils are clayey and well drained. Gilpin soils are moderately deep. Shelocta soils are

gravelly and shaly. Fairpoint soils are nonacid and are in reclaimed strip-mine areas.

Typical Pedon

Bethesda channery silty clay loam, in an area of Bethesda-Fairpoint soils, 2 to 6 percent slopes, in Butler County; 2.4 miles southeast of Jetson on Kentucky Highway 70, about 2.0 miles south of the junction of Kentucky Highway 1328 and Old Greenwich School Road, 0.5 mile from the junction of Old Greenwich School Road and Gary Ridge Road, then 0.42 mile northeast of Gary Ridge Road, in a reclaimed strip-mine area; long. 86 degrees 31 minutes 32 seconds and lat. 37 degrees 13 minutes 12 seconds:

Ap—0 to 6 inches; yellowish brown (10YR 5/6) channery silty clay loam; weak coarse prismatic structure; friable; few fine roots; 25 percent shale, sandstone, coal, and siltstone fragments; very strongly acid; clear smooth boundary.

C1—6 to 21 inches; variegated yellowish brown (10YR 5/8) and dark brown (10YR 4/3) very channery clay loam; massive; very firm; 50 percent shale, sandstone, coal, and siltstone fragments; very strongly acid; clear smooth boundary.

C2—21 to 62 inches; variegated yellowish brown (10YR 5/4) and dark brown (10YR 4/3) very channery clay loam; massive; very firm; 50 percent shale, sandstone, coal, and siltstone fragments; very strongly acid.

Range in Characteristics

Kind of rock fragments: Shale, siltstone, sandstone, and coal

Reaction: Strongly acid to extremely acid

A or Ap horizon (in reclaimed areas):
- Hue—7.5YR or 10YR
- Value—3 or 5
- Chroma—1 to 4
- Mottles—in shades of brown
- Texture—loam, silty clay loam, silt loam, or the gravelly, very gravelly, or channery analogs of those textures

C horizon:
- Hue—7.5YR to 5Y or neutral
- Value—3 to 6
- Chroma—0 to 8
- Texture—silty clay loam, clay loam, silt loam, loam, or the gravelly or channery analogs of those textures

Bledsoe Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Loamy and clayey colluvium over residuum derived from limestone, siltstone, shale, and sandstone
Slope: 15 to 50 percent
Taxonomic class: Fine, mixed, mesic Typic Hapludalfs

Associated Soils

Bledsoe soils are associated on the landscape with Wallen, Caneyville, and Fredonia soils. Wallen soils are in a loamy-skeletal family and are moderately deep to weathered sandstone. Caneyville and Fredonia soils are in a fine textured family and are moderately deep to limestone bedrock.

Typical Pedon

Bledsoe loam, in an area of Wallen-Bledsoe-Donahue complex, 15 to 35 percent slopes, very rocky, in Edmonson County; approximately 1.9 miles east of the intersection of Kentucky Highway 1352 and Ugly Creek Road, then 50 feet south of Ugly Creek Road, on a footslope; long. 86 degrees 05 minutes 36 seconds and lat. 37 degrees 14 minutes 00 seconds:

A—0 to 3 inches; brown (10YR 4/3) loam; moderate very fine granular structure; friable; many fine and common medium roots; moderately acid; clear wavy boundary.

E—3 to 10 inches; yellowish brown (10YR 5/4) loam; moderate fine granular structure; very friable; many fine and common medium roots; moderately acid; abrupt wavy boundary.

2Bt1—10 to 17 inches; dark brown (7.5YR 4/4) clay; few fine distinct yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine and common medium roots; many distinct continuous clay films on faces of peds; 1 percent sandstone fragments; slightly acid; clear wavy boundary.

2Bt2—17 to 25 inches; strong brown (7.5YR 5/6) clay; common medium distinct yellowish red (5YR 4/6) mottles; strong fine and medium subangular blocky structure; firm; common fine and medium roots; many distinct continuous clay films on faces of peds; common fine black stains; 5 percent sandstone fragments less than 3 inches in diameter; slightly acid; clear wavy boundary.

2Bt3—25 to 37 inches; yellowish red (5YR 4/6) sandy clay; few medium distinct yellowish brown (10YR 5/6) mottles; strong fine and medium subangular blocky structure; common fine roots; many prominent continuous clay films on faces of peds; many fine black (N 2.5/0) stains on faces of peds; 10 percent sandstone fragments; slightly acid; clear wavy boundary.

2Bt4—37 to 52 inches; yellowish brown (10YR 5/6) clay; many medium distinct yellowish red (5YR 4/6) mottles; strong medium angular blocky structure; firm; few fine roots; many prominent continuous clay films on faces of peds; many fine black (N 2.5/0) stains around pores and on faces of peds; 2 percent sandstone fragments less than 3 inches in diameter; slightly acid; clear wavy boundary.

2Bt5—52 to 60 inches; yellowish red (5YR 4/6) clay; few fine prominent brownish yellow (10YR 6/8) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; many distinct continuous clay films on faces of peds; common fine stains; 5 percent sandstone fragments; slightly acid; abrupt wavy boundary.

2Bt6—60 to 79 inches; yellowish red (5YR 5/6) very channery sandy clay loam; moderate medium angular blocky structure; firm; few fine roots; common distinct discontinuous clay films on faces of peds; common fine black (N 2.5/0) stains; 40 percent sandstone channers throughout the horizon; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to 80 inches
Kind of rock fragments: Sandstone fragments or quartzite pebbles and limestone and sandstone fragments in the 2Bt horizon
Reaction: Moderately acid to slightly alkaline throughout the profile

A horizon:
- Hue—10YR
- Value—3 or 4
- Chroma—2 to 4
- Texture of the fine-earth fraction—loam
- Content of rock fragments—0 to 15 percent

E horizon (and BE horizon if it occurs):
- Hue—10YR or 7.5YR
- Value—4 to 6
- Chroma—4 to 6
- Content of rock fragments—0 to 15 percent
- Texture of the fine-earth fraction—loam, fine sandy loam, or sandy loam

Bt1 horizon (if it occurs):
- Hue—10YR or 7.5YR
- Value—4 or 5
- Chroma—4 to 6
- Content of rock fragments—0 to 15 percent
- Texture of the fine-earth fraction—loam, sandy clay loam, or sandy loam

2Bt horizon:
- Hue—7.5YR or 10YR
- Value—4 or 5
- Chroma—4 to 8
- Content of rock fragments—0 to 20 percent
- Lithochromic mottles—in shades of brown, red, or gray
- Texture—clay loam, silty clay, clay, sandy clay, sandy clay loam, or the gravelly or channery analogs of those textures

Caneyville Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Residuum derived from limestone
Slope: 2 to 35 percent
Taxonomic class: Fine, mixed, mesic Typic Hapludalfs

Associated Soils

Caneyville soils are associated with Wellston, Frondorf, Lenberg, Rosine, Clarkrange, and Zanesville soils. Wellston soils are deep to sandstone and shale bedrock and have less clay in the subsoil than the Caneyville soils. Frondorf soils formed mostly in residuum derived from siltstone and sandstone and have less clay in the subsoil than the Caneyville soils. Lenberg soils are moderately deep to weathered, acid, clayey shale. Rosine soils formed partly in acid, clayey shale residuum and are moderately deep or deep to bedrock. Clarkrange and Zanesville soils are deeper to bedrock than the Caneyville soils and have a fragipan.

Typical Pedon

Caneyville silt loam, in an area of Caneyville-Lenberg complex, 8 to 20 percent slopes; about 1.92 miles southeast of Davis Crossroad at the intersection of Kentucky Highway 79 and Kentucky Highway 626, then 1.37 miles east on Kentucky Highway 626 to the intersection of Kentucky Highway 626 and Githens Cemetery Road, 2,000 feet south on Githens Cemetery Road, and 1,000 feet southeast of Githens Cemetery Road, in a wooded area of pasture; long. 86

degrees 43 minutes 27 seconds and lat. 37 degrees 02 minutes 12 seconds:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; weak and moderate medium granular structure; very friable; many fine roots; strongly acid; abrupt smooth boundary.
Bt1—5 to 21 inches; yellowish red (5YR 4/6) silty clay; moderate fine and medium angular blocky structure; firm; strongly acid; gradual smooth boundary.
Bt2—21 to 28 inches; strong brown (7.5YR 5/6) clay; common medium faint reddish brown (5YR 4/4) and grayish brown (10YR 5/2) mottles; moderate fine and medium angular blocky structure; very firm; moderately acid; abrupt smooth boundary.
R—28 inches; limestone bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kinds of rock fragments: Limestone, chert, and sandstone
Reaction: Very strongly acid to slightly acid in the upper part of the solum and moderately acid or slightly acid in the lower part

A or Ap horizon:
Hue—7.5YR or 10YR
Value—3 or 4
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam

E and BE horizons (if they occur):
Hue—10YR
Value—4 or 5
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—7.5YR to 2.5YR
Value—4 or 5
Chroma—4 to 6
Lithochromic mottles—in shades of brown, yellow, red, or gray
Content of rock fragments—0 to 15 percent
Texture of the fine-earth fraction—silty clay or clay

C or BC horizon (if it occurs):
Color of matrix and mottles—shades of red, brown, yellow, or olive
Lithochromic mottles—in shades of gray
Texture of the fine-earth fraction—silty clay or clay

Carpenter Series

Depth class: Deep or very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Colluvium over weathered shale or siltstone
Slope: 12 to 30 percent
Taxonomic class: Fine-loamy, mixed, mesic Ultic Hapludalfs

Associated Soils

Carpenter soils are associated on the landscape with Lenberg, Lily, and Rosine soils. These associated soils are in landscape positions similar to those of the Carpenter soils. Lenberg soils are in a fine textured family and are moderately deep to greenish gray, weathered shale. Lily soils are moderately deep and formed in residuum derived from sandstone. Rosine soils are deep and well drained and formed in residuum derived from shale, sandstone, and siltstone.

Typical Pedon

Carpenter silt loam, in an area of Carpenter-Lenberg complex, 20 to 30 percent slopes, in Edmonson County; approximately 5 miles north of Straw and 3.7 miles north of the intersection of Kentucky Highway 728 and Kentucky Highway 1827; 1.11 miles west on Dog Creek Road and Kentucky Highway 1827, then 0.56 mile north of Dog Creek-Long Fall Road, in a wooded area around Nolin Lake; long. 86 degrees 10 minutes 11 seconds and lat. 37 degrees 19 minutes 38 seconds:

A—0 to 7 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; very friable; few fine, medium, and coarse roots; 10 percent sandstone pebbles; slightly acid; gradual wavy boundary.
Bt1—7 to 16 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine and medium roots; 5 percent sandstone channers and pebbles; few faint clay films on faces of peds; moderately acid; gradual smooth boundary.
Bt2—16 to 23 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium and fine subangular blocky structure; friable; few fine and medium roots; 10 percent sandstone pebbles and channers; few faint clay films on faces of peds; moderately acid; gradual wavy boundary.
2BC—23 to 40 inches; strong brown (7.5YR 5/6) very gravelly silty clay loam; few faint light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few medium roots; 37 percent sandstone pebbles and cobbles; few faint clay

films on faces of peds; strongly acid; gradual wavy boundary.
2C1—40 to 42 inches; strong brown (7.5YR 5/6) silty clay loam; few faint olive yellow (2.5Y 6/8) and light olive brown (2.5Y 5/8) mottles; massive; firm; slightly acid; gradual wavy boundary.
2C2—42 to 57 inches; olive (5Y 5/6) clay; massive; firm; slightly acid; abrupt smooth boundary.
2Cr—57 inches; soft, gray shale.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Siltstone and shale
Reaction: Very strongly acid to slightly acid in the upper part of the solum and very strongly acid to moderately acid in the lower part of the solum and in the C horizon

A or Ap horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—2 or 3
Content of rock fragments—2 to 20 percent
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—5YR, 7.5YR, 10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—4 to 8
Lithochromic mottles—in shades of brown, red, or gray
Content of rock fragments—5 to 20 percent
Texture—silty clay loam, clay loam, or the gravelly analogs of those textures

2BC horizon:
Hue—5YR, 7.5YR, 10YR, or 5Y
Value—4 to 6
Chroma—3 to 8
Content of rock fragments—0 to 20 percent
Lithochromic mottles—in shades of gray or brown
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay

2C horizon:
Hue—5YR, 7.5YR, 10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—2 to 8
Content of rock fragments—0 to 20 percent
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay

Chagrin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Recent alluvium derived from limestone and calcareous shale
Slope: 0 to 2 percent
Taxonomic class: Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts

Associated Soils

Chagrin soils are on the same landscape as Nolin, Newark, and Grigsby soils. Nolin and Newark soils are in a fine-silty family. Also, Newark soils are somewhat poorly drained. Grigsby soils are in a coarse-loamy family.

Typical Pedon

Chagrin loam, frequently flooded, in Butler County; about 1.5 miles southwest of the intersection of Kentucky Highway 403 and Kentucky Highway 269, then 1,000 feet south of Kentucky Highway 269, in a soybean field; long. 86 degrees 46 minutes 21 seconds and lat. 37 degrees 15 minutes 26 seconds:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/3) loam; weak fine granular structure; very friable; few fine roots; slightly acid; gradual smooth boundary.
AB—7 to 15 inches; dark brown (10YR 3/3) loam; weak fine subangular blocky structure; very friable; few fine roots; slightly acid; gradual smooth boundary.
Bw1—15 to 22 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; very friable; few fine roots; moderately acid; gradual smooth boundary.
Bw2—22 to 28 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; moderately acid; gradual smooth boundary.
Bw3—28 to 35 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; moderately acid; gradual smooth boundary.
Bw4—35 to 48 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; moderately acid; gradual smooth boundary.
C—48 to 65 inches; dark yellowish brown (10YR 4/4) silt loam; few fine distinct yellowish brown (10YR 5/4) mottles; massive; friable; moderately acid.

Range in Characteristics

Thickness of the solum: 24 to 48 inches
Kind of rock fragments: Gravel
Reaction: Moderately acid to neutral

A or Ap horizon:
Hue—10YR or 7.5YR

Value—2 to 4
Chroma—1 to 4
Content of rock fragments—0 to 10 percent
Texture of the fine-earth fraction—loam or silt loam

AB horizon:
Hue—10YR or 7.5YR
Value—2 to 4
Chroma—1 to 4
Content of rock fragments—0 to 10 percent
Texture of the fine-earth fraction—loam or silt loam

Bw horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6
Content of rock fragments—0 to 15 percent
Texture of the fine-earth fraction—silt loam or loam

C horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—2 to 6
Lithochromic mottles—in shades of gray or brown below a depth of 28 inches
Texture of the fine-earth fraction—silt loam or loam; fine sand or loamy fine sand below a depth of 40 inches

Clarkrange Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Landform: Uplands
Parent material: Silty residuum derived from acid sandstone and shale
Slope: 2 to 12 percent
Taxonomic class: Fine-silty, siliceous, mesic Typic Fragiudults

Associated Soils

Clarkrange soils are on the same landscape as Gilpin, Lily, Riney, and Wellston soils, which do not have a fragipan and are well drained.

Typical Pedon

Clarkrange silt loam, 2 to 6 percent slopes, in Edmonson County; approximately 11.4 miles southeast of Brownsville, 0.20 mile south of the intersection of Kentucky Highway 70 and Kentucky Highway 255; about 0.64 mile west on Cedar Springs Valley Road, then 125 feet north of the road, in a wooded area of Mammoth Cave National Park; long. 86 degrees 04 minutes 39 seconds and lat. 37 degrees 07 minutes 32 seconds:

Ap—0 to 6 inches; silt loam, brown (10YR 5/3) when crushed; moderate fine granular structure; very friable; many coarse and common medium and fine roots; slightly acid; abrupt smooth boundary.
BA—6 to 11 inches; silt loam with yellowish brown (10YR 5/4) ped exteriors; moderate medium subangular blocky structure; friable; many fine, medium, and coarse roots; strongly acid; clear wavy boundary.
Bt1—11 to 21 inches; silt loam with yellowish brown (10YR 5/8) ped interiors; moderate medium subangular blocky structure; friable; many fine roots; common distinct clay films on faces of peds; very strongly acid; abrupt smooth boundary.
Bt2—21 to 25 inches; silty clay loam with yellowish brown (10YR 5/6) ped interiors; moderate medium subangular blocky structure; friable; many fine and medium roots; common distinct clay films on faces of peds; black (N 2.5/0) stains around roots; very strongly acid; abrupt wavy boundary.
B/E—25 to 32 inches; yellowish brown (10YR 5/6) silt loam with light yellowish brown (10YR 6/4) E material; weak fine granular structure; firm; few fine distinct strong brown (7.5YR 5/6) iron accumulations; many fine roots; common distinct discontinuous clay films on faces of peds; 4 percent angular sandstone fragments; very strongly acid; abrupt wavy boundary.
2Btx—32 to 48 inches; yellowish brown (10YR 5/4) silty clay loam; weak coarse and very coarse prismatic structure parting to strong fine and very fine angular blocky; very firm; few fine roots between prism faces; common distinct clay films; few fine distinct brown (10YR 5/3) and common fine distinct brownish yellow (10YR 6/8) iron accumulations and common medium distinct light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) iron depletions on prism faces; brittle in 60 percent of the mass; strongly acid; abrupt wavy boundary.
3BC1—48 to 57 inches; light brownish gray (10YR 6/2) clay loam; moderate medium subangular and angular blocky structure; very firm; few very fine roots; common distinct clay films on faces of peds; common medium distinct dark yellowish brown (10YR 4/6) and strong brown (7.5YR 5/6) and few fine distinct yellowish red (5YR 4/6) iron accumulations; 5 percent angular sandstone fragments in the upper part of the horizon; very strongly acid; clear wavy boundary.

3BC2—57 to 68 inches; clay, 25 percent light brownish gray (10YR 6/2), 25 percent dark yellowish brown (10YR 4/6), 25 percent strong brown (7.5YR 4/6), and 25 percent yellowish red (5YR 4/6); weak fine angular blocky structure; very firm; few fine roots; common distinct clay films; strongly acid; clear smooth boundary.
3Cr—68 to 72 inches; weathered shale.

Range in Characteristics

Thickness of the solum: 40 to 120 inches
Kind of rock fragments: Shale, siltstone, and sandstone
Reaction: Strongly acid or very strongly acid in unlimed areas

Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—2 or 3
Content of rock fragments—0 to 10 percent
Texture of the fine-earth fraction—silt loam

BA horizon:
Hue—10YR
Value—5 or 6
Chroma—4 or 6
Content of rock fragments—0 to 10 percent
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—10YR
Value—5 or 6
Chroma—4 to 8
Redoximorphic features—concentrations of iron and manganese around roots and in pores
Texture of the fine-earth fraction—silt loam or silty clay loam

B/E horizon:
Hue—10YR in the B part and 10YR or 2.5Y in the E part
Value—4 to 6 in the B and E parts
Chroma—4 to 8 in the B part and 1 to 4 in the E part
Content of rock fragments—0 to 10 percent
Texture of the fine-earth fraction—silt loam

2Btx horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—4 to 6
Chroma—3 to 6
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—silt loam or silty clay loam

3BC and 3C horizons:
Hue—10YR, 7.5YR, or 2.5Y
Value—5 or 6
Chroma—2 to 6
Redoximorphic features—in shades of gray or brown
Texture—silty clay loam, silty clay, clay loam, loam, clay, or the shaly analogs of those textures

Clifty Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Flood plains
Parent material: Alluvium derived from acid siltstone, sandstone, and shale and loess
Slope: 0 to 2 percent
Taxonomic class: Fine-loamy, mixed, mesic Fluventic Dystrochrepts

Associated Soils

Clifty soils are associated with Chagrin, Nolin, Newark, and Melvin soils on flood plains and Wellston, Gilpin, Rosine, and Clarkrange soils on uplands. The associated soils have less gravel in the upper part of the solum than the Clifty soils. Newark and Melvin soils are less well drained than the Clifty soils and have gray mottles in the subsoil. Wellston, Gilpin, Rosine, and Clarkrange soils have an argillic horizon.

Typical Pedon

Clifty gravelly silt loam, frequently flooded, in Butler County; 4.1 miles southeast of Jetson on Kentucky Highway 70, about 3.8 miles south of the junction of Kentucky Highway 1328 and Old Greenwich School Road, then about 2,000 feet southeast of Old Greenwich School Road, in a pasture on the Robert Fields farm; long. 86 degrees 32 minutes 18 seconds and lat. 37 degrees 11 minutes 35 seconds:

Ap—0 to 9 inches; brown (10YR 4/3) gravelly silt loam; weak fine granular structure; very friable; many fine and medium roots; many fine pores and wormholes; 20 percent rock fragments 1/8 to 1/2 inch across; neutral; abrupt smooth boundary.
Bw1—9 to 18 inches; yellowish brown (10YR 4/4) gravelly silt loam; weak fine granular structure; very friable; common fine and medium roots; common fine pores; 25 percent rock fragments 1/8 to 3/4 inch across; strongly acid; gradual smooth boundary.

Bw2—18 to 38 inches; yellowish brown (10YR 5/4) gravelly silt loam; moderate fine granular structure; very friable; few fine roots and pores; 25 percent rock fragments 1/4 inch to 2 inches across; very strongly acid; gradual wavy boundary.
C—38 to 67 inches; yellowish brown (10YR 5/4) gravelly loam; massive; very friable; 35 percent rock fragments 1/4 inch to 3 inches across; strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kind of rock fragments: Water-worked pebbles
Reaction: Strongly acid or very strongly acid in unlimed areas

A or Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—3 or 4
Content of rock fragments—as much as 50 percent in individual subhorizons in the control section but 15 to 35 percent by weighted average
Texture—gravelly silt loam or gravelly loam

Bw horizon:
Hue—10YR
Value—4 or 5
Chroma—3 to 6
Content of rock fragments—as much as 50 percent in individual subhorizons in the control section but 15 to 35 percent by weighted average
Texture of the fine-earth fraction—silt loam or loam

C horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 or 6
Content of rock fragments—20 to 80 percent, by volume, below a depth of 4 feet
Texture of the fine-earth fraction—silt loam, loam, or clay loam; stratified below a depth of 4 feet

Crider Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: A mantle of loess over residuum derived from limestone
Slope: 2 to 12 percent
Taxonomic class: Fine-silty, mixed, mesic Typic Paleudalfs

Associated Soils

Crider soils are associated with Baxter, Fredonia, and Caneyville soils. Baxter, Fredonia, and Caneyville soils are in a fine textured family. Fredonia and Caneyville soils are moderately deep.

Typical Pedon

Crider silt loam, 2 to 6 percent slopes, in Edmonson County; approximately 3.6 miles southwest of Park City, 1.89 miles south of U.S. Highway 31-W, 1,000 feet north of Kentucky Highway 1339, and 300 feet east of a gravel lane in a hayfield; long. 86 degrees 04 minutes 48 seconds and lat. 37 degrees 03 minutes 34 seconds:

Ap—0 to 7 inches; dark yellowish brown (10YR 3/4) silt loam; weak fine granular structure; very friable; few fine roots; few dark stains on ped interiors; neutral; gradual smooth boundary.
Bt1—7 to 12 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; 2 percent angular chert fragments; neutral; gradual wavy boundary.
Bt2—12 to 18 inches; yellowish brown (10YR 5/8) silt loam; moderate medium subangular blocky structure; firm; few fine roots; few faint clay films on faces of peds; 2 percent chert; neutral; gradual wavy boundary.
Bt3—18 to 31 inches; strong brown (7.5YR 5/6) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; few faint distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.
Bt4—31 to 39 inches; yellowish brown (10YR 5/6) silt loam; few fine strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; few faint distinct clay films; few pale brown silt coatings on faces of peds; very strongly acid; abrupt wavy boundary.
2Bt5—39 to 66 inches; red (2.5YR 4/6) silt clay loam; common distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few pale brown and white silt coatings on faces of peds; very strongly acid.

Range in Characteristics

Thickness of the solum: 60 to 100 inches
Kind of rock fragments: Gravel, mostly chert

Reaction: Neutral to strongly acid in the upper part of the solum and slightly acid to very strongly acid in the lower part

A or Ap horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—10YR or 7.5YR in the upper part of the horizon and 7.5YR or 5YR in the lower part
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—silt loam or silty clay loam

2Bt horizon:
Hue—5YR or 10YR
Value—3 to 5
Chroma—4 to 8
Mottles—in shades of red or brown
Lithochromic features—in shades of black, gray, or yellow
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay

Donahue Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Colluvium derived from sandstone over residuum derived from limestone
Slope: 15 to 50 percent
Taxonomic class: Fine, mixed, mesic Typic Hapludalfs

Associated Soils

Donahue soils are associated with Wellston, Lily, Lenberg, Wallen, and Clarkrange soils. Wellston soils are deep to sandstone and shale bedrock and have less clay in the subsoil than the Donahue soils. Lily soils formed mostly in residuum derived from siltstone and sandstone and have less clay in the subsoil than the Donahue soils. Lenberg soils are moderately deep to soft, acid, clayey shale. Wallen soils formed in sandstone and shale residuum and are less clayey than the Donahue soils. Clarkrange soils are very deep and have a fragipan.

Typical Pedon

Donahue loam, in an area of Wallen-Bledsoe-Donahue complex, 15 to 35 percent slopes, very rocky, in Edmonson County; about 2.34 miles west of Park City, 0.79 mile north of the intersection of Bald Knob Road and U.S. Highway 31-W, 0.71 mile east on Clubhouse Road, then 250 feet north on a wooded footslope; long. 86 degrees 04 minutes 42 seconds and lat. 37 degrees 06 minutes 10 seconds:

Oi—1/2 inch to 0; partially decomposed leaf litter.
A—0 to 4 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; common fine, medium, and coarse roots; less than 5 percent sandstone fragments; very strongly acid; clear wavy boundary.
BA—4 to 9 inches; strong brown (7.5YR 4/6) loam; dark yellowish brown (10YR 4/4) mottles; weak medium and coarse subangular blocky structure; friable; common fine, medium, and coarse roots; 10 percent sandstone fragments; very strongly acid; clear wavy boundary.
Bt1—9 to 16 inches; strong brown (7.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; few faint clay films around pores; 14 percent angular sandstone fragments; strongly acid; clear wavy boundary.
2Bt2—16 to 24 inches; strong brown (7.5YR 4/6) gravelly silty clay; moderate medium and coarse subangular blocky structure; firm; few fine roots; common distinct clay films; about 25 percent angular sandstone fragments; strongly acid; clear wavy boundary.
2Bt3—24 to 31 inches; strong brown (7.5YR 4/6) channery clay; few medium faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films; few black stains; 30 percent sandstone and limestone channers; slightly acid; clear wavy boundary.
2Bt4—31 to 34 inches; yellowish brown (10YR 5/6) channery clay; common medium faint dark yellowish brown (10YR 4/4) and few fine distinct strong brown (7.5YR 4/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; common distinct clay films; 20 percent limestone channers; moderately alkaline; abrupt smooth boundary.
2R—34 inches; limestone.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kind of rock fragments: Sandstone pebbles, gravel, and channers
Content of rock fragments: 0 to 30 percent
Reaction: Strongly acid or very strongly acid in the upper part of the solum and strongly acid to slightly alkaline in the 2Bt horizon

A horizon:
Hue—2.5Y or 10YR
Value—4 or 5
Chroma—2 or 4
Texture of the fine-earth fraction—loam

BA horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 to 6
Texture of the fine-earth fraction—loam

Bt horizon:
Hue—5YR, 7.5YR, or 10YR
Value—4 or 5
Chroma—4 to 6
Texture of the fine-earth fraction—loam, sandy clay loam, or clay loam

2Bt horizon:
Hue—7.5YR, 10YR, or 2.5YR
Value—4 or 5
Chroma—2 to 6
Mottles—in shades of red or brown
Lithochromic features—in shades of gray or yellow
Texture of the fine-earth fraction—silty clay or clay

Dunning Series

Depth class: Very deep
Drainage class: Very poorly drained or poorly drained
Permeability: Slow
Landform: Flood plains, streamheads, and ponded areas
Parent material: Slackwater alluvium derived from soils that formed in limestone residuum
Slope: 0 to 3 percent
Taxonomic class: Fine, mixed, mesic Fluvaquentic Endoaquolls

Associated Soils

Dunning soils are geographically associated with Melvin, Newark, Nolin, Mullins, Lawrence, Elk, and Johnsburg soils. Melvin, Newark, and Nolin soils have a fine-silty control section and do not have a mollic epipedon or a fine texture. Mullins, Lawrence, and Johnsburg soils have a fragipan and are on stream terraces and upland flats. Elk soils have an argillic horizon.

Typical Pedon

Dunning silty clay loam, occasionally flooded, in Edmonson County; on the J.D. Cline farm, approximately 1.75 miles west of the intersection of Kentucky Highway 743 and Kentucky Highway 101, then 1.42 miles south on Sulphur Road, 1 mile east of Sulphur Road, and 0.2 mile north of Shady Land Road, in a cultivated field; long. 86 degrees 17 minutes 00 seconds and lat. 37 degrees 05 minutes 45 seconds:

Ap—0 to 4 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine and medium angular blocky structure; firm; common fine and few medium roots; neutral; gradual smooth boundary.
Ag—4 to 9 inches; black (10YR 2/1) silty clay loam; moderate fine and medium angular blocky structure; firm; common fine roots; neutral; gradual smooth boundary.
Bg1—9 to 19 inches; very dark gray (10YR 3/1) silty clay; weak coarse prismatic structure parting to strong medium angular blocky; firm; common fine roots; few fine faint yellowish brown (10YR 5/6) iron accumulations; neutral; gradual smooth boundary.
Bg2—19 to 27 inches; very dark gray (10YR 3/1) silty clay; weak coarse prismatic structure parting to strong medium angular blocky; firm; common fine roots; few brown concretions; few fine distinct yellowish brown (10YR 5/8) iron accumulations; neutral; gradual smooth boundary.
Bg3—27 to 33 inches; dark gray (10YR 4/1) silty clay; weak coarse prismatic structure parting to moderate medium angular blocky; firm; common fine roots; few brown concretions; common fine distinct yellowish brown (10YR 5/8) iron accumulations; neutral; gradual smooth boundary.
Bg4—33 to 45 inches; dark gray (10YR 4/1) silty clay; weak coarse prismatic structure parting to moderate medium angular blocky; firm; few fine roots; few black and brown concretions; many fine distinct yellowish brown (10YR 5/8) iron accumulations; neutral; gradual wavy boundary.
Cg—45 to 71 inches; gray (10YR 5/1) silty clay; massive; firm; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) iron accumulations; neutral.

Range in Characteristics

Thickness of the solum: 30 to 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Reaction: Moderately acid to slightly alkaline throughout the profile

Ap and Ag horizons:
Hue—10YR, 2.5Y, or 5Y
Value—2 or 3
Chroma—1 to 3
Texture of the fine-earth fraction—silty clay loam

Bg horizon:
Hue—neutral or 10YR, 7.5YR, 2.5Y, 5Y, or 5GY
Value—3 to 6
Chroma—0 to 2
Redoximorphic features—in shades of gray, olive, red, or brown
Texture of the fine-earth fraction—silty clay

Cg horizon:
Hue—neutral or 10YR, 7.5YR, 2.5Y, 5Y, or 5GY
Value—3 to 6
Chroma—0 to 2
Redoximorphic features—in shades of gray, olive, red, or brown
Texture of the fine-earth fraction—generally silty clay; stratified silt loam, loam, sandy loam, and gravel below a depth of 40 inches in some pedons

Elk Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Terraces
Parent material: Mixed alluvium derived from limestone, sandstone, shale, and loess
Slope: 2 to 12 percent
Taxonomic class: Fine-silty, mixed, mesic Ultic Hapludalfs

Associated Soils

Elk soils are associated with Nolin and Newark soils on flood plains and Allegheny soils on stream terraces. Nolin and Newark soils do not have an argillic horizon. Allegheny soils are in a fine-loamy family.

Typical Pedon

Elk silt loam, 2 to 6 percent slopes, rarely flooded, in Edmonson County; about 1.5 miles east of the intersection of Kentucky Highway 259 and Kyrock-Bungalow Road, 0.6 mile north of the confluence of Pigeon Creek and the Nolin River, in a hayfield; long. 86 degrees 15 minutes 03 seconds and lat. 37 degrees 15 minutes 56 seconds:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak fine granular structure; few fine roots; friable; slightly acid; gradual wavy boundary.
Bt1—10 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; few medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; few fine roots; common distinct clay films; neutral; gradual wavy boundary.
Bt2—14 to 18 inches; yellowish brown (10YR 5/4) silt loam; few fine faint light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films; neutral; gradual smooth boundary.
Bt3—18 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common prominent dark yellowish brown (10YR 3/4) clay films; strongly acid; clear smooth boundary.
Bt4—28 to 38 inches; dark yellowish brown (10YR 4/6) silty clay loam; weak medium subangular blocky structure; firm; few faint clay films; strongly acid; gradual smooth boundary.
BC—38 to 52 inches; brown (7.5YR 4/4) silt loam; common medium distinct strong brown (7.5YR 5/6) and few fine distinct dark yellowish brown (10YR 3/6) mottles; weak medium subangular blocky structure; friable; few fine roots; moderately acid; gradual wavy boundary.
C—52 to 64 inches; dark yellowish brown (10YR 4/6) loam; few fine distinct yellowish brown (10YR 5/4) mottles; massive; friable; moderately acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Gravel
Content of rock fragments: 0 to 5 percent
Reaction: In unlimed areas, slightly acid to very strongly acid throughout the profile

A or Ap horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 or 4
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4 to 6
Lithochromic features—in shades of gray or brown in the lower part of the horizon
Texture of the fine-earth fraction—silt loam or silty clay loam

C horizon:
Hue—5YR, 7.5YR, or 10YR
Value—4 to 7
Chroma—2 to 6
Lithochromic features—in shades of gray

Texture of the fine-earth fraction—silt loam, loam, silty clay loam, or silty clay

Epley Series

Depth class: Deep or very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Uplands
Parent material: Silty material and the underlying clayey limestone and shale residuum or old alluvium
Slope: 2 to 12 percent
Taxonomic class: Fine-silty, mixed, mesic Oxyaquic Hapludalfs

Associated Soils

Epley soils are associated with Caneyville, Lenberg, Karnak, and Lawrence soils. Lawrence soils have more numerous gray mottles in the upper part of the argillic horizon than the Epley soils. Caneyville soils are moderately deep. Karnak soils are poorly drained and formed in slackwater deposits. Lenberg soils are in a fine textured family.

Typical Pedon

Epley silt loam, 2 to 6 percent slopes, in Butler County; about 6.8 miles south of Morgantown, 0.7 mile east of the intersection of U.S. Highway 231 and Kentucky Highway 1435, about 300 feet north of Kentucky Highway 1435, in a hayfield; long. 86 degrees 38 minutes 32 seconds and lat. 37 degrees 08 minutes 06 seconds:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; slightly acid; gradual wavy boundary.
Bt1—7 to 16 inches; brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; few faint clay films; slightly acid; gradual wavy boundary.
Bt2—16 to 21 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few faint clay films; very strongly acid; gradual wavy boundary.
Bt3—21 to 28 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct light brownish gray (10YR 6/2) iron depletions; weak fine and medium subangular blocky structure; friable; few fine roots; common distinct clay films; very strongly acid; abrupt wavy boundary.
2B/E—28 to 32 inches; dark yellowish brown (10YR 4/6), very firm silty clay with moderate coarse prismatic structure parting to moderate medium subangular blocky (Bt part); light brownish gray (10YR 6/2), friable silt loam (E part); common fine roots; common distinct clay films; common fine distinct pale brown (10YR 6/3) and few fine prominent light gray (10YR 7/2) iron depletions; very strongly acid; abrupt wavy boundary.
2BC—32 to 45 inches; yellowish brown (10YR 5/6) clay; massive; very firm; common medium distinct light brownish gray (10YR 6/2) iron depletions; very strongly acid; gradual wavy boundary.
2C—45 to 65 inches; light olive brown (2.5Y 5/6) clay; massive; common medium distinct light brownish gray (2.5Y 6/2) iron depletions; very firm; moderately acid.

Range in Characteristics

Thickness of the solum: 30 to 50 inches
Reaction: Very strongly acid to moderately acid through the 2BC horizon and moderately acid to neutral in the 2C horizon

A or Ap horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—10YR or 2.5YR
Value—5 or 6
Chroma—4 to 6
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—silt loam or silty clay loam

2B/E horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Redoximorphic features—in shades of gray or brown; 10 to 50 percent of the horizon is a 1- to 5-millimeter-thick coating of silt loam (E part)

2BC and 2C horizons:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture of the fine-earth fraction—silty clay or clay
Redoximorphic features—in shades of gray or brown
Content of rock fragments—0 to 50 percent in the 2C horizon, mostly shale fragments

Fairpoint Series

Depth class: Deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Material that was moved in the mining of coal (broken and crushed pieces of bedrock that were above the coal)
Slope: 2 to 35 percent.
Taxonomic class: Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents

Associated Soils

Fairpoint soils are associated with Bethesda, Wellston, Clarkrange, Gilpin, and Rosine soils. Bethesda soils are more acid than the Fairpoint soils. The other associated soils are not so deep to bedrock as the Fairpoint soils, have fewer rock fragments, and have a more developed profile.

Typical Pedon

Fairpoint channery silt loam, in an area of Bethesda-Fairpoint soils, 12 to 20 percent slopes, in Butler County; approximately 12.0 miles east of Morgantown, then 0.24 mile southwest of the intersection of Kentucky Highway 70 and Kentucky Highway 1328, then 0.94 mile south on Kentucky Highway 2266, then 1,000 feet east of Kentucky Highway 2266, on a reclaimed strip-mine site; long. 86 degrees 32 minutes 15 seconds and lat. 37 degrees 12 minutes 57 seconds:

Ap—0 to 4 inches; dark brown (10YR 4/3) channery silt loam; weak fine granular structure; friable; common fine roots; 30 percent randomly oriented, gray siltstone fragments 1/4 inch to 2 inches long; neutral; abrupt smooth boundary.
C1—4 to 20 inches; dark grayish brown (2.5Y 4/2) channery silt loam; massive; friable; 30 percent thin, randomly oriented, gray siltstone fragments 1/2 inch to 4 inches long; neutral; clear wavy boundary.
C2—20 to 25 inches; strong brown (7.5YR 5/6) very channery silty clay loam; sticky, plastic; common medium distinct light gray (10YR 7/1) mottles; weak very fine subangular blocky structure; 36 percent randomly oriented, gray siltstone channers 1/2 inch to 4 inches long; strongly acid; clear wavy boundary.
C3—25 to 60 inches; variegated dark gray (10YR 4/1) and brown (10YR 4/3) channery silt loam; massive; friable; 35 percent randomly oriented, gray siltstone and shale channers 1/4 inch to 2 inches long and 15 percent subrounded, brown sandstone fragments 1/2 inch to 4 inches across; one hard sandstone boulder and one soft siltstone boulder about 2 feet in diameter; few pieces of strong brown silty clay loam 1/2 inch in diameter; neutral.

Range in Characteristics

Kind of rock fragments: Shale, siltstone, sandstone, limestone, and coal
Content of rock fragments: 5 to 75 percent in individual horizons; by weighted average, more than 35 percent in the control section
Reaction: Generally moderately acid to neutral but strongly acid or slightly alkaline in some subhorizons

A or Ap horizon:
Hue—7.5YR or 10YR
Value—3 to 6
Chroma—1 to 6
Texture of the fine-earth fraction—silt loam

C horizon:
Hue—10YR, 7.5YR, 2.5Y, or 5Y or neutral
Value—3 to 6
Chroma—0 to 8
Content of rock fragments—35 to 60 percent, by volume; average of about 45 percent
Texture—silty clay loam, loam, clay loam, silt loam, or the gravelly analogs of those textures

Fredonia Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow or slow
Landform: Uplands
Parent material: Residuum derived from limestone
Slope: 2 to 20 percent
Taxonomic class: Fine, mixed, mesic Typic Hapludalfs

Associated Soils

Fredonia soils are associated on the landscape with Caneyville, Hagerstown, and Pembroke soils. Caneyville soils are not so red in the lower part of the Bt horizon as the Fredonia soils and typically are on steep footslopes and on high ridges. Hagerstown and Pembroke soils are deeper to bedrock than the Fredonia soils.

Typical Pedon

Fredonia silt loam, in an area of Fredonia-Hagerstown complex, 6 to 20 percent slopes, rocky, eroded, in Edmonson County; about 0.6 mile east of Liberty-Chaumont Road and 0.35 mile north of U.S.

Highway 31-W, in a hayfield; long. 86 degrees 06 minutes 09 seconds and lat. 37 degrees 05 minutes 55 seconds:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots; slightly acid; abrupt wavy boundary.
Bt1—5 to 11 inches; yellowish red (5YR 4/6) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; neutral; gradual wavy boundary.
Bt2—11 to 19 inches; reddish brown (2.5YR 4/4) silty clay; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.
Bt3—19 to 26 inches; dark yellowish brown (10YR 3/6) clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; very strongly acid; abrupt smooth boundary.
R—26 inches; limestone bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kind of rock fragments: Chert
Content of rock fragments: 0 to 5 percent
Reaction: Except where the surface layer has been limed, strongly acid to moderately acid in the upper part of the solum and very strongly acid to neutral in the lower part

A or Ap horizon:
Hue—10YR, 7.5YR, or 5YR
Value—3 or 4
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam or silty clay loam

Bt horizon:
Hue—2.5YR, 5YR, or 10YR
Value—3 or 4
Chroma—4 to 6
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay

Frondorf Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Mantle of loess over residuum derived from sandstone, siltstone, and shale
Slope: 6 to 50 percent
Taxonomic class: Fine-loamy, mixed, mesic Ultic Hapludalfs

Associated Soils

Frondorf soils are near Sadler, Wellston, and Zanesville soils. Sadler and Zanesville soils have a fragipan, and Wellston soils are more than 40 inches deep to bedrock.

Typical Pedon

Frondorf silt loam, 12 to 20 percent slopes, eroded, in Butler County; about 4 miles south of Sugar Grove, then 2.75 miles west of the intersection of Kentucky Highway 626 and Kentucky Highway 1083, about 1,800 feet south of the intersection of Kentucky Highway 626 and Sunnylane-Richelieu Road, 1,400 feet east of Sunnylane-Richelieu Road, on a wooded hillside; long. 86 degrees 42 minutes 44 seconds and lat. 37 degrees 02 minutes 07 seconds:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; few fine and medium roots; less than 2 percent sandstone pebbles; moderately acid; abrupt smooth boundary.
BA—6 to 12 inches; dark yellowish brown (10YR 4/6) silt loam; weak fine subangular blocky structure; very friable; common medium and fine roots; strongly acid; abrupt wavy boundary.
Bt1—12 to 17 inches; brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; firm; common fine and medium roots; few faint clay films; 5 percent sandstone pebbles; strongly acid; gradual wavy boundary.
Bt2—17 to 25 inches; dark yellowish brown (10YR 4/6) channery silt loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films; 18 percent sandstone channers; strongly acid; abrupt wavy boundary.
BC—25 to 37 inches; yellowish brown (10YR 5/6) gravelly silt loam; massive; firm; 15 percent sandstone pebbles; strongly acid.
R—37 inches; sandstone.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kind of rock fragments: Sandstone, siltstone, and shale
Content of rock fragments: 0 to 5 percent in the upper part of the solum and 15 to 75 percent in the lower part
Reaction: Very strongly acid or strongly acid in unlimed areas

A or Ap horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam

BA horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—2 to 6
Texture of the fine-earth fraction—silt loam

Bt and BC horizons:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 8
Texture—silt loam, silty clay loam, or the gravelly, shaly, or channery analogs of those textures

Gilpin Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum derived from acid sandstone
Slope: 2 to 20 percent
Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludults

Associated Soils

Gilpin soils are adjacent to Wellston, Clarkrange, and Riney soils. Wellston soils have a fine-silty control section. Clarkrange soils have a fine-silty control section and a fragipan. Riney soils have siliceous mineralogy.

Typical Pedon

Gilpin loam, 6 to 12 percent slopes, eroded, in Butler County; about 13 miles northeast of Morgantown, 2.2 miles from the intersection of Kentucky Highway 70 and C. Lawrence Road, 0.78 mile south on Kentucky Highway 1328, and 0.5 mile southeast on Rock Ridge Road, on the right side of the road; long. 86 degrees 36 minutes 45 seconds and lat. 37 degrees 13 minutes 30 seconds:

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable; many very fine, fine, and medium roots; neutral; clear wavy boundary.
BE—5 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; less than 2 percent sandstone pebbles; neutral; gradual wavy boundary.
Bt1—9 to 14 inches; light yellowish brown (10YR 6/4) silt loam; weak fine and medium subangular blocky structure; friable; few coarse and common fine and medium roots; few faint clay films; 5 percent sandstone pebbles; slightly acid; clear wavy boundary.
Bt2—14 to 21 inches; yellowish brown (10YR 5/6) very channery silt loam; weak fine and medium subangular blocky structure; friable; common fine and medium and few coarse roots; common faint clay films; 37 percent sandstone channers and pebbles; strongly acid; gradual smooth boundary.
Bt3—21 to 28 inches; strong brown (7.5YR 4/6) channery clay loam; weak fine and medium subangular blocky structure; friable; few fine and medium roots; common faint clay films; 20 percent sandstone channers and pebbles; strongly acid; abrupt wavy boundary.
C/B—28 to 35 inches; yellowish brown (10YR 5/6) channery clay loam with pockets of strong brown (7.5YR 5/6) mottles; massive; friable; few fine and medium roots; few faint clay films; 18 percent sandstone channers and pebbles; strongly acid; gradual smooth boundary.
Cr—35 inches; pink sandstone.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kind of rock fragments: Shale, siltstone, and sandstone
Content of rock fragments: 5 to 40 percent in individual horizons in the solum and 30 to 90 percent in the C horizon
Reaction: Extremely acid to strongly acid in unlimed areas

A or Ap horizon:
Hue—10YR
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—loam

BE horizon:
Hue—10YR
Value—5 or 6
Chroma—4 to 6
Texture of the fine-earth fraction—loam or silt loam

Bt horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—4 to 8
Texture of the fine-earth fraction—loam, silt loam, silty clay loam, or clay loam

C/B horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—3 to 5
Chroma—2 to 6
Texture of the fine-earth fraction—loam, silt loam, silty clay loam, or clay loam

Grigsby Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Flood plains
Parent material: Mixed alluvium
Slope: 0 to 2 percent
Taxonomic class: Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts

Associated Soils

Grigsby soils are associated with Elk, Newark, and Nolin soils. Elk soils are on terraces and have a fine-silty control section. Newark soils are somewhat poorly drained. Nolin soils have a fine-silty control section and are well drained.

Typical Pedon

Grigsby fine sandy loam, frequently flooded, in Butler County; approximately 2.5 miles north of Logansport, then 0.6 mile west on Taylor Lake Road, 500 feet northwest of Taylor Lake Road, in a cultivated field; long. 86 degrees 47 minutes 10 seconds and lat. 37 degrees 18 minutes 43 seconds:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; very friable; few fine roots; moderately acid; abrupt smooth boundary.
Bw1—8 to 19 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; few fine roots; strongly acid; gradual smooth boundary.
Bw2—19 to 25 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable; few fine roots; strongly acid; gradual smooth boundary.
Bw3—25 to 32 inches; dark yellowish brown (10YR 4/4) loam; weak fine and medium subangular blocky structure; friable; few fine roots; strongly acid; abrupt wavy boundary.
Bw4—32 to 42 inches; brown (10YR 5/3) loam; common medium distinct dark yellowish brown (10YR 4/3) mottles; weak medium subangular blocky structure; firm; few fine roots; strongly acid; abrupt wavy boundary.
Bw5—42 to 56 inches; light yellowish brown (10YR 6/4) silt loam; common medium distinct very pale brown (10YR 7/3) and few fine distinct light gray (10YR 7/2) iron depletions; weak fine subangular blocky structure; firm; strongly acid; gradual wavy boundary.
C—56 to 64 inches; light yellowish brown (10YR 6/4) loam; few medium distinct brownish yellow (10YR 6/8) and light gray (10YR 7/2) iron depletions; massive; friable; very strongly acid.

Range in Characteristics

Thickness of the solum: 30 to 40 inches
Kind of rock fragments: Gravel
Content of rock fragments: 0 to 15 percent in the solum and 0 to 30 percent in the C horizon
Reaction: Moderately acid to neutral in the solum and strongly acid to neutral in the C horizon

A or Ap horizon:
Hue—10YR
Value—4
Chroma—2 to 4
Texture of the fine-earth fraction—fine sandy loam

Bw horizon:
Hue—10YR
Value—3 to 6
Chroma—3 to 6
Lithochromic features—in shades of gray below a depth of 24 inches
Texture of the fine-earth fraction—fine sandy loam, loam, or silt loam

C horizon:
Hue—10YR
Value—3 to 6
Chroma—3 to 6
Lithochromic features—in shades of brown or yellow
Redoximorphic features—in shades of brown or gray
Texture—fine sandy loam, loam, loamy fine sand, or the gravelly or very gravelly analogs of those textures

Hagerstown Series

Depth class: Deep or very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum derived from limestone
Slope: 2 to 20 percent
Taxonomic class: Fine, mixed, mesic Typic Hapludalfs

Associated Soils

Hagerstown soils are associated on the landscape with Pembroke, Caneyville, and Fredonia soils. Pembroke soils have limestone bedrock at a depth of more than 60 inches. Caneyville and Fredonia soils have limestone bedrock at a depth of 20 to 40 inches and generally are in the higher positions on the landscape.

Typical Pedon

Hagerstown silt loam, in an area of Fredonia-Hagerstown complex, 6 to 20 percent slopes, rocky, eroded, in Edmonson County; about 4.4 miles northeast of Rocky Hill, 0.85 mile north of the intersection of U.S. Highway 31-W and Liberty-Chaumont Road, and 0.47 mile east of Liberty-Chaumont Road, in a field of clover on the Albert Parsely farm; long. 86 degrees 06 minutes 09 seconds and lat. 37 degrees 06 minutes 20 seconds:

Ap—0 to 6 inches; dark brown (7.5YR 3/4) silt loam; weak fine granular structure; very friable; few fine roots; slightly acid; gradual wavy boundary.

BA—6 to 9 inches; dark reddish brown (5YR 3/4) silt loam; weak fine subangular blocky structure; friable; few fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 16 inches; reddish brown (2.5YR 4/4) silty clay; weak medium subangular blocky structure; friable; few fine roots; few distinct clay films; neutral; gradual wavy boundary.

Bt2—16 to 26 inches; red (2.5YR 4/6) silty clay; moderate medium subangular blocky structure; firm; few fine roots; common prominent clay films; strongly acid; gradual wavy boundary.

Bt3—26 to 30 inches; dark reddish brown (2.5YR 3/4) silty clay; moderate medium subangular blocky structure; firm; few fine roots; common prominent clay films; strongly acid; gradual wavy boundary.

BC—30 to 50 inches; dark yellowish brown (10YR 3/6) silty clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films; very strongly acid; abrupt smooth boundary.

C—50 to 55 inches; dark reddish brown (2.5YR 3/4) clay; massive; very firm; neutral; abrupt smooth boundary.

R—55 inches; limestone bedrock

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Chert and limestone
Content of rock fragments: Less than 15 percent, by volume
Reaction: Strongly acid to slightly acid in the upper part of the solum and strongly acid to neutral in the lower part

A or Ap horizon:
Hue—10YR, 7.5YR, or 5YR
Value—3 to 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—5YR or 2.5YR
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—silty clay loam, clay, or silty clay

BC horizon (and C horizon if it occurs):
Hue—10YR, 7.5YR, 5YR, or 2.5YR
Value—3 to 6
Chroma—4 to 8
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay

Jefferson Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Uplands
Parent material: Colluvium derived from soils that formed in acid sandstone, shale, and siltstone residuum
Slope: 12 to 35 percent
Taxonomic class: Fine-loamy, siliceous, mesic Typic Hapludults
Taxadjunct statement: The Jefferson soils in this survey area are taxadjuncts to the series because the mineralogy is mixed and the clay content is less than 18 percent in the control section.

Associated Soils

Jefferson soils are on the same landscape as Caneyville, Lily, and Riney soils. Caneyville and Lily soils are less than 40 inches deep to bedrock. Riney soils have a B horizon with hue redder than 7.5YR.

Typical Pedon

Jefferson loam, in an area of Jefferson-Lily-Rock outcrop complex, 20 to 35 percent slopes, in Edmonson County; about 6 miles northeast of Brownsville, 2.25 miles southwest of the intersection of Kentucky Highway 728 and Ferry Road, then 1 mile north of Ollie Road and 200 feet northeast, on a wooded hillside; long. 86 degrees 10 minutes 58 seconds and lat. 37 degrees 16 minutes 01 second:

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable; many very fine and fine and common medium roots; 1 percent rounded quartzite pebbles; slightly acid; clear smooth boundary.
A2—4 to 13 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable; common fine and very fine and few medium and coarse roots; 5 percent quartzite and sandstone pebbles; moderately acid; gradual smooth boundary.
Bt1—13 to 20 inches; dark yellowish brown (10YR 4/4) loam; weak medium and fine subangular blocky structure; friable; common medium and coarse and few fine roots; 5 percent sandstone pebbles; few faint clay films; strongly acid; gradual wavy boundary.
Bt2—20 to 32 inches; strong brown (7.5YR 4/6) gravelly loam; moderate medium subangular blocky structure; firm; common coarse and few fine and medium roots; common distinct clay films on faces of peds; 15 percent quartzite and sandstone pebbles; strongly acid; gradual smooth boundary.
Bt3—32 to 37 inches; strong brown (7.5YR 5/6) gravelly sandy loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; 34 percent sandstone pebbles and channers; strongly acid; abrupt wavy boundary.
Bt4—37 to 61 inches; strong brown (7.5YR 5/6) gravelly sandy loam; moderate medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; 20 percent sandstone and quartzite pebbles; strongly acid.

Range in Characteristics

Thickness of the solum: More than 40 inches
Kind of rock fragments: Sandstone and quartzite
Content of rock fragments: 5 to 35 percent within a depth of 40 inches and 20 to 80 percent below that depth
Reaction: Generally very strongly acid or strongly acid but very strongly acid to neutral in the A horizon

A or Ap horizon:
Hue—10YR
Value—3 to 5
Chroma—1 to 3
Texture of the fine-earth fraction—loam

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 8
Lithochromic mottles—in shades of gray, yellow, red, or brown
Texture—sandy loam, loam, or the gravelly analogs of those textures

Johnsburg Series

Depth class: Deep or very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Landform: Upland flats and stream terraces
Parent material: Loess and the underlying residuum derived from sandstone, siltstone, and shale
Slope: 0 to 3 percent
Taxonomic class: Fine-silty, mixed, mesic Aquic Fragiudults

Associated Soils

Johnsburg soils are associated with Clarkrange and Mullins soils. Clarkrange soils are moderately well drained and do not have gray mottles in the upper 10 inches of the argillic horizon. Mullins soils are poorly drained and formed in old alluvium or residuum derived from siltstone, sandstone, and shale.

Typical Pedon

Johnsburg silt loam, in Edmonson County; 1.9 miles south of Rhoda on Rhoda School Road, 770 feet north-northeast of a farm corner at a bend in the road; long. 86 degrees 13 minutes 48 seconds and lat. 37 degrees 07 minutes 44 seconds:

Ap—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine roots; moderately alkaline; clear smooth boundary.
AB—2 to 7 inches; grayish brown (10YR 5/2) silt loam; weak medium subangular blocky structure; friable; common fine roots; many medium distinct pale brown (10YR 6/3) and few fine distinct yellowish brown (10YR 5/6) iron accumulations; moderately acid; clear wavy boundary.
Bt1—7 to 14 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; few fine and medium roots; few distinct clay films on faces of peds; few fine faint light brownish gray (10YR 6/2) iron depletions; moderately acid; clear smooth boundary.
Bt2—14 to 21 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; common distinct clay films; common medium distinct light brownish gray (10YR 6/2) iron depletions and few medium distinct yellowish brown (10YR 5/8) iron

accumulations; very strongly acid; clear smooth boundary.

2Btx1—21 to 34 inches; light yellowish brown (10YR 6/4) silt loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; firm; common distinct clay films on faces of peds; many medium distinct light brownish gray (10YR 6/2) iron depletions; common medium distinct yellowish brown (10YR 5/4) iron accumulations; 1 percent sandstone pebbles; brittle in 60 percent of the mass; strongly acid; clear wavy boundary.

2Btx2—34 to 54 inches; 50 percent yellowish brown (10YR 5/4) and 50 percent light yellowish brown (10YR 6/4) silt loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm; common clay films on faces of prisms; many medium distinct light grayish brown (10YR 6/2) iron depletions; yellowish brown (10YR 6/4) iron accumulations; 1 percent sandstone pebbles; brittle in 60 percent of the mass; very strongly acid; clear wavy boundary.

2C—54 to 62 inches; yellowish brown (10YR 6/4) loam; massive; common manganese stains throughout; 1 percent sandstone fragments; very strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Reaction: Strongly acid or very strongly acid in unlimed areas

A or Ap horizon:
- Hue—10YR
- Value—4 or 5
- Chroma—2 to 4
- Texture of the fine-earth fraction—silt loam

AB horizon:
- Hue—10YR or 2.5Y
- Value—5 or 6
- Chroma—2 to 4
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam

Bt horizon:
- Hue—7.5YR, 10YR, or 2.5Y
- Value—5 or 6
- Chroma—4 to 6
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam or silty clay loam

2Btx horizon:
- Hue—10YR, 7.5YR, or 2.5Y
- Value—5 or 6
- Chroma—4 to 6
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam or silty clay loam

2C horizon:
- Hue—10YR
- Value—5 or 6
- Chroma—2 to 6
- Redoximorphic features—in shades of gray or brown
- Content of rock fragments—2 to 10 percent
- Texture of the fine-earth fraction—loam, sandy loam, silt loam, or silty clay loam

Karnak Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Slackwater alluvium
Slope: 0 to 2 percent
Taxonomic class: Fine, montmorillonitic, nonacid, mesic Vertic Endoaquepts
Taxadjunct statement: The map unit Karnak silty clay loam, overwash, frequently flooded, in this survey area is a taxadjunct because it has mixed rather than montmorillonitic mineralogy. This soil classifies as a fine, mixed, nonacid, mesic Vertic Endoaquept. The use, management, and behavior of the soil are similar to those of the Karnak series.

Associated Soils

Karnak soils are geographically associated with Newark and Melvin soils on flood plains. Newark and Melvin soils contain less clay than the Karnak soils. Also, Newark soils are somewhat poorly drained and have a lower percentage of gray in the subsoil.

Typical Pedon

Karnak silty clay loam, frequently flooded, in Butler County; about 2.5 miles south of Huntsville and 0.34 mile southeast of Kentucky Highway 949, then 0.66 mile northwest of J. Arnold Road, in a soybean field; long. 86 degrees 53 minutes 43 seconds and lat. 37 degrees 07 minutes 12 seconds:

Ap—0 to 4 inches; dark brown (10YR 4/2) silty clay loam; few fine distinct dark brown (7.5YR 3/4) pore

linings along root channels; moderate medium granular structure; friable; many fine and very fine roots; slightly acid; abrupt smooth boundary.

BA—4 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate coarse prismatic structure parting to weak medium subangular blocky; firm; few medium, fine, and very fine roots; common fine distinct strong brown (7.5YR 4/6) iron accumulations; 1 percent rounded quartz fragments; neutral; clear wavy boundary.

Bg1—9 to 14 inches; grayish brown (2.5Y 5/2) silty clay; moderate coarse prismatic structure parting to weak medium subangular blocky; firm; few medium and fine roots; few pressure faces; common fine distinct strong brown (7.5YR 5/8) iron accumulations; common fine faint gray (10YR 6/1) iron depletions; 1 percent rounded quartz fragments; neutral; clear smooth boundary.

Bg2—14 to 23 inches; gray (5YR 5/1) silty clay; moderate coarse prismatic structure parting to moderate medium angular blocky; very firm; few medium and fine roots; common pressure faces; many medium distinct strong brown (7.5YR 5/8) iron accumulations; 2 percent rounded quartz fragments; neutral; gradual wavy boundary.

Bg3—23 to 40 inches; gray (5Y 5/1) silty clay; moderate coarse prismatic structure parting to moderate medium angular blocky; very firm; many pressure faces; many coarse distinct strong brown (7.5YR 5/8) and common medium distinct brownish yellow (10YR 6/6) iron accumulations; 2 percent rounded quartz fragments; neutral; gradual wavy boundary.

BCg—40 to 46 inches; gray (5Y 6/1) clay; weak fine subangular blocky structure; firm; few pressure faces; many coarse distinct pale brown (10YR 6/3) and common medium distinct strong brown (7.5YR 5/8) iron accumulations; 2 percent rounded quartz fragments; neutral; clear wavy boundary.

C—46 to 62 inches; gray (5Y 6/1) clay; massive; firm; many coarse distinct reddish yellow (7.5YR 6/8) and common medium distinct pale brown (10YR 6/3) iron accumulations; 4 percent rounded quartz fragments; neutral.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Quartz
Reaction: Strongly acid to slightly acid in the upper part of the solum and slightly acid to slightly alkaline in the lower part

A or Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—1 or 2
Redoximorphic features—in shades of brown
Texture of the fine-earth fraction—silty clay loam

BA horizon:
Hue—10YR
Value—4 to 6
Chroma—1 or 2
Texture of the fine-earth fraction—silty clay loam

Bg and BC horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 or 2
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—clay or silty clay

C horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 or 2
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—silty clay or silty clay loam

Latham Series

Depth class: Moderately deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Uplands
Parent material: Residuum derived from acid clay shale interbedded with sandstone and siltstone
Slope: 6 to 30 percent
Taxonomic class: Clayey, mixed, mesic Aquic Hapludults

Associated Soils

Latham soils are geographically associated with Gilpin, Wellston, Zanesville, and Clarkrange soils. The associated soils have less clay in the subsoil than the Latham soils. Wellston soils are deep or very deep to bedrock. Zanesville and Clarkrange soils have a fragipan.

Typical Pedon

Latham silt loam, 12 to 20 percent slopes, eroded, in Edmonson County; about 5 miles north of Straw and 3.7 miles north of the intersection of Kentucky Highway 728 and Union Light-Dog Creek Road, 1.13 miles west of Union Light-Dog Creek Road, 0.58 mile north of Dog Creek Road along Fall Road, in a

wooded area; long. 86 degrees 10 minutes 12 seconds and lat. 37 degrees 19 minutes 40 seconds:

A—0 to 3 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; 10 percent sandstone channers and pebbles; slightly acid; clear wavy boundary.

Bt1—3 to 9 inches; strong brown (7.5YR 5/6) silty clay; many medium distinct brown (10YR 4/3) mottles; moderate medium angular blocky structure; firm; common coarse and few fine and medium roots; common distinct clay films on faces of peds; 1 percent sandstone channers; moderately acid; gradual smooth boundary.

Bt2—9 to 13 inches; reddish yellow (7.5YR 6/6) silty clay; few medium distinct yellowish red (5YR 5/8) mottles; moderate medium angular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; 5 percent channers and pebbles; strongly acid; gradual wavy boundary.

Bt3—13 to 22 inches; strong brown (7.5YR 5/8) silty clay; few fine distinct light brownish gray (10YR 6/2) and few fine distinct red (2.5YR 4/6) mottles; strong medium angular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; 5 percent sandstone pebbles and channers; very strongly acid; abrupt wavy boundary.

Bt4—22 to 33 inches; variegated light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8 and 4/6) silty clay; weak medium and fine subangular blocky structure; firm; few fine and medium roots; common distinct clay films; 5 percent sandstone channers; very strongly acid; abrupt smooth boundary.

Cr—33 inches; weathered shale.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Kind of rock fragments: Thin shale and siltstone fragments

Content of rock fragments: Less than 15 percent in the A horizon, 0 to 20 percent in the Bt horizon, and as much as 30 percent in the BC horizon

Reaction: Strongly acid to extremely acid in the upper part of the solum and very strongly acid or extremely acid in the lower part

A or Ap horizon:
- Hue—10YR
- Value—4 or 5
- Chroma—3 to 6
- Texture of the fine-earth fraction—silt loam

Bt horizon:
- Hue—7.5YR, 10YR, or 2.5Y
- Value—4 to 6
- Chroma—2 to 8
- Lithochromic mottles—in shades of gray, brown, or red
- Texture of the fine-earth fraction—silty clay or silty clay loam

BC horizon (if it occurs):
- Hue—10YR or 2.5Y
- Value—5 or 6
- Chroma—2 to 6
- Lithochromic mottles—in shades of gray or brown
- Texture—silty clay, silty clay loam, or the gravelly analogs of those textures

Lawrence Series

Depth class: Very deep

Drainage class: Somewhat poorly drained

Permeability: Moderate above the fragipan and slow in the fragipan

Landform: Terraces and uplands

Parent material: Mixed alluvium and, in some areas, loess; also, the underlying residuum derived from limestone, sandstone, and shale

Slope: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Aquic Fragiudalfs

Associated Soils

Lawrence soils are commonly associated with Melvin, Otwell, and Nolin soils. Melvin soils have dominantly grayish colors and are poorly drained. Otwell soils are moderately well drained. Nolin soils do not have a fragipan or an argillic horizon.

Typical Pedon

Lawrence silt loam, in Butler County; on a farm 4 miles northwest of the intersection of Kentucky Highway 79 and Kentucky Highway 403, about 1.4 miles northeast of Logansport, then 0.54 mile east of Kentucky Highway 403, on a cultivated second bottom; long. 86 degrees 46 minutes 21 seconds and lat. 37 degrees 15 minutes 54 seconds:

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; few fine roots; slightly acid; abrupt wavy boundary.

BA—6 to 14 inches; pale brown (10YR 6/3) silt loam; weak fine subangular blocky structure; friable; few fine faint yellowish brown (10YR 5/4) iron accumulations; few fine roots; strongly acid; abrupt smooth boundary.

Bt—14 to 24 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common distinct clay films;

common black and brown stains and concretions; common medium distinct light brownish gray (10YR 6/2) iron depletions; very strongly acid; gradual smooth boundary.

Btx1—24 to 35 inches; yellowish brown (10YR 5/4) silt loam; strong very coarse prismatic structure parting to moderate medium subangular blocky; very firm; few roots between prism faces; common distinct clay films; few medium distinct light brownish gray (10YR 6/2) iron depletions; few medium distinct yellowish brown (10YR 5/6) iron accumulations; brittle in 60 percent of the mass; very strongly acid; gradual wavy boundary.

Btx2—35 to 49 inches; light brownish gray (10YR 6/2) silt loam; strong very coarse prismatic structure parting to moderate medium subangular blocky; very firm; common distinct clay films; common medium distinct dark yellowish brown (10YR 4/4) iron accumulations; common black and brown stains; brittle in 60 percent of the mass; very strongly acid; abrupt wavy boundary.

BC—49 to 61 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; firm; few faint clay films; few black and brown stains; few fine distinct gray (10YR 6/1) iron depletions; strongly acid; gradual wavy boundary.

CB—61 to 76 inches; yellowish brown (10YR 5/8) silty clay loam; weak fine blocky structure; firm; few brown stains; common medium gray (10YR 6/1) iron depletions; moderately acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

Content of rock fragments: 0 to 10 percent throughout the profile

Reaction: In unlimed areas, strongly acid or very strongly acid through the fragipan and very strongly acid to neutral in the BC and C horizons

A or Ap horizon:
- Hue—2.5Y to 10YR
- Value—4 or 5
- Chroma—2 to 4
- Texture of the fine-earth fraction—silt loam

BA horizon:
- Hue—10YR to 2.5Y
- Value—5 or 6
- Chroma—3 to 6
- Texture of the fine-earth fraction—silt loam

Bt horizon:
- Hue—2.5Y to 10YR
- Value—5 or 6
- Chroma—3 to 6
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam or silty clay loam

Btx horizon:
- Hue—7.5YR, 10YR, or 2.5Y (matrix and mottles)
- Value—6 or less
- Chroma—8 or less
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam or silty clay loam

BC and CB horizons:
- Hue—10YR to 2.5Y
- Value—6 or less
- Chroma—8 or less
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam or silty clay loam

Lenberg Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Residuum derived from acid clay shale commonly interbedded with sandstone and siltstone
Slope: 6 to 30 percent
Taxonomic class: Fine, mixed, mesic Ultic Hapludalfs

Associated Soils

Lenberg soils are geographically associated with Carpenter, Clarkrange, Frondorf, Gilpin, Wellston, Zanesville, and Caneyville soils. Clarkrange, Frondorf, Gilpin, Wellston, and Zanesville soils have less clay in the subsoil than the Lenberg soils. Wellston soils are deep or very deep to bedrock. Clarkrange and Zanesville soils have a fragipan. Caneyville soils are underlain by limestone bedrock. Carpenter soils have a fine-loamy control section.

Typical Pedon

Lenberg silt loam, in an area of Carpenter-Lenberg complex, 12 to 20 percent slopes, in Edmonson County; about 5 miles north of Straw and 3.7 miles north of the intersection of Kentucky Highway 728 and Union Light and Dog Creek Road, 1.06 miles west of Union Light and Dog Creek Road, and 0.51 mile north of Dog Creek-Long Fall Road, in a wooded area; long.

86 degrees 10 minutes 06 seconds and lat. 37 degrees 19 minutes 36 seconds:

A—0 to 5 inches; grayish brown (10YR 5/2) silt loam; weak fine subangular blocky structure; very friable; common fine and few medium roots; 1 percent channers; moderately acid; clear wavy boundary.
BA—5 to 9 inches; yellowish brown (10YR 5/4) silty clay loam; few medium distinct brown (10YR 4/3) mottles; moderate medium subangular blocky structure; friable; common fine and few medium roots; 5 percent channers; strongly acid; gradual wavy boundary.
Bt1—9 to 15 inches; yellowish brown (10YR 5/6) silty clay loam; few fine faint brownish yellow (10YR 6/8) and light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable; few medium and few fine roots; common distinct clay films on faces of peds; 2 percent channers; strongly acid; clear wavy boundary.
2Bt2—15 to 23 inches; variegated light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/6) clay; moderate medium and fine angular blocky structure; firm; common distinct clay films on faces of peds; 5 percent shale channers; very strongly acid; abrupt wavy boundary.
2BC—23 to 30 inches; variegated light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/6) channery clay; weak medium subangular blocky structure; firm; few faint clay films on faces of peds; 25 percent shale channers; very strongly acid; abrupt smooth boundary.
2Cr—30 to 31 inches; shale.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kind of rock fragments: Sandstone, siltstone, and shale
Content of rock fragments: 0 to 30 percent, by volume, in the solum and 5 to 60 percent in the C horizon (if it occurs)
Reaction: Neutral to very strongly acid in the upper part of the solum and strongly acid or very strongly acid in the lower part

A or Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—2 or 6
Texture of the fine-earth fraction—silt loam or silty clay loam

BA horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—2 to 6
Texture of the fine-earth fraction—silt loam or silty clay loam

Bt and 2Bt horizons:
Hue—10YR, 7.5YR, or 5YR
Value—4 or 5
Chroma—3 to 8
Mottles—in shades of red or brown
Redoximorphic features—in shades of gray, yellow, or brown
Texture of the fine-earth fraction—clay, silty clay, or silty clay loam

2BC horizon:
This horizon has colors and textures similar to those of the 2Bt horizon.

Lily Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Uplands
Parent material: Residuum derived from acid sandstone
Slope: 2 to 35 percent
Taxonomic class: Fine-loamy, siliceous, mesic Typic Hapludults

Associated Soils

Lily soils are adjacent to Wellston and Riney soils. Wellston soils have a fine-silty control section. Riney soils have a fine-loamy control section and are underlain by weakly consolidated sandstone and shale.

Typical Pedon

Lily loam, 6 to 12 percent slopes, eroded, in Edmonson County; approximately 3 miles southeast of Brownsville, 0.18 mile west of Kentucky Highway 259 on a gravel lane, then 1,000 feet northwest of the gravel lane, in an idle field; long. 86 degrees 13 minutes 42 seconds and lat. 37 degrees 09 minutes 49 seconds:

Ap—0 to 7 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; very friable; many fine and medium roots; 1 percent sandstone pebbles; moderately acid; gradual wavy boundary.
AB—7 to 12 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; 5 percent sandstone pebbles; strongly acid; abrupt wavy boundary.
Bt1—12 to 21 inches; strong brown (7.5YR 5/6) loam;

common medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; 2 percent sandstone pebbles; strongly acid; gradual wavy boundary.

Bt2—21 to 27 inches; yellowish red (5YR 5/6) loam; few fine distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; few very fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—27 to 33 inches; strong brown (7.5YR 5/6) loam; few fine distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; few very fine roots; common distinct clay films on faces of peds; 3 percent sandstone pebbles; strongly acid; abrupt smooth boundary.

R—33 to 36 inches; sandstone.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kind of rock fragments: Sandstone
Content of rock fragments: 0 to 30 percent in the upper part of the solum and 0 to 35 percent in the lower part
Reaction: In unlimed areas, strongly acid to extremely acid throughout the profile

A or Ap horizon:
Hue—10YR
Value—4 to 6
Chroma—2 to 4
Texture of the fine-earth fraction—loam

AB horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—1 to 8
Texture of the fine-earth fraction—fine sandy loam

Bt horizon:
Hue—10YR, 7.5YR, or 5YR
Value—5 or 6
Chroma—4 to 8
Mottles—in shades of brown, yellow, or red
Texture of the fine-earth fraction—loam to sandy clay loam

Melvin Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium derived from limestone, shale, and sandstone
Slope: 0 to 2 percent
Taxonomic class: Fine-silty, mixed, nonacid, mesic Typic Fluvaquents

Associated Soils

Melvin soils are on the same landscape as Newark and Nolin soils. Newark soils are somewhat poorly drained. Nolin soils are well drained.

Typical Pedon

Melvin silt loam, frequently flooded, in Butler County; about 3.8 miles west of the intersection of Kentucky Highway 106 and Kentucky Highway 153, then west 1.4 miles on Watkins Road, then 0.3 mile north on Roundabout Swamp Road, 50 feet east of the road; long. 86 degrees 55 minutes 14 seconds and lat. 37 degrees 04 minutes 08 seconds:

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam; common fine faint brown mottles; weak fine granular structure; friable; many fine roots; slightly acid; gradual smooth boundary.

AB—8 to 18 inches; light brownish gray (10YR 6/2) silt loam; weak fine granular and subangular blocky structure; friable; common fine roots; common medium distinct yellowish brown (10YR 5/8), light olive brown (2.5Y 5/4), and dark brown (10YR 3/3) iron accumulations; slightly acid; gradual smooth boundary.

Bg—18 to 38 inches; grayish brown (2.5Y 5/2) silt loam; moderate medium subangular blocky structure; firm; few fine roots in the upper part; common medium distinct yellowish brown (10YR 5/6) iron accumulations; very dark grayish brown (2.5Y 3/2) iron depletions; slightly acid; gradual smooth boundary.

Cg—38 to 65 inches; light brownish gray (2.5Y 6/2) silt loam; strong medium subangular blocky structure; firm; few black and brown concretions; common medium distinct dark yellowish brown (10YR 3/4) and dark brown (7.5YR 4/4) iron accumulations; few small pebbles; moderately acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Reaction: Moderately acid to slightly alkaline throughout the profile

A or Ap horizon:
Hue—10YR to 5Y
Value—4 to 7
Chroma—1 to 3
Texture of the fine-earth fraction—silt loam

AB horizon:
Hue—10YR or 2.5Y
Value—4 to 7
Chroma—1 to 3
Texture of the fine-earth fraction—silt loam or silty clay loam

Bg horizon:
Hue—10YR, 5Y, or 2.5Y
Value—4 to 6
Chroma—1 or 2
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—silt loam or silty clay loam

Cg horizon:
Hue—10YR, 5Y, or 2.5Y
Value—4 to 7
Chroma—1 or 2
Redoximorphic features—in shades of gray, red, or brown
Texture of the fine-earth fraction—silt loam or silty clay loam

Mullins Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Stream terraces and upland flats
Parent material: Old alluvium or residuum derived from sandstone, siltstone, and shale
Slope: 0 to 2 percent
Taxonomic class: Fine-silty, mixed, mesic Typic Fragiaquults

Associated Soils

Mullins soils are on the same landscape as Wellston, Johnsburg, and Clarkrange soils. Wellston soils are deep or very deep, are well drained, and do not have a fragipan. Johnsburg and Clarkrange soils are higher on the landscape than the Mullins soils and are better drained.

Typical Pedon

Mullins silt loam, in Edmonson County; about 4 miles south of Brownsville, 2.1 miles east of the intersection of Kentucky Highway 101 and Kentucky Highway 259, about 0.4 mile south of Kentucky Highway 259, in a soybean field; long. 86 degrees 12 minutes 36 seconds and lat. 37 degrees 08 minutes 39 seconds:

Ap—0 to 5 inches; light olive gray (5Y 6/2) silt loam; weak fine granular structure; friable; few fine roots; slightly acid; clear wavy boundary.
BA—5 to 11 inches; dark gray (5Y 4/1) silt loam; weak medium subangular blocky structure; firm; few fine roots; few faint clay films; common fine distinct yellowish red (5YR 5/8) iron accumulations; strongly acid; clear wavy boundary.
Btg—11 to 23 inches; gray (5Y 6/1) silt loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common distinct clay films; many medium distinct strong brown (7.5YR 5/6) iron accumulations; very strongly acid; clear wavy boundary.
Btgx1—23 to 31 inches; gray (2.5YR 6/1) silty clay loam; strong very coarse prismatic structure parting to moderate medium subangular blocky; firm; common distinct clay films; common coarse vertical seams of uniform gray (10YR 6/1) silt loam between prisms; common medium distinct reddish yellow (7.5YR 6/8) iron accumulations; brittle in 60 percent of the mass; very strongly acid; clear wavy boundary.
Btgx2—31 to 39 inches; gray (2.5YR 5/1) silty clay loam; strong very coarse prismatic structure parting to moderate medium subangular blocky; very firm; few distinct clay films; common coarse vertical seams of gray (10YR 6/1) silt loam between prisms; common medium distinct reddish yellow (7.5YR 6/8) iron accumulations; brittle in 60 percent of the mass; extremely acid; gradual wavy boundary.
BCg—39 to 51 inches; dark gray (2.5YR 4/1) silty clay loam; weak fine blocky structure; firm; common medium distinct light brownish gray (10YR 6/2) clay depletions; few fine distinct brownish yellow (10YR 6/6) iron accumulations; very strongly acid; abrupt wavy boundary.
Cg—51 to 62 inches; gray (2.5YR 5/1) silty clay; massive; firm; few fine distinct light gray (10YR 7/1) clay depletions; very strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Reaction: In unlimed areas, strongly acid or very strongly acid in the surface layer through the fragipan and very strongly to neutral below the fragipan

A or Ap horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—2 or less
Redoximorphic features—in shades of brown
Texture of the fine-earth fraction—silt loam

BA horizon:
Hue—5Y, 2.5Y, or 10YR
Value—4 to 6
Chroma—1 or 2
Redoximorphic features—in shades of brown and red
Texture of the fine-earth fraction—silt loam

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—6 or 7
Chroma—1 or 2
Redoximorphic features—in shades of yellow, brown, red, olive, or gray
Texture of the fine-earth fraction—silt loam or silty clay loam

Btgx horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 to 7
Chroma—1 or 2
Redoximorphic features—in shades of gray, yellow, or brown
Variegations—variegated colors in shades of brown, yellow, or gray in some layers
Texture of the fine-earth fraction—silt loam or silty clay loam

Cg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 to 7
Chroma—1 or 2
Variegations—variegated colors in shades of gray, red, or brown in some layers
Content of rock fragments—0 to 35 percent below a depth of 48 inches
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—silty clay, clay loam, silt loam, or silty clay loam

Newark Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Mixed alluvium derived from limestone, shale, sandstone, and loess
Slope: 0 to 2 percent
Taxonomic class: Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents

Associated Soils

Newark soils are geographically associated with Melvin, Dunning, Elk, Lawrence, and Nolin soils. Melvin soils are poorly drained. Dunning soils are very poorly drained. Elk soils are on terraces and have an argillic horizon. Lawrence soils have a fragipan. Nolin soils are well drained and are on flood plains.

Typical Pedon

Newark silt loam, frequently flooded, in Butler County; about 4.7 miles southwest of Jetson on Kentucky Highway 70, about 4.6 miles south of the junction of Kentucky Highway 1328 and Old Greenwich School Road, 800 feet northwest of the junction of Old Greenwich School Road and Little Martin Lake Road, in a cornfield on the Robert Fields farm; long. 86 degrees 32 minutes 58 seconds and lat. 37 degrees 11 minutes 12 seconds:

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.
Bw—8 to 16 inches; brown (10YR 5/3) silt loam; weak fine granular structure; friable; few small flakes of mica; many fine light brownish gray (10YR 6/2) iron depletions; moderately acid; gradual smooth boundary.
Bg—16 to 32 inches; light brownish gray (2.5Y 6/2) silt loam; weak fine and medium subangular blocky structure; friable; few small flakes of mica; many fine and medium faint brown (10YR 5/3) iron accumulations; moderately acid; gradual smooth boundary.
Cg1—32 to 42 inches; light brownish gray (2.5Y 6/2) silt loam; massive; friable; few small flakes of mica; common coarse distinct dark brown (10YR 4/3) iron accumulations; moderately acid; gradual smooth boundary.
Cg2—42 to 63 inches; light brownish gray (2.5Y 6/2) silt loam; massive; friable; few small flakes of mica; irregularly shaped black and brown iron and manganese accumulations; common coarse distinct dark brown (10YR 4/3) iron accumulations; common medium distinct very dark grayish brown (10YR 3/2) iron depletions; slightly acid.

Range in Characteristics

Thickness of the solum: 20 to 60 inches
Kind of rock fragments: Pebbles
Content of rock fragments: 0 to 5 percent to a depth of 30 inches, as much as 15 percent between depths of 30 and 40 inches, and as much as 60 percent below a depth of 40 inches
Reaction: Moderately acid to slightly alkaline throughout the profile

A or Ap horizon:
Hue—7.5YR, 10YR, or 2.5Y

Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam

Bw horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 or 5
Chroma—2 to 4
Redoximorphic features—in shades of gray
Texture of the fine-earth fraction—silt loam

Bg horizon:
Hue—2.5Y to 7.5YR or neutral
Value—4 to 7
Chroma—0 to 2
Redoximorphic features—in shades of brown
Texture of the fine-earth fraction—silt loam or silty clay loam

Cg horizon:
Hue—2.5Y to 7.5YR or neutral
Value—4 to 7
Chroma—0 to 2
Redoximorphic features—in shades of brown
Texture of the fine-earth fraction—silt loam or silty clay loam

Nolin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium derived from limestone, siltstone, shale, and loess
Slope: 0 to 2 percent
Taxonomic class: Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts

Associated Soils

Nolin soils are on the same landscape as Elk, Melvin, and Newark soils. Elk soils are on stream terraces and have an argillic horizon. Melvin soils are poorly drained. Newark soils are somewhat poorly drained.

Typical Pedon

Nolin silt loam, frequently flooded, in Butler County; about 4.7 miles southwest of Jetson, 5.3 miles south of the junction of Kentucky Highway 1328 and Old Greenwich School Road, and 0.9 mile southwest of the junction of Old Greenwich School Road and Little Martin Lake Road, in a cultivated field on the Robert Fields farm; long. 86 degrees 33 minutes 34 seconds and lat. 37 degrees 11 minutes 00 seconds:

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam; weak fine and medium subangular blocky structure; very friable; few fine roots; neutral; abrupt smooth boundary.
Bw—7 to 25 inches; brown (10YR 5/3) silt loam; moderate medium granular structure; friable; few fine roots; neutral; clear smooth boundary.
C—25 to 63 inches; yellowish brown (10YR 5/4) silt loam; few fine faint pale brown (10YR 6/3) and common fine faint dark brown (7.5YR 4/4) mottles; massive; friable; slightly acid.

Range in Characteristics

Thickness of the solum: More than 40 inches
Kind of rock fragments: Limestone and siltstone
Content of rock fragments: 0 to 5 percent in the solum and 0 to 35 percent in the C horizon
Reaction: Moderately acid to moderately alkaline

A or Ap horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam

Bw horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 or 5
Chroma—3 to 6
Mottles—in shades of brown or gray below a depth of 24 inches in some pedons
Texture of the fine-earth fraction—silt loam or silty clay loam

C horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 or 5
Chroma—2 to 6
Lithochromic features—in shades of gray or brown
Texture—silt loam, silty clay loam, strata of those textures, or the gravelly or cobbly analogs of those textures

Otwell Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and very slow in the fragipan
Landform: Terraces
Parent material: Silty alluvium derived from sediments eroded from soils that formed in sandstone, shale, limestone residuum, and loess
Slope: 2 to 12 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Fragiudalfs

Associated Soils

Otwell soils are associated with Lawrence, Newark, Allegheny, and Melvin soils on stream terraces. Lawrence soils have gray mottles in the upper part of the argillic horizon and are in the slightly lower topographic positions. Newark, Allegheny, and Melvin soils do not have a fragipan.

Typical Pedon

Otwell silt loam, 2 to 6 percent slopes, occasionally flooded, in Butler County; about 4 miles northwest of the intersection of Kentucky Highway 79 and Kentucky Highway 403, about 1.3 miles northwest of Logansport, 0.39 mile east of Kentucky Highway 403, on a cultivated second bottom; long. 86 degrees 46 minutes 17 seconds and lat. 37 degrees 15 minutes 50 seconds:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots; neutral; gradual wavy boundary.

Bt1—7 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; few fine roots; few distinct clay films; very strongly acid; gradual wavy boundary.

Bt2—14 to 19 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few distinct clay films; very strongly acid; abrupt wavy boundary.

Bt3—19 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; few distinct clay films; few fine distinct yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) iron accumulations; common medium distinct gray (10YR 6/1) iron depletions; very strongly acid; abrupt wavy boundary.

Btx1—26 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm; few fine roots between prisms; common distinct clay films; rounded black concretions; black and brown stains; common medium distinct pale brown (10YR 6/3) iron accumulations; few faint distinct light brownish gray (10YR 6/2) iron depletions; brittle in 60 percent of the mass; strongly acid; gradual wavy boundary.

Btx2—33 to 42 inches; dark yellowish brown (10YR 4/6 and 3/6) silty clay loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm; common distinct clay films; black and brown stains; common medium distinct gray (10YR 6/1) and few faint distinct light gray (10YR 7/2) iron depletions; brittle in 60 percent of the mass; very strongly acid; gradual wavy boundary.

BC—42 to 52 inches; dark yellowish brown (10YR 3/4) silty clay loam; moderate medium subangular blocky structure; firm; few black stains; common medium distinct very pale brown (10YR 7/3) iron accumulations; few fine distinct light brownish gray (10YR 6/2) iron depletions; strongly acid; abrupt wavy boundary.

C—52 to 68 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; firm; common black stains on faces of peds; few fine distinct light brownish gray (10YR 6/2) iron depletions; strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Gravel and chert
Reaction: Neutral to very strongly acid in the Ap horizon, strongly acid or very strongly acid in the Bt and Btx horizons, and slightly acid to strongly acid in the BC and C horizons

A or Ap horizon:
- Hue—10YR, 7.5YR, or 2.5Y
- Value—4 or 5
- Chroma—2 to 4
- Texture of the fine-earth fraction—silt loam

Bt horizon:
- Hue—10YR, 7.5YR, or 2.5Y
- Value—4 or 5
- Chroma—4 to 6
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam or silty clay loam

Btx horizon:
- Hue—10YR or 7.5YR
- Value—4 or 5
- Chroma—3 to 6
- Content of rock fragments—0 to 5 percent
- Redoximorphic features—in shades of gray, yellow, or brown
- Texture of the fine-earth fraction—silt loam or silty clay loam

C horizon:
- Hue—10YR or 7.5YR
- Value—4 or 5
- Chroma—3 to 6

Redoximorphic features—in shades of gray, yellow, or brown
Content of rock fragments—0 to 15 percent
Texture of the fine-earth fraction—silt loam or silty clay loam

Pembroke Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Loess underlain by limestone residuum and old alluvium
Slope: 0 to 12 percent
Taxonomic class: Fine-silty, mixed, mesic Mollic Paleudalfs

Associated Soils

Pembroke soils are on the same landscape as Baxter, Caneyville, Crider, Fredonia, and Lawrence soils. Baxter soils have more than 35 percent clay in the control section and have an argillic horizon that is more than 15 percent chert. Caneyville and Fredonia soils are moderately deep to bedrock and have more than 35 percent clay in the control section. Crider soils are yellowish brown and strong brown in the Bt horizon. Lawrence soils have a fragipan.

Typical Pedon

Pembroke silt loam, 2 to 6 percent slopes, in Edmonson County; about 600 feet north of U.S. Highway 31-W and 4,400 feet east of Liberty-Chaumont Road, on the Albert Parsely farm; long. 86 degrees 05 minutes 51 seconds and lat. 37 degrees 05 minutes 38 seconds:

Ap—0 to 6 inches; dark brown (7.5YR 3/3) silt loam; weak fine granular structure; very friable; few fine roots; strongly acid; abrupt smooth boundary.
BA—6 to 12 inches; strong brown (7.5YR 4/6) silt loam; weak fine subangular blocky structure; very friable; few fine roots; strongly acid; clear wavy boundary.
Bt1—12 to 17 inches; yellowish red (5YR 4/6) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; few distinct clay films on faces of peds; strongly acid; clear wavy boundary.
Bt2—17 to 26 inches; dark red (2.5YR 3/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films; very strongly acid; gradual wavy boundary.
Bt3—26 to 39 inches; dark red (2.5YR 3/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common prominent clay films; 5 percent chert fragments; very strongly acid; gradual wavy boundary.
Bt4—39 to 54 inches; dark red (2.5YR 3/6) silty clay; few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; common prominent clay films; very strongly acid; gradual wavy boundary.
Bt5—54 to 70 inches; dark red (2.5YR 3/6) silty clay; moderate medium subangular blocky structure; very firm; common prominent clay films; very strongly acid; abrupt smooth boundary.
BC—70 to 73 inches; dark red (10R 3/6) clay; massive; very firm; moderately acid.

Range in Characteristics

Thickness of the solum: More than 60 inches
Kind of rock fragments: Chert
Content of rock fragments: 0 to 5 percent in the upper part of the solum and 0 to 15 percent in the lower part
Reaction: Very strongly acid to moderately acid

A or Ap horizon:
Hue—10YR, 7.5YR, or 5YR
Value—3
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam

BA horizon:
Hue—10YR, 7.5YR, or 5YR
Value—4
Chroma—4 or 6
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—5YR or 2.5YR in the upper part of the horizon and 5YR to 10R in the lower part
Value—3 or 4
Chroma—6
Lithochromic features—in shades of gray or brown
Texture of the fine-earth fraction—silty clay loam or silty clay

BC horizon:
Hue—5YR to 10R
Value—3 or 4
Chroma—6
Lithochromic features—in shades of gray or brown
Texture of the fine-earth fraction—silty clay or clay

Riney Series

Depth class: Deep or very deep
Drainage class: Well drained
Permeability: Moderately rapid

Landform: Uplands
Parent material: Material weathered from weakly consolidated sandstone and shale
Slope: 2 to 30 percent
Taxonomic class: Fine-loamy, siliceous, mesic Typic Hapludults

Associated Soils

Riney soils are associated with Caneyville, Jefferson, and Lily soils. Caneyville and Lily soils are moderately deep to bedrock. Jefferson soils have a B horizon with hue of 10YR or 7.5YR.

Typical Pedon

Riney silt loam, 6 to 12 percent slopes, eroded, in Edmonson County; approximately 0.49 mile east of the intersection of Kentucky Highway 1352 and Ugly Creek Road, then 0.2 mile to Wilkins Cemetery, 50 feet north of the cemetery, on a side slope; long. 86 degrees 06 minutes 45 seconds and lat. 37 degrees 14 minutes 32 seconds:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; moderate very fine granular structure; very friable; many fine and common coarse and medium roots; moderately acid; abrupt wavy boundary.
BA—6 to 10 inches; dark yellowish brown (10YR 4/6) silt loam; weak medium subangular blocky structure; friable; strongly acid; abrupt wavy boundary.
Bt1—10 to 21 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; very friable; common fine and few medium roots; many discontinuous clay films on faces of peds; strongly acid; abrupt smooth boundary.
2Bt2—21 to 40 inches; dark brown (7.5YR 4/4) loam; moderate coarse angular blocky structure parting to moderate medium subangular blocky; firm; few fine roots; many continuous clay films on faces of peds; 2 percent quartzite pebbles; strongly acid; abrupt smooth boundary.
2BC1—40 to 43 inches; strong brown (7.5YR 4/6) gravelly sandy loam; moderate medium angular blocky structure parting to moderate fine and medium subangular blocky; friable; few fine roots; 2 percent black stains on faces of peds; 20 percent rounded quartzite pebbles; strongly acid; abrupt smooth boundary.
2BC2—43 to 50 inches; strong brown (7.5YR 5/6) loamy sand; weak medium subangular blocky structure; very friable; common distinct clay films on faces of peds; few fine and medium roots; 5 percent quartzite pebbles; strongly acid; abrupt smooth boundary.
2CB—50 to 56 inches; strong brown (7.5YR 5/6) sandy loam; massive; firm; few fine roots; few patchy yellowish brown clay films; 10 percent sandstone and quartzite pebbles; strongly acid; abrupt wavy boundary.
3Bt3—56 to 72 inches; red (2.5YR 5/6) gravelly sandy clay loam; many medium distinct brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm; few fine and common medium roots; many distinct continuous clay films on faces of peds and fragments; 30 percent quartzite pebbles; very strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 80 inches
Kind of rock fragments: Quartzite pebbles and sandstone fragments
Content of rock fragments: 0 to 10 percent in the A horizon, 0 to 20 percent in the Bt horizon, 0 to 35 percent in the 2Bt horizon, and 0 to 40 percent in the BC and CB horizons (if they occur)
Reaction: Strongly acid or very strongly acid

A or Ap horizon:
Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam

BA horizon:
Hue—10YR
Value—4 to 6
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam, loam, or clay loam

Bt and 2Bt horizons:
Hue—10YR, 7.5YR, 2.5YR, or 5YR
Value—4 or 5
Chroma—4 to 8
Lithochromic features—in shades of red or brown
Texture of the fine-earth fraction—loam, sandy loam, clay loam, or fine sandy loam

BC and CB horizons (if they occur):
Hue—10YR, 7.5YR, 5YR, or 2.5YR
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—sandy loam, loamy sand, fine sandy loam, or sandy clay loam

3Bt3 horizon (if it occurs):
Below a depth of 40 inches

Rosine Series

Depth class: Deep or very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Loess and the underlying residuum derived from shale that is interbedded with siltstone in places
Slope: 2 to 20 percent
Taxonomic class: Fine-silty, mixed, mesic Ultic Hapludalfs

Associated Soils

Rosine soils are associated with Gilpin, Wellston, Clarkrange, and Caneyville soils. Gilpin, Wellston, and Clarkrange soils have less clay in the lower part of the subsoil than the Rosine soils. Gilpin soils are moderately deep to bedrock. Clarkrange soils are on hilltops and have a fragipan. Caneyville soils are moderately deep to limestone bedrock.

Typical Pedon

Rosine silt loam, 6 to 12 percent slopes, eroded, in Butler County; about 1.34 miles north of the intersection of Kentucky Highway 728 and Union Light and Dog Creek Road, 0.75 mile west on Ralph Bush Road, then 600 feet south of Ralph Bush Road, in a hayfield; long. 86 degrees 07 minutes 30 seconds and lat. 37 degrees 17 minutes 24 seconds:

Ap—0 to 7 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; common fine and very fine roots; slightly acid; clear smooth boundary.
BA—7 to 14 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine and very fine roots; strongly acid; clear wavy boundary.
Bt1—14 to 22 inches; yellowish brown (10YR 5/8) silty clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common distinct clay films; very strongly acid; clear wavy boundary.
2Bt2—22 to 33 inches; brownish yellow (10YR 6/6) silty clay loam; few fine distinct light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; common distinct clay films; 5 percent shale and sandstone fragments; very strongly acid; clear smooth boundary.
2Bt3—33 to 52 inches; red (2.5YR 4/6) clay; common medium distinct light yellowish brown (10YR 6/4) and common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; very firm; common prominent clay films; very strongly acid; gradual wavy boundary.
2BC—52 to 55 inches; clay, 34 percent light gray (10YR 7/2), 33 percent light yellowish brown (10YR 6/4), and 33 percent red (2.5YR 4/6); weak medium subangular blocky structure; very firm; few distinct clay films; very strongly acid; clear wavy boundary.
2C—55 to 65 inches; multicolored shale and light red (2.5YR 6/6), brownish yellow (10YR 6/8), and light brownish gray (10YR 6/2) clay; massive; very strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Sandstone, siltstone, and shale channers
Content of rock fragments: 0 to 30 percent in the solum and 25 to 60 percent in the C horizon
Reaction: Strongly acid or very strongly acid in the solum and very strongly acid to slightly acid in the 2C horizon

A or Ap horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture of the fine-earth fraction—silt loam

BA horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture of the fine-earth fraction—silt loam or silty clay loam

Bt horizon:
Hue—10YR to 5YR
Value—4 or 5
Chroma—4 to 8
Texture of the fine-earth fraction—silty clay loam or silt loam

2Bt horizon
Hue—2.5YR, 5YR, 7.5YR, or 10YR
Value—5 to 7
Chroma—3 to 6
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay

2BC and 2C horizons:
Hue—2.5YR, 5YR, 7.5YR, or 10YR
Value—5 to 7
Chroma—3 to 6

Texture—silty clay loam, silty clay, clay, or the gravelly analogs of those textures

Sadler Series

Depth class: Deep or very deep
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and slow in the fragipan
Landform: Uplands
Parent material: A mantle of loess and the underlying residuum derived from sandstone, siltstone, or shale
Slope: 0 to 6 percent
Taxonomic class: Fine-silty, mixed, mesic Oxyaquic Fragiudalfs

Associated Soils

Sadler soils are associated with Zanesville, Johnsburg, and Wellston soils. Zanesville soils are on ridges and do not have an E/B horizon above the fragipan. Johnsburg soils are somewhat poorly drained and have gray mottles in the upper 10 inches of the argillic horizon. Wellston soils do not have a fragipan.

Typical Pedon

Sadler silt loam, 2 to 6 percent slopes, in Butler County; approximately 3.25 miles north of the intersection of Kentucky Highway 106 and Kentucky Highway 1150 at Quality, 0.39 mile southwest on J. Arnold Road, then 100 feet north on a gravel lane in a soybean field; long. 86 degrees 52 minutes 34 seconds and lat. 37 degrees 07 minutes 05 seconds:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; few fine and very fine roots; slightly acid; abrupt smooth boundary.
Bt1—6 to 12 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; few very fine roots; few faint clay films; strongly acid; clear wavy boundary.
Bt2—12 to 17 inches; brownish yellow (10YR 6/6) silt loam; moderate medium and fine subangular blocky structure; firm; few very fine roots; common distinct clay films; few black and brown iron and manganese concretions; few medium distinct pale brown (10YR 6/3) iron accumulations; very strongly acid; clear wavy boundary.
E/B—17 to 23 inches; 60 percent light yellowish brown (10YR 6/4), light gray (10YR 7/2), white (10YR 8/1), and light brownish gray (2.5Y 6/2), friable silt loam with moderate medium and fine subangular blocky structure (E part); 40 percent pockets of yellowish brown (10YR 5/4), firm silt loam (Bt part); common coarse prominent white (10YR 8/1) silt coatings on peds; brittle in 40 percent of the mass; very strongly acid; clear wavy boundary.
2Btx1—23 to 38 inches; yellowish brown (10YR 5/4) silt loam; moderate coarse prismatic structure parting to weak medium subangular blocky; very firm; few faint clay films on prisms; common medium distinct light brownish gray (10YR 6/2) iron depletions; yellowish brown (10YR 5/6) iron accumulations; brittle in 60 percent of the mass; very strongly acid; gradual wavy boundary.
2Btx2—38 to 53 inches; light yellowish brown (2.5Y 6/4) loam; moderate coarse prismatic structure parting to weak medium subangular blocky; very firm; few faint clay films; few fine distinct yellowish brown (10YR 5/8) iron accumulations; common fine distinct light brownish gray (10YR 6/2) and grayish brown (10YR 5/2) iron depletions; brittle in 60 percent of the mass; very strongly acid; abrupt wavy boundary.
2C—53 to 61 inches; light yellowish brown (10YR 6/4) loam; massive; firm; few fine distinct light brownish gray (10YR 6/2) iron depletions; few fine distinct pale yellow (2.5Y 7/4) iron accumulations; very strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Sandstone
Reaction: Very strongly acid or strongly acid

A or Ap horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—2.5Y or 7.5YR
Value—5 or 6
Chroma—4 to 6
Texture of the fine-earth fraction—silt loam or silty clay loam

E/B horizon:
Hue—10YR or 2.5Y in the E part and 10YR to 2.5YR in the B part
Value—4 to 6 in the E and B parts
Chroma—1 to 3 in the E part and 4 to 8 in the B part
Texture of the fine-earth section—silt or silt loam in the E part and silt loam or silty clay loam in the B part

2Btx horizon:
Hue—7.5YR to 2.5Y
Value—3 to 6
Chroma—1 to 6
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—silt loam or silty clay loam

2C horizon:
Hue—7.5YR to 5Y
Value—3 to 6
Chroma—1 to 6
Content of rock fragments—1 to 60 percent sandstone or siltstone fragments
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—loam, silt loam, silty clay loam, clay loam, or sandy clay loam

Sciotoville Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and moderately slow or slow in the fragipan
Landform: High terraces
Parent material: Old alluvium
Slope: 2 to 12 percent
Taxonomic class: Fine-silty, mixed, mesic Aquic Fragiudalfs
Taxadjunct statement: The Sciotoville soils in this survey area are taxadjuncts to the series because they have no redoximorphic features within 16 inches of the top of the argillic horizon. The soils classify as fine-silty, mixed, mesic Oxyaquic Fragiudalfs. They formed in old alluvium overlain by loess. The use, management, and behavior of the soils are similar to those of the Sciotoville series.

Associated Soils

Sciotoville soils are associated with Allegheny, Elk, and Otwell soils. Allegheny and Elk soils are well drained and do not have a fragipan. Otwell soils formed in recent alluvial material.

Typical Pedon

Sciotoville silt loam, 2 to 6 percent slopes, in Butler County; approximately 0.3 mile north of Logansport; 300 feet southwest of Kentucky Highway 403 and 400 feet south of Horseshoe Bend Road; long. 86 degrees 46 minutes 25 seconds and lat. 37 degrees 17 minutes 10 seconds:

Ap1—0 to 3 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; common fine roots; slightly acid; abrupt wavy boundary.
Ap2—3 to 8 inches; brown (10YR 4/3) loam; few fine faint brown (10YR 5/3) mottles; weak fine granular structure; very friable; common fine roots; slightly acid; abrupt wavy boundary.
Bt1—8 to 17 inches; yellowish brown (10YR 5/8) clay loam; weak medium subangular blocky structure; friable; common fine roots; common distinct clay films; strongly acid; gradual wavy boundary.
Bt2—17 to 22 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct clay films; very strongly acid; gradual wavy boundary.
Bt3—22 to 32 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; few fine faint light yellowish brown (10YR 6/4) iron accumulations; few fine roots; common distinct clay films; very strongly acid; abrupt wavy boundary.
Btx—32 to 48 inches; 50 percent yellowish brown (10YR 5/4) and 50 percent brownish yellow (10YR 6/6) loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; firm, brittle, and compact; common medium distinct light gray (10YR 7/2) iron depletions; few thin clay films on faces of prisms; common distinct dark yellowish brown (10YR 4/6) clay films on faces of peds; very strongly acid; abrupt wavy boundary.
BC—48 to 66 inches; light yellowish brown (10YR 6/4) sandy clay loam; weak thin platy structure; firm; few fine faint brownish yellow (10YR 6/8) iron accumulations; common medium distinct light gray (10YR 7/2) iron depletions; few faint clay films between gray streaks; strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Waterworn sandstone and quartzite pebbles
Content of rock fragments: 0 to 2 percent in the Ap horizon, 0 to 5 percent in the Bt and Btx horizons, and 0 to 15 percent in the BC horizon
Reaction: Slightly acid to strongly acid in the Ap horizon, strongly acid or very strongly acid in the Bt horizon, moderately acid to very strongly acid in the Btx horizon, and slightly acid to strongly acid in the BC horizon

A or Ap horizon:
Hue—10YR or 7.5YR
Value—4 or 5

Chroma—3 to 6
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—silt loam or silty clay loam

Btx horizon:
Hue—10YR, 7.5YR, or 5YR
Value—4 to 6
Chroma—3 to 6
Redoximorphic features—in shades of gray or brown
Texture of the fine-earth fraction—loam, silt loam, or silty clay loam

BC horizon (and CB horizon if it occurs):
Hue—10YR or 7.5YR
Value—4 or 6
Chroma—3 to 8
Texture of the fine-earth fraction—sandy clay loam, loam, silty clay loam, or silt loam

Shelocta Series

Depth class: Deep or very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Colluvium over weathered shale or siltstone
Slope: 12 to 30 percent
Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludults

Associated Soils

Shelocta soils are associated on the landscape with Latham, Gilpin, and Lenberg soils. Latham soils are in a fine textured family and are moderately deep to soft, greenish gray shale. Gilpin soils are moderately deep and formed in residuum derived from sandstone. Lenberg soils have a fine textured control section and are moderately deep to shale.

Typical Pedon

Shelocta silt loam, in an area of Shelocta-Latham-Gilpin complex, 20 to 30 percent slopes, in Edmonson County; about 5 miles north of Straw and 3.7 miles north of the intersection at Kentucky Highway 728 and Union Light-Dog Creek Road, 0.83 mile west on Dog Creek-Long Fall Road, and 0.35 mile north in a wooded area above Nolin Lake; long. 86 degrees 10 minutes 01 second and lat. 37 degrees 19 minutes 37 seconds:

A—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine and medium roots; 2 percent sandstone pebbles; very strongly acid; clear wavy boundary.
Bt1—3 to 8 inches; brownish yellow (10YR 6/6) silt loam; friable; weak fine subangular blocky structure; common fine and few medium roots; few faint clay films on faces of peds; 2 percent sandstone channers and pebbles; very strongly acid; gradual wavy boundary.
Bt2—8 to 14 inches; brownish yellow (10YR 6/6) silty clay loam; moderate medium subangular blocky structure; friable; few coarse and many medium and fine roots; common distinct clay films on faces of peds; 10 percent sandstone pebbles 1/4 inch to 2 inches in diameter; very strongly acid; gradual wavy boundary.
Bt3—14 to 20 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine, medium, and coarse roots; common distinct clay films on faces of peds; 10 percent sandstone pebbles 1/4 inch to 2 inches in diameter; very strongly acid; clear wavy boundary.
BC1—20 to 27 inches; strong brown (7.5YR 5/8) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; 10 percent sandstone pebbles 1/4 inch to 2 inches in diameter; very strongly acid; gradual wavy boundary.
2BC2—27 to 40 inches; strong brown (7.5YR 5/8) clay; common medium distinct light gray (10YR 7/2) and few fine distinct reddish yellow (5YR 6/8) mottles; moderate fine and medium angular blocky structure; firm; common distinct clay films on faces of peds; very strongly acid; abrupt wavy boundary.
2C—40 to 62 inches; brownish yellow (10YR 6/6) clay; many coarse distinct light gray (10YR 7/2) and few fine distinct yellowish red (5YR 5/8) mottles; strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Kind of rock fragments: Sandstone, siltstone, and shale
Content of rock fragments: 2 to 20 percent in the A horizon, 5 to 35 percent in the B horizon, and 0 to 20 percent in the 2B and 2C horizons

Reaction: Very strongly acid to slightly acid in the upper part of the solum and very strongly acid to moderately acid in the lower part of the solum and in the 2C horizon

A or Ap horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—2 or 3
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—4 to 8
Lithochromic features—in shades of gray, red, or brown in the lower part
Texture of the fine-earth fraction—silt loam, silty clay loam, clay loam, or loam

2BC and 2C horizons:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 7
Chroma—3 to 8
Lithochromic features—in shades of gray, red, or brown
Texture of the fine-earth fraction—silty clay loam, silty clay, or clay

Wallen Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Uplands
Parent material: Residuum derived from acid sandstone
Slope: 15 to 50 percent
Taxonomic class: Loamy-skeletal, siliceous, mesic Typic Dystrochrepts

Associated Soils

Wallen soils are associated on the landscape with Bledsoe, Caneyville, Clarkrange, Donahue, Lily, and Wellston soils. Bledsoe soils are very deep to bedrock and are in a fine textured family. Caneyville and Donahue soils are moderately deep and are in a fine textured family. Clarkrange soils are in a fine-silty family and have a fragipan. Lily soils have an argillic horizon and are in a fine-loamy family. Wellston soils are in a fine-silty family.

Typical Pedon

Wallen gravelly loam, in an area of Wallen-Bledsoe-Donahue complex, 15 to 35 percent slopes, very rocky, in Edmonson County; 2.34 miles west of Park City, then 0.79 mile north of the intersection of Bald Knob Road and U.S. Highway 31-W, 0.47 mile east on Clubhouse Road, then 400 feet south of Clubhouse Road, on a wooded hillside; long. 86 degrees 04 minutes 48 seconds and lat. 37 degrees 06 minutes 06 seconds:

Oi—½ inch to 0; partially decomposed leaf litter.
A—0 to 6 inches; brown (10YR 4/3) gravelly loam; moderate medium granular structure; friable; many fine, medium, and coarse roots; about 15 percent, by volume, angular sandstone fragments; slightly acid; abrupt smooth boundary.
BE—6 to 11 inches; dark yellowish brown (10YR 4/4) very gravelly loam; weak fine subangular blocky structure parting to weak fine granular; friable; many fine, medium, and coarse roots; about 40 percent, by volume, angular sandstone fragments as much as 3 inches in diameter; strongly acid; clear wavy boundary.
Bw1—11 to 17 inches; dark brown (7.5YR 4/4) very stony loam; weak medium subangular blocky structure; friable; many fine, medium, and coarse roots; about 50 percent, by volume, angular sandstone cobbles and stones as much as 15 inches in diameter; very strongly acid; gradual wavy boundary.
Bw2—17 to 25 inches; dark yellowish brown (10YR 4/6) very stony loam; weak medium subangular blocky structure; firm; many fine roots; about 50 percent sandstone cobbles and stones as much as 20 inches in diameter; very strongly acid; abrupt smooth boundary.
R—25 inches; sandstone bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Kind of rock fragments: Sandstone or quartzite pebbles
Content of rock fragments: 15 to 35 percent, by volume, in the A and BE horizons and 20 to 50 percent in the Bw horizon
Reaction: Moderately acid to very strongly acid

A or Ap horizon:
Hue—10YR
Value—3 or 4
Chroma—1 to 3
Texture—loam or gravelly loam

BE horizon:
Hue—10YR
Value—4 to 6
Chroma—2 to 4

Texture of the fine-earth fraction—loam, silt loam, fine sandy loam, or sandy loam

Bw horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 6
Lithochromic features—in some pedons, colors in shades of brown or red in the lower part
Texture—loam, sandy loam, fine sandy loam, or the gravelly or stony analogs of those textures

Weikert Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Uplands
Parent material: Residuum derived from acid sandstone
Slope: 20 to 50 percent
Taxonomic class: Loamy-skeletal, mixed, mesic Lithic Dystrochrepts

Associated Soils

Weikert soils are associated on the landscape with Frondorf, Jefferson, Lily, and Wellston soils. Frondorf soils are in a fine-loamy family and are moderately deep. Jefferson soils are in a fine-loamy family and are deep. Lily soils have an argillic horizon and are in a fine-loamy family. Wellston soils are in a fine-silty family and are deeper than 40 inches.

Typical Pedon

Weikert very channery silt loam, in an area of Frondorf-Weikert complex, 20 to 50 percent slopes, in Butler County; about 4 miles south of Sugar Grove, then 2.75 miles west of the intersection of Kentucky Highway 626 and Kentucky Highway 1083, about 1,800 feet south of the intersection of Kentucky Highway 626 and Sunnylane-Richelieu Road, 1,000 feet east of Sunnylane-Richelieu Road, on a wooded hillside; long. 86 degrees 42 minutes 48 seconds and lat. 37 degrees 02 minutes 07 seconds:

A—0 to 6 inches; yellowish brown (10YR 5/4) very channery silt loam; weak fine granular structure; very friable; many fine and medium roots; 35 percent sandstone channers 1/4 inch to 2 inches in diameter; moderately acid; clear wavy boundary.
Bw1—6 to 11 inches; yellowish brown (10YR 5/4) very channery loam; moderate medium subangular blocky structure; friable; common medium and coarse roots; 40 percent sandstone channers 1/2 inch to 3 inches in diameter; strongly acid; clear wavy boundary.
Bw2—11 to 17 inches; yellowish brown (10YR 5/6) very channery loam; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; 45 percent sandstone channers; strongly acid; abrupt wavy boundary.
Cr—17 to 20 inches; yellowish red (5YR 4/6), soft sandstone; abrupt smooth boundary.
R—20 inches; hard sandstone.

Range in Characteristics

Thickness of the solum: 8 to 20 inches
Kind of rock fragments: Shale, siltstone, and sandstone
Content of rock fragments: 5 to 50 percent in the A horizon and 35 to 60 percent in the Bw horizon
Reaction: Moderately acid to very strongly acid

A or Ap horizon:
Hue—7.5YR or 10YR
Value—3 or 5
Chroma—2 to 4
Texture of the fine-earth fraction—silt loam

Bw horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6
Texture—loam, silt loam, or the shaly, channery, very shaly, or very channery analogs of those textures

Wellston Series

Depth class: Deep or very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: A thin layer of loess and the underlying residuum derived from sandstone and siltstone
Slope: 2 to 20 percent
Taxonomic class: Fine-silty, mixed, mesic Ultic Hapludalfs

Associated Soils

Wellston soils are associated with Gilpin, Rosine, Lily, and Clarkrange soils. Gilpin and Lily soils are moderately deep to bedrock. Rosine soils have more clay in the lower part of the subsoil than the Wellston soils. Clarkrange soils are moderately well drained and have a fragipan.

Typical Pedon

Wellston silt loam, 6 to 12 percent slopes, eroded, in Edmonson County; 9.2 miles east of Brownsville, 4.4 miles north of the intersection of Kentucky Highway 70 and Mammoth Cave Entrance Road, then 3.5 miles north on Maple Springs Ranger Station Road, then 1,200 feet west of Maple Springs Ranger Station Road, then 700 feet north of a paved park road, on a wooded hillside; long. 86 degrees 07 minutes 42 seconds and lat. 37 degrees 12 minutes 29 seconds:

Oi—1/2 inch to 0; decayed leaf litter, twigs, and leaves.
A1—0 to 4 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; few medium roots; strongly acid; gradual smooth boundary.
A2—4 to 11 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine and medium and few coarse roots; strongly acid; abrupt wavy boundary.
Bt1—11 to 16 inches; strong brown (7.5YR 4/6) silt loam; weak fine and medium subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.
Bt2—16 to 26 inches; dark brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; firm; few fine and medium roots; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.
Bt3—26 to 40 inches; strong brown (7.5YR 4/6) silt loam; weak medium subangular blocky structure; firm; few fine roots; common distinct clay films; very strongly acid; abrupt smooth boundary.
2BC—40 to 49 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; firm; very strongly acid; abrupt smooth boundary.
2C—49 to 60 inches; strong brown (7.5YR 5/8) sandy loam; few fine faint pink (7.5YR 7/4) and common medium distinct pale brown (10YR 6/3) and brownish yellow (10YR 6/6) mottles; massive; firm; very strongly acid.

Range in Characteristics

Thickness of the solum: 32 to 50 inches
Kind of rock fragments: Flat fragments of siltstone and fine grained sandstone
Content of rock fragments: 0 to 15 percent in the A horizon and the upper part of the Bt horizon, 0 to 60 percent in the lower part of the Bt horizon and in the 2BC horizon, and 0 to 90 percent in the 2C horizon
Reaction: Moderately acid to extremely acid in the A horizon and moderately acid to very strongly acid below the A horizon

A or Ap horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 or 4
Texture of the fine-earth fraction—silt loam

Bt horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—4 to 6
Lithochromic features—in shades of light gray or pale brown in some pedons
Texture of the fine-earth fraction—silt loam or silty clay loam

2BC and 2C horizons:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 or 5
Chroma—3 to 6
Lithochromic features—in shades of gray or brown
Texture—silt loam, loam, sandy loam, clay loam, or the gravelly or channery analogs of those textures

Zanesville Series

Depth class: Deep or very deep
Drainage class: Moderately well drained
Permeability: Moderate above the fragipan and moderately slow or slow in the fragipan
Landform: Uplands
Parent material: Loess and the underlying residuum derived from sandstone, siltstone, and shale
Slope: 2 to 12 percent
Taxonomic class: Fine-silty, mixed, mesic Oxyaquic Fragiudalfs

Associated Soils

Zanesville soils are associated with Wellston, Frondorf, Sadler, and Rosine soils. Wellston, Frondorf, and Rosine soils do not have a fragipan. Frondorf soils are moderately deep to bedrock. Rosine soils have more clay in the subsoil than the Zanesville soils. Sadler soils have a bisequum.

Typical Pedon

Zanesville silt loam, 2 to 6 percent slopes, in Edmonson County; about 4 miles south of Sugar Grove, then 2.75 miles west of the intersection of Kentucky Highway 626 and Kentucky Highway 1083,

about 550 feet south of the intersection of Kentucky Highway 626 and Sunnylane-Richelieu Road, 100 feet west of Sunnylane-Richelieu Road, in a field of grass; long. 86 degrees 43 minutes 01 second and lat. 37 degrees 02 minutes 18 seconds:

Ap—0 to 7 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; common fine and medium roots; slightly acid; abrupt smooth boundary.

BA—7 to 11 inches; yellowish brown (10YR 5/6) silt loam; very friable; common fine roots; common fine vesicular pores; few black concretions; slightly acid; gradual wavy boundary.

Bt1—11 to 18 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate medium subangular blocky structure parting to weak fine subangular blocky; firm; common fine roots; common distinct clay films; strongly acid; gradual wavy boundary.

Bt2—18 to 24 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; few fine roots; common faint clay films; very strongly acid; abrupt wavy boundary.

Btx1—24 to 31 inches; yellowish brown (10YR 5/4) silt loam; moderate very coarse prismatic structure; very firm; common distinct clay films; common medium distinct strong brown (7.5YR 4/6) iron accumulations; common fine distinct light gray (10YR 7/2) iron depletions; brittle in 60 percent of the mass; very strongly acid; gradual wavy boundary.

Btx2—31 to 40 inches; yellowish brown (10YR 5/8) silt loam; moderate very coarse prismatic structure; very firm; few faint clay films; common medium distinct light gray (10YR 7/2) iron depletions; brittle in 60 percent of the mass; very strongly acid; abrupt wavy boundary.

2BC—40 to 51 inches; strong brown (7.5YR 4/6) silt loam; massive; firm; few fine distinct yellowish brown (10YR 5/6) iron accumulations; strongly acid; gradual wavy boundary.

2C—51 to 60 inches; brownish yellow (10YR 6/6) silt loam; massive; firm; common medium distinct light brownish gray (10YR 6/2) iron depletions; very strongly acid.

Range in Characteristics

Thickness of the solum: 35 to 60 inches
Kind of rock fragments: Sandstone and siltstone
Content of rock fragments: 0 to 15 percent in the Btx horizon and 5 to 60 percent in the 2C horizon
Reaction: Strongly acid or very strongly acid in unlimed areas

A or Ap horizon:
- Hue—10YR
- Value—4 or 5
- Chroma—3 or 4
- Texture of the fine-earth fraction—silt loam

BA horizon:
- Hue—10YR
- Value—4 or 5
- Chroma—4 to 6
- Texture of the fine-earth fraction—silt loam

Bt horizon:
- Hue—10YR, 7.5YR, or 5YR
- Value—4 or 5
- Chroma—4 to 6
- Texture of the fine-earth fraction—silt loam or silty clay loam

Btx horizon:
- Hue—10YR or 7.5YR
- Value—4 or 5
- Chroma—3 to 6
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam, silty clay loam, or loam

2BC and 2C horizons:
- Hue—10YR or 7.5YR
- Value—4 or 5
- Chroma—3 to 6
- Redoximorphic features—in shades of gray or brown
- Texture of the fine-earth fraction—silt loam, sandy clay loam, or loam

Formation of the Soils

This section provides information concerning formation of the soils in Butler and Edmonson Counties. It describes the five factors of soil formation and explains their effects on the soils in the survey area.

The discipline of soil science began in the late 19th century when the concept of soil as an organized natural body was initially developed. According to this concept, a soil is a unique individual whose properties are not the result of any single factor, such as geology, but rather the result of the interaction of several factors working together (Buol, Hole, and McCracken 1980).

The five recognized factors in soil formation are climate, parent material, plant and animal life, relief, and time. Each factor is capable of working independently to influence the properties of soil (Fanning and Fanning 1989). In many instances, however, the climate and relief of the area influence organisms in a soil. It is of interest in soil science to separate the influences that each of the factors has on a particular group of soils in order to understand the relationship between soils and how their characteristics vary because of these factors. The following paragraphs describe the soils of Butler and Edmonson Counties and how they were influenced by the factors of soil formation.

Factors of Soil Formation

Soils are individual material bodies formed through the interaction of the five major factors of soil formation. Climate and plant and animal life act on the parent material. Their effects on soil formation are controlled by relief and the amount of time that they have been active.

Climate

The climate of Butler and Edmonson Counties is humid and temperate. Summers are warm, winters are cool, and precipitation occurs throughout the year. The average annual precipitation is about 52.1 inches in Edmonson County and 47.6 inches in Butler County. The average annual air temperature is 56.5 degrees F in Edmonson County and 57.1 degrees F in Butler County. Because the soils in the survey area are not dry or frozen for long periods, the processes of soil formation are active throughout the year. Climate generally is the most important factor of soil formation. Because the climate is uniform throughout the survey area, however, the differences among the soils in the survey area are the result of other factors.

Climate affects soil formation primarily through the effects of temperature and rainfall on the chemical and physical weathering of geologic material, on erosion, and on the kind and number of plants and animals on and in the soils. As water percolates downward through the soils, it leaches soluble bases from the soils and moves particles of clay to the lower layers. Because of the translocation of these materials over a period of time, many of the soils in the survey area are acid, have a loamy surface layer, and have accumulated clay in the subsoil. Rosine, Wellston, and Gilpin soils are examples of these soils.

Parent Material

Parent material, which is the unconsolidated mass in which a soil forms, varies, especially in degree of consolidation, texture, and mineralogy. It exerts the greatest influence on soil characteristics in young soils.

Most of the soils in Butler and Edmonson Counties formed in residuum from sedimentary rocks. The other kinds of parent material in the survey area are loess, alluvium, and colluvium.

Some soils in the survey area formed in a combination of loess and residuum. Loess, which is wind-deposited material comprised mostly of silt-sized particles, is on most of the uplands. It is thickest on gentle slopes. Clarkrange and Rosine soils are examples of soils that formed partly in loess and partly in residuum from sandstone, siltstone, or shale bedrock.

Some soils in Mammoth Cave National Park formed entirely in residuum. These soils are generally on the steeper slopes where loess was not deposited or where erosion removed the loess cap before the present soil formed. Wallen and Lily soils formed in

sandstone residuum. Lenberg soils formed in clayey residuum from shale.

Soils on flood plains and stream terraces formed in alluvium washed from the higher landscape positions. Elk and Otwell soils formed in old alluvium on stream terraces. The stream terraces, which are on old alluvial plains, no longer receive new depositions of soil material. Newark, Nolin, Melvin, and Grigsby soils formed in recent alluvium on flood plains. The flood plains continue to receive new depositions of soil material. Newark, Nolin, and Melvin soils are silty in texture, and Grigsby soils are sandier in texture and are loamy.

Colluvium is material removed from soils on the side slopes of steep hills and deposited on footslopes by gravity. Bledsoe and Jefferson soils formed in clayey or loamy colluvium.

Plant and Animal Life

Plants and animals in and on the soil are active forces in the soil-forming process. Plants add organic matter to the surface layer of the soil, and their roots transfer or cycle nutrients from the subsoil. Many forms of animal life, including earthworms, grubs, moles, and mice, are in the soil. These organisms influence the addition and decomposition of organic matter, nitrogen content, nutrient cycling, mineral weathering, and mixing of soil material.

The native vegetation in the survey area is predominantly hardwood forest. Soils formed under this type of vegetation typically are acid and have a thin, dark surface layer resulting from small amounts of organic matter returned to the soils.

Human activities also influence soil formation. These activities include clearing forests, tilling cleared areas, and, in some areas, burning vegetation. In some cultivated areas, accelerated erosion has removed most of the original surface layer and exposed the subsoil.

Relief

Relief, or lay of the land, has a dramatic effect on the properties of soils as they develop on a particular landscape. Soils that formed on nearly level topography and have poor drainage are not so well developed as soils that have good drainage.

As the slope of the landscape increases, poor drainage becomes less of a factor and the effects of erosion increase. Soils in steep areas are generally not so deep and are less developed than soils in gently sloping areas. The hazard of water erosion is increased because of the steeper slope, and often soil material is removed from the surface as fast as the residuum is formed. Lily and Wallen soils on the steeper landscapes are not so deep over bedrock as soils on the more gently sloping landscapes.

Time

Time refers to a measured period in which soil-forming processes have been at work. Generally, the longer the processes have continued, the older the soil and the more well developed the soil profile. Ultimately, the amount of profile development determines the maturity of a soil rather than the number of years that a soil has been in the process of developing.

The soils in Butler and Edmonson Counties range in age from young to old. The youngest soils, Chagrin, Melvin, Newark, and Nolin soils, formed in alluvial deposits. They have profiles with indistinct soil horizons and show little evidence of profile development. Some soils that formed on stream terraces, such as Elk and Otwell soils, are older and exhibit more mature horizon development.

Bledsoe, Pembroke, Rosine, and Wellston soils represent the oldest, most mature soils in the survey area. These soils are in stable landscape positions and formed in colluvium and residuum; loess, residuum, and old alluvium; or loess and residuum.

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Glossary

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

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.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

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

Backslope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

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.

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

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

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

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

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.

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 depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

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.

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.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

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.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

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.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

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.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

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.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

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

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.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

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.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an 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.

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.

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.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

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.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

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.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

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.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

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

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.

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:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 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.

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.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

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:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly 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

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

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.

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.

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.

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.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

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. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Strongly sloping	6 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 30 percent
Very steep	30 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

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.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. 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. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or

flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

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.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

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.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

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.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Beaver Dam in Butler County and at Mammoth Cave National Park in Edmonson County)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
Beaver Dam:											
January---	42.7	23.3	33.0	70	-13	65	3.21	1.52	4.67	5	2.4
February--	48.4	27.0	37.7	75	- 4	105	4.13	1.75	6.14	6	2.9
March-----	59.9	36.7	48.3	83	13	300	4.44	2.52	6.15	7	.5
April-----	70.4	45.5	58.0	88	25	538	4.32	2.11	6.24	6	.0
May-------	78.4	53.7	66.1	90	33	799	4.84	2.75	6.70	7	.0
June------	85.7	62.2	74.0	96	45	1,008	3.49	1.59	5.12	5	.0
July------	88.6	66.0	77.3	98	50	1,143	4.47	2.10	6.51	6	.0
August----	87.5	64.4	75.9	98	49	1,098	3.38	2.07	4.56	5	.0
September-	81.6	57.8	69.7	95	36	890	3.39	1.73	5.73	5	.0
October---	71.6	45.4	58.5	80	24	553	2.85	1.35	4.32	5	.0
November--	59.0	37.5	48.3	80	14	281	4.24	2.22	6.01	6	.3
December--	47.6	28.3	38.0	71	- 1	109	4.32	2.01	6.31	6	.6
Yearly:											
Average--	68.5	45.7	57.1	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	-14	---	---	---	---	---	---
Total----	---	---	---	---	---	6,889	47.56	39.61	54.25	69	6.6
Mammoth Cave National Park:											
January---	42.9	23.3	33.1	69	-13	68	3.77	1.74	5.52	6	5.8
February--	48.7	26.9	37.8	74	- 4	107	3.13	2.20	5.82	6	4.2
March-----	60.0	36.3	48.1	83	10	297	5.22	3.18	7.06	8	1.6
April-----	70.7	45.1	57.9	87	24	538	4.49	2.28	6.42	7	.1
May-------	77.8	52.3	65.1	89	31	774	5.07	3.05	6.87	7	.0
June------	84.5	60.4	72.5	95	42	968	4.30	2.55	5.87	7	.0
July------	87.6	64.3	76.0	98	49	1,106	4.75	3.24	6.13	7	.0
August----	86.5	63.3	74.9	97	47	1,082	3.64	1.98	5.10	5	.0
September-	80.8	57.0	68.9	94	36	861	4.16	1.69	6.24	5	.0
October---	70.7	45.3	58.0	86	24	555	3.15	1.60	4.70	5	.0
November--	58.4	37.5	48.0	79	12	275	4.43	2.66	6.02	7	.9
December--	47.8	28.5	38.1	70	- 2	114	5.03	2.74	7.05	7	2.1
Yearly:											
Average--	68.0	45.0	56.5	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	-14	---	---	---	---	---	---
Total----	---	---	---	---	---	6,746	52.13	44.77	57.88	77	14.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Beaver Dam in Butler County and at Mammoth Cave National Park in Edmonson County)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Beaver Dam:			
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 5	Apr. 20	May 3
2 years in 10 later than--	Mar. 31	Apr. 15	Apr. 28
5 years in 10 later than--	Mar. 21	Apr. 5	Apr. 17
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 26	Oct. 10	Oct. 1
2 years in 10 earlier than--	Nov. 1	Oct. 16	Oct. 7
5 years in 10 earlier than--	Nov. 12	Oct. 27	Oct. 18
Mammoth Cave National Park:			
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 13	Apr. 25	May 13
2 years in 10 later than--	Apr. 7	Apr. 19	May 7
5 years in 10 later than--	Mar. 28	Apr. 8	Apr. 26
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 25	Oct. 9	Sept. 29
2 years in 10 earlier than--	Oct. 31	Oct. 15	Oct. 4
5 years in 10 earlier than--	Nov. 11	Oct. 26	Oct. 13

Table 3.--Growing Season

(Recorded in the period 1961-90 at Beaver Dam in Butler County and at Mammoth Cave National Park in Edmonson County)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
Beaver Dam:			
9 years in 10--	210	182	159
8 years in 10--	218	188	167
5 years in 10--	233	202	181
2 years in 10--	248	215	195
1 year in 10--	255	221	203
Mammoth Cave National Park:			
9 years in 10--	205	175	149
8 years in 10--	212	183	156
5 years in 10--	227	199	168
2 years in 10--	241	214	181
1 year in 10--	248	222	188

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Butler County	Edmonson County	Total	
				Area	Extent
		Acres	Acres	Acres	Pct
AlB	Allegheny loam, 2 to 6 percent slopes	1,375	201	1,576	0.3
AlC2	Allegheny loam, 6 to 12 percent slopes, eroded	3,745	656	4,401	0.9
AlC3	Allegheny loam, 6 to 12 percent slopes, severely eroded	237	6	243	*
AlD2	Allegheny loam, 12 to 20 percent slopes, eroded	3,159	406	3,565	0.8
AlD3	Allegheny loam, 12 to 20 percent slopes, severely eroded	227	52	279	*
BaB	Baxter gravelly silt loam, 2 to 6 percent slopes	---	148	148	*
BaC2	Baxter gravelly silt loam, 6 to 12 percent slopes, eroded	---	3,550	3,550	0.8
BaD2	Baxter gravelly silt loam, 12 to 20 percent slopes, eroded	---	2,614	2,614	0.6
BaE	Baxter gravelly silt loam, 20 to 30 percent slopes	---	112	112	*
BfB	Bethesda-Fairpoint soils, 2 to 6 percent slopes	1,017	59	1,076	0.2
BfC	Bethesda-Fairpoint soils, 6 to 12 percent slopes	2,124	108	2,232	0.5
BfD	Bethesda-Fairpoint soils, 12 to 20 percent slopes	4,753	180	4,933	1.0
BfE	Bethesda-Fairpoint soils, 20 to 35 percent slopes	5,488	1,311	6,799	1.4
CaB2	Caneyville silt loam, 2 to 6 percent slopes, eroded	855	147	1,002	0.2
CaC2	Caneyville silt loam, 6 to 12 percent slopes, eroded	5,382	1,447	6,829	1.4
CcC3	Caneyville silty clay loam, 6 to 12 percent slopes, severely eroded	565	30	595	0.1
CeD	Caneyville-Lenberg complex, 8 to 20 percent slopes	7,128	1,016	8,144	1.7
CgE	Caneyville-Lenberg-Rock outcrop complex, 20 to 30 percent slopes	9,334	328	9,662	2.0
CkD	Caneyville-Rock outcrop complex, 6 to 20 percent slopes	2,986	6,991	9,977	2.1
CkE	Caneyville-Rock outcrop complex, 20 to 35 percent slopes	1,247	4,429	5,676	1.2
CmD	Carpenter-Lenberg complex, 12 to 20 percent slopes	28	911	939	0.2
CmE	Carpenter-Lenberg complex, 20 to 30 percent slopes	---	818	818	0.2
Cn	Chagrin loam, frequently flooded	723	514	1,237	0.3
CoB	Clarkrange silt loam, 2 to 6 percent slopes	12,015	17,721	29,736	6.3
CoC	Clarkrange silt loam, 6 to 12 percent slopes	3,376	3,902	7,278	1.5
Cp	Clifty gravelly silt loam, frequently flooded	1,160	472	1,632	0.3
CrB	Crider silt loam, 2 to 6 percent slopes	725	431	1,156	0.2
CrC2	Crider silt loam, 6 to 12 percent slopes, eroded	329	319	648	0.1
DAM	Large dam	15	28	43	*
Dt	Dumps, mine; tailings; and tipples	39	---	39	*
Du	Dunning silty clay loam, occasionally flooded	198	26	224	*
EkB	Elk silt loam, 2 to 6 percent slopes, rarely flooded	211	58	269	*
EkC	Elk silt loam, 6 to 12 percent slopes, rarely flooded	383	37	420	*
EpB	Epley silt loam, 2 to 6 percent slopes	1,149	---	1,149	0.2
EpC	Epley silt loam, 6 to 12 percent slopes	490	---	490	0.1
FaB	Fredonia-Hagerstown complex, 2 to 6 percent slopes, rocky	235	137	372	*

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Butler County	Edmonson County	Total	
				Area	Extent
		Acres	Acres	Acres	Pct
FaC2	Fredonia-Hagerstown complex, 6 to 20 percent slopes, rocky, eroded	437	1,146	1,583	0.3
FaC3	Fredonia-Hagerstown complex, 6 to 20 percent slopes, rocky, severely eroded	---	134	134	*
FdC2	Frondorf silt loam, 6 to 12 percent slopes, eroded	1,304	173	1,477	0.3
FdD2	Frondorf silt loam, 12 to 20 percent slopes, eroded	1,307	81	1,388	0.3
FoD3	Frondorf silty clay loam, 12 to 20 percent slopes, severely eroded	92	---	92	*
FwF	Frondorf-Weikert complex, 20 to 50 percent slopes	507	---	507	0.1
GnB2	Gilpin loam, 2 to 6 percent slopes, eroded	70	62	132	*
GnC2	Gilpin loam, 6 to 12 percent slopes, eroded	6,815	8,176	14,991	3.2
GnC3	Gilpin loam, 6 to 12 percent slopes, severely eroded	191	15	206	*
GnD2	Gilpin loam, 12 to 20 percent slopes, eroded	5,537	3,330	8,867	1.9
GnD3	Gilpin loam, 12 to 20 percent slopes, severely eroded	349	166	515	0.1
Gr	Grigsby fine sandy loam, frequently flooded	2,319	738	3,057	0.6
JfD	Jefferson-Lily-Rock outcrop complex, 12 to 20 percent slopes	318	3,897	4,215	0.9
JfE	Jefferson-Lily-Rock outcrop complex, 20 to 35 percent slopes	13	15,128	15,141	3.2
Jo	Johnsburg silt loam	61	5,381	5,442	1.2
Ka	Karnak silty clay loam, frequently flooded	496	---	496	0.1
Kb	Karnak silty clay loam, overwash, frequently flooded	1,216	---	1,216	0.3
LaC2	Latham silt loam, 6 to 12 percent slopes, eroded	1,579	391	1,970	0.4
LaD2	Latham silt loam, 12 to 20 percent slopes, eroded	1,031	396	1,427	0.3
Le	Lawrence silt loam, occasionally flooded	2,495	93	2,588	0.5
LnC2	Lenberg silt loam, 6 to 12 percent slopes, eroded	1,153	3	1,156	0.2
LnD2	Lenberg silt loam, 12 to 20 percent slopes, eroded	436	---	436	*
LyB	Lily loam, 2 to 6 percent slopes	7	240	247	*
LyC2	Lily loam, 6 to 12 percent slopes, eroded	581	6,507	7,088	1.5
LyD2	Lily loam, 12 to 20 percent slopes, eroded	1,123	6,684	7,807	1.6
Me	Melvin silt loam, frequently flooded	7,519	80	7,599	1.6
Mu	Mullins silt loam	74	433	507	0.1
Ne	Newark silt loam, frequently flooded	36,262	3,877	40,139	8.5
No	Nolin silt loam, frequently flooded	6,543	4,446	10,989	2.3
OtC	Otwell silt loam, 6 to 12 percent slopes, rarely flooded	383	529	912	0.2
OwB	Otwell silt loam, 2 to 6 percent slopes, occasionally flooded	2,211	1,067	3,278	0.7
PeB	Pembroke silt loam, 2 to 6 percent slopes	249	1,607	1,856	0.4
PeC2	Pembroke silt loam, 6 to 12 percent slopes, eroded	142	155	297	*
Ps	Pits, quarries, asphalt	---	199	199	*
Pt	Pits, quarries, limestone	98	108	206	*
ReB2	Riney silt loam, 2 to 6 percent slopes, eroded	159	344	503	0.1
ReC2	Riney silt loam, 6 to 12 percent slopes, eroded	917	2,422	3,339	0.7
ReD2	Riney silt loam, 12 to 20 percent slopes, eroded	607	2,156	2,763	0.6
ReE	Riney silt loam, 20 to 30 percent slopes	---	86	86	*
RoB	Rosine silt loam, 2 to 6 percent slopes	489	441	930	0.2

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Butler County	Edmonson County	Total	
				Area	Extent
		Acres	Acres	Acres	Pct
RoC2	Rosine silt loam, 6 to 12 percent slopes, eroded	4,877	1,683	6,560	1.4
RoD2	Rosine silt loam, 12 to 20 percent slopes, eroded	253	240	493	0.1
RsC3	Rosine silty clay loam, 6 to 12 percent slopes, severely eroded	227	---	227	*
RsD3	Rosine silty clay loam, 12 to 20 percent slopes, severely eroded	36	---	36	*
SaB	Sadler silt loam, 2 to 6 percent slopes	1,039	172	1,211	0.3
ScB	Sciotoville silt loam, 2 to 6 percent slopes	1,051	---	1,051	0.2
ScC2	Sciotoville silt loam, 6 to 12 percent slopes, eroded	127	---	127	*
SgD2	Shelocta-Latham-Gilpin complex, 12 to 20 percent slopes, eroded	21,273	8,126	29,399	6.2
SgD3	Shelocta-Latham-Gilpin complex, 12 to 20 percent slopes, severely eroded	331	46	377	*
SgE	Shelocta-Latham-Gilpin complex, 20 to 30 percent slopes	77,373	34,203	111,576	23.6
W	Water	200	3,905	4,105	0.9
WbE	Wallen-Bledsoe-Donahue complex, 15 to 35 percent slopes, very rocky	---	7,879	7,879	1.7
WbF	Wallen-Bledsoe-Donahue complex, 35 to 50 percent slopes, very rocky	---	11,145	11,145	2.4
WeB	Wellston silt loam, 2 to 6 percent slopes	2,150	2,182	4,332	0.9
WeC2	Wellston silt loam, 6 to 12 percent slopes, eroded	5,632	6,712	12,344	2.6
WeD	Wellston silt loam, 12 to 20 percent slopes	245	638	883	0.2
WsC3	Wellston silty clay loam, 6 to 12 percent slopes, severely eroded	150	193	343	*
ZaB	Zanesville silt loam, 2 to 6 percent slopes	4,194	20	4,214	0.9
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded	1,030	44	1,074	0.2
ZnC3	Zanesville silty clay loam, 6 to 12 percent slopes, severely eroded	165	---	165	*
	Total	276,141	197,044	473,185	

* Less than 0.05 percent. The combined extent of the map units assigned an asterisk in the "Total--Extent" column is about 1.4 percent.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Corn	Corn silage	Soybeans	Tobacco	Winter wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Lbs	Bu	Tons	Tons	AUM
AlB:									
Allegheny	2e	125	23	40	3,300	45	5.0	4.0	8.0
AlC2:									
Allegheny	3e	115	21	35	2,750	40	4.0	3.5	7.0
AlC3:									
Allegheny	4e	105	21	35	2,400	40	3.0	3.0	6.0
AlD2:									
Allegheny	4e	90	18	30	2,400	35	3.0	2.5	6.0
AlD3:									
Allegheny	6e	---	---	---	---	---	2.5	2.5	5.0
BaB:									
Baxter	2e	100	19	35	2,800	45	6.0	4.5	9.0
BaC2:									
Baxter	3e	80	16	32	2,500	35	5.5	4.2	8.0
BaD2:									
Baxter	4e	70	14	22	1,500	27	4.5	3.2	6.5
BaE:									
Baxter	6e	---	---	---	---	---	---	---	4.0
BfB:									
Bethesda	6s	---	---	---	---	---	---	2.0	4.0
Fairpoint	6s	---	---	---	---	---	---	2.0	4.0
BfC:									
Bethesda	6s	---	---	---	---	---	---	1.9	3.0
Fairpoint	6s	---	---	---	---	---	---	1.9	3.0
BfD:									
Bethesda	6s	---	---	---	---	---	---	1.0	3.0
Fairpoint	6s	---	---	---	---	---	---	1.0	3.0
BfE:									
Bethesda	7e	---	---	---	---	---	---	---	---
Fairpoint	7e	---	---	---	---	---	---	---	---
CaB2:									
Caneyville	2e	85	16	25	2,300	30	---	3.5	7.0
CaC2:									
Caneyville	3e	70	14	21	2,000	25	---	3.0	6.0
CcC3:									
Caneyville	4e	70	14	21	1,800	25	---	3.0	5.5
CeD:									
Caneyville	4e	---	---	---	---	---	---	2.5	4.5
Lenberg	4e	---	---	---	---	---	---	2.5	4.5

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Corn silage	Soybeans	Tobacco	Winter wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Lbs	Bu	Tons	Tons	AUM
CgE:									
Caneyville	6e	---	---	---	---	---	---	---	4.5
Lenberg	6e	---	---	---	---	---	---	2.2	4.5
Rock outcrop	8s	---	---	---	---	---	---	---	---
CkD:									
Caneyville	6e	---	---	---	---	---	---	---	5.0
Rock outcrop	8s	---	---	---	---	---	---	---	---
CkE:									
Caneyville	6e	---	---	---	---	---	---	---	5.0
Rock outcrop	8s	---	---	---	---	---	---	---	---
CmD:									
Carpenter	4e	---	---	---	---	---	---	2.5	4.5
Lenberg	4e	---	---	---	---	---	---	2.5	4.5
CmE:									
Carpenter	6e	---	---	---	---	---	---	---	3.5
Lenberg	6e	---	---	---	---	---	---	---	3.5
Cn:									
Chagrin	2w	115	21	36	2,900	---	---	4.5	8.0
CoB:									
Clarkrange	2e	115	21	35	2,700	40	4.0	4.0	7.0
CoC:									
Clarkrange	3e	100	18	30	2,300	35	3.5	3.5	6.5
Cp:									
Clifty	2s	110	22	35	2,400	35	---	3.5	7.0
CrB:									
Crider	2e	125	23	45	3,200	45	6.0	5.5	11.0
CrC2:									
Crider	3e	95	16	35	2,900	40	5.0	4.5	9.0
DAM:									
Dam	7s	---	---	---	---	---	---	---	---
Dt:									
Dumps, mine	8s	---	---	---	---	---	---	---	---
Du:									
Dunning	4w	95	20	35	---	---	---	4.0	7.0
EkB:									
Elk	2e	125	25	45	3,200	45	5.5	4.5	9.0
EkC:									
Elk	3e	110	22	35	2,900	40	5.0	4.5	9.0
EpB:									
Epley	2e	115	23	35	2,400	45	5.0	4.5	7.5

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Corn silage	Soybeans	Tobacco	Winter wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Lbs	Bu	Tons	Tons	AUM
EpC:									
Epley	3e	95	19	30	2,200	40	4.0	4.0	7.5
FaB:									
Fredonia	3s	100	20	40	2,800	40	5.5	4.0	7.0
Hagerstown	3s	100	20	40	2,800	40	5.5	4.0	7.0
FaC2:									
Fredonia	4e	80	19	22	2,300	25	3.5	3.5	6.5
Hagerstown	4e	80	19	22	2,300	25	3.5	3.5	6.5
FaC3:									
Fredonia	6e	---	---	---	---	---	3.5	3.4	6.5
Hagerstown	6e	---	---	---	---	---	3.5	3.4	6.5
FdC2:									
Frondorf	3e	85	16	28	2,000	30	4.0	3.5	5.5
FdD2:									
Frondorf	4e	75	15	25	---	25	---	3.0	4.5
FoD3:									
Frondorf	6e	---	---	---	---	---	---	2.5	4.0
FwF:									
Frondorf	7e	---	---	---	---	---	---	---	---
Weikert	7e	---	---	---	---	---	---	---	---
GnB2:									
Gilpin	2e	90	19	35	2,400	40	3.5	3.5	7.0
GnC2:									
Gilpin	3e	85	17	30	2,000	35	3.5	3.0	6.0
GnC3:									
Gilpin	4e	80	16	25	2,000	30	3.0	3.0	6.0
GnD2:									
Gilpin	4e	80	16	25	---	---	---	2.5	6.0
GnD3:									
Gilpin	6e	---	---	---	---	---	---	2.0	5.0
Gr:									
Grigsby	2w	115	21	35	2,500	20	---	3.0	6.0
JfD:									
Jefferson	4e	---	---	---	---	---	---	2.7	5.2
Lily	4e	---	---	---	---	---	---	2.7	5.2
Rock outcrop	8s	---	---	---	---	---	---	---	---
JfE:									
Jefferson	6e	---	---	---	---	---	---	---	3.5
Lily	6e	---	---	---	---	---	---	---	3.5

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Corn silage	Soybeans	Tobacco	Winter wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Lbs	Bu	Tons	Tons	AUM
JfE:									
Rock outcrop	8s	---	---	---	---	---	---	---	---
Jo:									
Johnsburg	3w	100	18	35	---	---	---	3.5	6.5
Ka:									
Karnak	4w	80	15	25	---	---	---	3.0	7.0
Kb:									
Karnak	4w	100	18	35	---	---	---	3.5	7.0
LaC2:									
Latham	3e	75	14	25	1,800	25	3.0	3.0	6.0
LaD2:									
Latham	4e	65	12	20	---	20	2.5	2.5	4.5
Le:									
Lawrence	3w	100	18	35	---	---	---	3.0	5.5
LnC2:									
Lenberg	3e	70	14	20	2,200	25	3.0	2.5	5.0
LnD2:									
Lenberg	4e	55	11	15	---	20	2.8	2.0	4.0
LyB:									
Lily	2e	95	19	35	2,400	40	3.5	3.5	7.0
LyC2:									
Lily	3e	85	17	30	2,100	35	3.0	3.0	6.0
LyD2:									
Lily	4e	70	14	25	---	30	---	2.5	5.0
Me:									
Melvin	4w	95	18	35	---	---	---	3.0	6.5
Mu:									
Mullins	4w	95	18	35	---	---	---	3.0	5.5
Ne:									
Newark	3w	115	20	40	---	---	---	4.5	9.0
No:									
Nolin	2w	125	25	40	2,700	38	5.0	4.5	9.0
OtC:									
Otwell	3e	85	16	30	2,200	35	---	3.0	6.0
OwB:									
Otwell	2e	105	19	35	2,500	38	---	3.5	7.5
PeB:									
Pembroke	2e	135	26	45	3,200	45	6.0	5.0	9.5
PeC2:									
Pembroke	3e	90	20	35	2,700	35	5.0	4.0	8.5
Ps, Pt:									
Pits.									

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Corn silage	Soybeans	Tobacco	Winter wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Lbs	Bu	Tons	Tons	AUM
ReB2:									
Riney	2e	90	17	35	2,400	45	4.0	3.5	7.0
ReC2:									
Riney	3e	75	15	25	2,200	38	3.0	2.5	5.5
ReD2:									
Riney	4e	70	13	20	---	30	---	2.0	4.5
ReE:									
Riney	6e	---	---	---	---	---	---	---	3.5
RoB:									
Rosine	2e	110	20	35	2,400	40	5.0	4.0	7.5
RoC2:									
Rosine	3e	100	18	30	2,200	38	4.8	4.0	7.0
RoD2:									
Rosine	4e	85	14	25	--	30	--	3.5	6.5
RsC3:									
Rosine	4e	85	14	25	2,000	30	4.5	3.5	7.0
RsD3:									
Rosine	6e	---	---	---	---	---	---	3.0	6.0
SaB:									
Sadler	2e	115	21	35	2,550	40	---	3.5	7.0
ScB:									
Sciotoville	2e	115	21	35	2,700	40	4.0	4.0	7.0
ScC2:									
Sciotoville	3e	100	18	27	2,000	35	3.2	3.5	6.5
SgD2:									
Shelocta	4e	---	---	---	---	---	---	2.0	5.5
Latham	4e	---	---	---	---	---	---	2.0	5.5
Gilpin	4e	---	---	---	---	---	---	2.0	5.5
SgD3:									
Shelocta	6e	---	---	---	---	---	---	2.0	5.5
Latham	6e	---	---	---	---	---	---	2.0	5.5
Gilpin	6e	---	---	---	---	---	---	2.0	5.5
SgE:									
Shelocta	6e	---	---	---	---	---	---	---	6.0
Latham	6e	---	---	---	---	---	---	---	6.0
Gilpin	6e	---	---	---	---	---	---	---	6.0
W:									
Water.									
WbE:									
Wallen	6e	---	---	---	---	---	---	---	4.0

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Corn silage	Soybeans	Tobacco	Winter wheat	Alfalfa hay	Grass-legume hay	Pasture
		Bu	Tons	Bu	Lbs	Bu	Tons	Tons	AUM
WbE:									
Bledsoe	6e	---	---	---	---	---	---	---	4.0
Donahue	6e	---	---	---	---	---	---	---	4.0
WbF:									
Wallen	7e	---	---	---	---	---	---	---	---
Bledsoe	7e	---	---	---	---	---	---	---	---
Donahue	7e	---	---	---	---	---	---	---	---
WeB:									
Wellston	2e	115	21	35	2,800	40	4.5	4.5	7.5
WeC2:									
Wellston	3e	95	18	30	2,500	30	4.5	4.5	7.0
WeD:									
Wellston	4e	90	14	28	---	25	4.0	4.0	6.0
WsC3:									
Wellston	4e	90	14	28	2,200	25	4.0	4.0	6.0
ZaB:									
Zanesville	2e	115	21	35	2,700	35	---	4.0	7.0
ZaC2:									
Zanesville	3e	75	15	30	2,300	30	---	3.5	6.5
ZnC3:									
Zanesville	4e	60	12	25	2,000	25	---	3.0	6.5

Table 6.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Dashes indicate no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I:				
Butler County	---	---	---	---
Edmonson County	---	---	---	---
II:				
Butler County	38,691	27,949	9,582	1,160
Edmonson County	31,011	23,774	6,765	472
III:				
Butler County	77,301	38,245	38,821	235
Edmonson County	46,194	36,706	9,351	137
IV:				
Butler County	53,875	44,372	9,503	---
Edmonson County	31,878	31,339	539	---
V:				
Butler County	---	---	---	---
Edmonson County	---	---	---	---
VI:				
Butler County	98,212	90,318	---	7,894
Edmonson County	66,977	66,630	---	347
VII:				
Butler County	6,108	5,995	---	113
Edmonson County	12,791	12,456	---	335
VIII:				
Butler County	1,954	---	200	1,754
Edmonson County	8,193	---	3,905	4,288

Table 7.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
AlB, AlC2, AlC3-Allegheny	Slight	Slight	Slight	Slight	Severe	Red maple	---	---	White ash, yellow-poplar, shortleaf pine, white oak, northern red oak, black walnut, eastern white pine.
						Sugar maple	---	---	
						Pignut hickory	---	---	
						Virginia pine	72	112	
						Black oak	78	60	
						American elm	---	---	
						White ash	---	---	
						Yellow-poplar	93	95	
						Shortleaf pine**	80	130	
						White oak	70	52	
						Northern red oak	---	---	
AlD2, AlD3-Allegheny	Moderate	Moderate	Slight	Slight	Severe	Red maple	---	---	White ash, yellow-poplar, shortleaf pine, white oak, northern red oak, black walnut, eastern white pine.
						Sugar maple	---	---	
						Pignut hickory	---	---	
						Virginia pine	72	112	
						Black oak	78	60	
						American elm	---	---	
						White ash	---	---	
						Yellow-poplar	93	95	
						Shortleaf pine**	80	130	
						White oak	70	52	
						Northern red oak	---	---	
BaB, BaC2-Baxter	Slight	Slight	Slight	Slight	Moderate	Sugar maple	---	---	Yellow-poplar, white oak, northern red oak, white ash, shortleaf pine, eastern white pine, loblolly pine.
						Hickory	---	---	
						Southern red oak	71	53	
						Black oak**	81	---	
						Yellow-poplar	92	93	
						White oak	74	56	
						Northern red oak	---	---	
BaD2, BaE-Baxter	Moderate	Moderate	Slight	Slight	Severe	Sugar maple	---	---	Yellow-poplar, white oak, northern red oak, white ash, shortleaf pine, eastern white pine, loblolly pine.
						Hickory	---	---	
						Southern red oak	71	53	
						Black oak**	81	---	
						Yellow-poplar	92	93	
						White oak	74	56	
						Northern red oak	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
BfB***, BfC***:									
Bethesda	Slight	Slight	Moderate	Slight	Moderate	Sweetgum	---	---	Loblolly pine, black locust, eastern white pine.
						Eastern cottonwood	---	---	
						Black oak	73	55	
						Loblolly pine**	69	91	
						Black locust	---	---	
Fairpoint	Slight	Moderate	Moderate	Slight	Moderate	Sweetgum	---	---	Loblolly pine, black locust, eastern white pine.
						Loblolly pine**	82	114	
						Black locust	59	---	
BfD***, BfE***:									
Bethesda	Moderate	Moderate	Moderate	Slight	Moderate	Sweetgum	---	---	Loblolly pine, black locust, eastern white pine.
						Eastern cottonwood	---	---	
						Black oak	73	55	
						Loblolly pine**	69	91	
						Black locust	75	---	
Fairpoint	Moderate	Moderate	Moderate	Slight	Moderate	Sweetgum	---	---	Loblolly pine, black locust, eastern white pine.
						Loblolly pine**	82	114	
						Black locust	---	---	
CaB2, CaC2	Moderate	Moderate	Slight	Slight	Severe	Sugar maple	---	---	Eastern redcedar, loblolly pine, Virginia pine.
Caneyville						Hickory	---	---	
						White oak	60	43	
						Scarlet oak	50	34	
						Chinkapin oak	44	29	
						Black oak**	65	47	
						Eastern redcedar	36	38	
CcC3	Moderate	Moderate	Moderate	Slight	Severe	Sugar maple	---	---	Eastern redcedar, loblolly pine, Virginia pine.
Caneyville						Hickory	---	---	
						White oak	60	43	
						Scarlet oak	50	34	
						Chinkapin oak	44	29	
						Black oak**	65	47	
						Eastern redcedar	36	38	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
CeD***:									
Caneyville	Moderate	Moderate	Slight	Slight	Severe	Sugar maple	---	---	White ash, eastern redcedar, yellow-poplar, white oak, eastern white pine, loblolly pine, Virginia pine.
						Hickory	---	---	
						Scarlet oak	57	40	
						Chinkapin oak	54	38	
						Black oak**	65	47	
						White ash	75	---	
						Eastern redcedar	46	54	
						Yellow-poplar	90	90	
						White oak	64	47	
Lenberg	Moderate	Moderate	Slight	Slight	Moderate	Hickory	---	---	White oak, shortleaf pine, loblolly pine.
						Virginia pine**	61	93	
						Scarlet oak	66	48	
						Chestnut oak	56	39	
						Post oak	46	31	
						Black oak	60	43	
						White oak	62	45	
CgE***:									
Caneyville (cool aspect)	Severe	Moderate	Slight	Slight	Severe	Sugar maple	---	---	White ash, yellow-poplar, white oak, eastern white pine, loblolly pine, scarlet oak.
						Hickory	---	---	
						Eastern redcedar	46	54	
						Chinkapin oak	54	38	
						Black oak**	71	53	
						White ash	75	---	
						Yellow-poplar	90	92	
Lenberg (cool aspect)	Severe	Severe	Slight	Slight	Moderate	Hickory	---	---	White oak, shortleaf pine, loblolly pine.
						Virginia pine**	61	93	
						Scarlet oak	66	48	
						Chestnut oak	56	39	
						Post oak	46	31	
						Black oak	60	43	
						White oak	62	45	
Rock outcrop.									

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
CgE***:									
Caneyville (warm aspect)	Severe	Moderate	Slight	Slight	Severe	Sugar maple	---	---	White oak, Virginia pine.
						Hickory	---	---	
						Eastern redcedar	46	---	
						Chinkapin oak	54	38	
						Black oak**	65	47	
						White ash	75	---	
						White oak	64	47	
Lenberg (warm aspect)	Severe	Severe	Slight	Slight	Moderate	Hickory	---	---	White oak, shortleaf pine, loblolly pine, Virginia pine.
						Virginia pine**	61	93	
						Scarlet oak	66	48	
						Chestnut oak	56	39	
						Post oak	46	31	
						Black oak	60	44	
						White oak	62	45	
Rock outcrop.									
CkD***:									
Caneyville	Moderate	Moderate	Slight	Slight	Severe	Sugar maple	---	---	White ash, yellow-poplar, white oak, eastern white pine, loblolly pine.
						Hickory	---	---	
						Eastern redcedar	46	54	
						Scarlet oak	57	40	
						Chinkapin oak	54	38	
						Black oak**	65	47	
						White ash	75	---	
						Yellow-poplar	90	90	
						White oak	64	47	
Rock outcrop.									
CkE***:									
Caneyville (cool aspect)	Severe	Moderate	Slight	Slight	Severe	Sugar maple	---	---	White ash, yellow-poplar, white oak, eastern white pine, loblolly pine, scarlet oak.
						Hickory	---	---	
						Eastern redcedar	46	54	
						Chinkapin oak	54	38	
						Black oak**	71	53	
						White ash	75	---	
						Yellow-poplar	90	90	
						White oak	64	47	
Rock outcrop.									

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
CkE***:									
Caneyville (warm aspect)-	Severe	Moderate	Slight	Slight	Severe	Sugar maple	---	---	Loblolly pine, Virginia pine, eastern redcedar.
						Hickory	---	---	
						Eastern redcedar	46	---	
						Chinkapin oak	54	38	
						Black oak**	65	47	
						White ash	75	---	
						White oak	64	47	
Rock outcrop									
CmD***:									
Carpenter	Moderate	Moderate	Moderate	Slight	Severe	Hickory	---	---	White oak, northern red oak, white ash, black walnut, yellow-poplar, eastern white pine, loblolly pine.
						Virginia pine	74	114	
						Scarlet oak	75	57	
						Chestnut oak	70	52	
						Black oak	74	56	
						White oak**	71	53	
						Northern red oak	71	53	
Lenberg	Moderate	Moderate	Slight	Slight	Moderate	Hickory	---	---	Virginia pine, white oak, shortleaf pine, loblolly pine.
						Scarlet oak	66	48	
						Chestnut oak	56	39	
						Post oak	46	31	
						Black oak	60	43	
						Virginia pine**	61	93	
						White oak	62	45	
CmE***:									
Carpenter (cool aspect)-	Severe	Severe	Slight	Slight	Severe	Hickory	---	---	White oak, northern red oak, white ash, black walnut, yellow-poplar, eastern white pine, loblolly pine.
						Virginia pine	74	114	
						Scarlet oak	75	57	
						Chestnut oak	70	52	
						Black oak	74	56	
						White oak**	71	53	
						Northern red oak	71	53	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
CmE***:									
Lenberg									
(cool aspect)-	Severe	Severe	Slight	Slight	Moderate	Hickory	---	---	White oak, shortleaf pine, loblolly pine.
						Virginia pine**	61	93	
						Scarlet oak	66	48	
						Chestnut oak	56	39	
						Post oak	46	31	
						Black oak	60	44	
						White oak	62	45	
CmE***:									
Carpenter									
(warm aspect)-	Severe	Severe	Slight	Slight	Severe	Hickory	---	---	White oak, loblolly pine, Virginia pine.
						Virginia pine	74	112	
						Scarlet oak	75	57	
						Chestnut oak	70	52	
						Black oak	74	56	
						White oak**	58	41	
						Northern red oak	71	53	
Lenberg									
(warm aspect)-	Severe	Severe	Slight	Slight	Moderate	Hickory	---	---	White oak, shortleaf pine, loblolly pine, Virginia pine.
						Virginia pine**	61	93	
						Scarlet oak	66	48	
						Chestnut oak	56	39	
						Post oak	46	31	
						Black oak	60	44	
						White oak	62	---	
Cn	Slight	Slight	Moderate	Slight	Severe	Sugar maple	---	---	Yellow-poplar, white oak, northern red oak, white ash, black walnut.
Chagrin						Yellow-poplar**	85	91	
						White oak	---	---	
						Northern red oak	75	57	
CoB, CoC	Slight	Slight	Slight	Moderate	Severe	American beech	---	---	Shortleaf pine, eastern white pine, loblolly pine.
Clarkrange						Yellow-poplar**	90	90	
						Virginia pine	70	109	
						Northern red oak	70	52	
						Shortleaf pine	70	110	
						Eastern white pine	80	144	
						Loblolly pine	76	103	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Cp---------- Clifty	Slight	Slight	Slight	Slight	Severe	Red maple----------	---	---	Shortleaf pine, white oak, northern red oak, white ash, sweetgum, eastern white pine, loblolly pine.
						American beech------	---	---	
						Black walnut--------	---	---	
						Yellow-poplar-------	72	57	
						Virginia pine-------	---	---	
						Shortleaf pine**----	76	122	
						White oak----------	65	47	
						Northern red oak----	---	---	
CrB, CrC2------- Crider	Slight	Slight	Slight	Slight	Severe	Sugar maple---------	---	---	White ash, black walnut, yellow-poplar, white oak, northern red oak, eastern white pine, loblolly pine.
						Hickory------------	---	---	
						Black oak----------	84	---	
						White ash----------	87	---	
						Black walnut--------	80	---	
						Yellow-poplar**-----	97	102	
						White oak----------	72	54	
						Northern red oak----	84	---	
Du---------- Dunning	Slight	Moderate	Severe	Severe	Severe	Boxelder-----------	---	---	Sweetgum, American sycamore, pin oak.
						Red maple----------	---	---	
						Eastern cottonwood--	100	128	
						Swamp white oak-----	---	---	
						Black willow--------	---	---	
						Sweetgum-----------	95	122	
						American sycamore---	---	---	
						Pin oak**----------	95	---	
EkB, EkC-------- Elk	Slight	Slight	Slight	Slight	Severe	Red maple----------	---	---	Black walnut, yellow-poplar, cherrybark oak, white ash, eastern white pine, loblolly pine, white oak.
						Hackberry----------	---	---	
						American sycamore---	---	---	
						Pin oak------------	96	---	
						Black walnut--------	---	---	
						Yellow-poplar**-----	91	92	
						Cherrybark oak------	95	133	
EpB, EpC-------- Epley	Slight	Slight	Slight	Slight	Severe	Red maple----------	---	---	Sweetgum, white oak, white ash, shortleaf pine, eastern white pine, loblolly pine.
						Hickory------------	---	---	
						Scarlet oak---------	70	52	
						Black oak----------	70	52	
						American elm--------	---	---	
						Sweetgum-----------	80	79	
						White oak**--------	70	52	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
FaB***, FaC2***, FaC3***:									
Fredonia	Slight	Moderate	Slight	Slight	Severe	Hickory	---	---	White oak, white ash, eastern white pine.
						Black walnut	---	---	
						Eastern redcedar	---	---	
						Southern red oak	70	52	
						Black oak**	70	52	
						Amierican elm	---	---	
						White oak	65	47	
Hagerstown	Slight	Moderate	Slight	Slight	Severe	Yellow-poplar	95	98	Yellow-poplar, northern red oak, eastern white pine, white oak.
						Northern red oak**	85	67	
FdC2---------- Frondorf	Slight	Slight	Slight	Slight	Moderate	Hickory	---	---	Yellow-poplar, white oak, shortleaf pine, eastern white pine, loblolly pine, northern red oak.
						White ash	---	---	
						Virginia pine	72	112	
						Black oak	76	58	
						Yellow-poplar	---	---	
						White oak**	74	56	
FdD2---------- Frondorf	Moderate	Moderate	Slight	Slight	Moderate	Hickory	---	---	Yellow-poplar, white oak, shortleaf pine, eastern white pine, loblolly pine, northern red oak.
						White ash	---	---	
						Virginia pine	72	112	
						Black oak	76	58	
						Yellow-poplar	---	---	
						White oak**	74	56	
FoD3---------- Frondorf	Moderate	Moderate	Slight	Slight	Moderate	Sugar maple	---	---	White oak, shortleaf pine, loblolly pine.
						Hickory	---	---	
						Southern red oak	---	---	
						Post oak	73	55	
						Black oak	---	---	
						White oak**	68	50	
FwF***: Frondorf (cool aspect)	Severe	Severe	Slight	Slight	Moderate	Hickory	---	---	Yellow-poplar, white oak, shortleaf pine, eastern white pine, loblolly pine, northern red oak.
						White ash	---	---	
						Virginia pine	72	112	
						Black oak	76	58	
						Yellow-poplar	---	---	
						White oak**	74	56	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
FwF***:									
Weikert									
(cool aspect)	Moderate	Severe	Severe	Moderate	Slight	Red maple	---	---	Shortleaf pine, white oak,
						Hickory	---	---	eastern white pine, loblolly
						American beech	---	---	pine.
						Yellow-poplar	---	---	
						Scarlet oak	73	55	
						Chestnut oak	65	47	
						Black oak**	80	62	
						Shortleaf pine	58	84	
						White oak	73	55	
FwF***:									
Frondorf									
(warm aspect)	Severe	Severe	Slight	Slight	Moderate	Hickory	---	---	White oak, shortleaf pine,
						White ash	---	---	eastern white pine, loblolly
						Virginia pine	70	109	pine.
						Black oak	70	52	
						White oak**	74	56	
Weikert									
(warm aspect)	Moderate	Severe	Severe	Moderate	Slight	Northern red oak	55	38	Shortleaf pine, eastern white
						Virginia pine	52	73	pine, loblolly pine.
						Black oak**	80	62	
GnB2, GnC2, GnC3	Slight	Slight	Slight	Slight	Moderate	Virginia pine	71	110	Yellow-poplar, shortleaf
Gilpin						Scarlet oak	76	58	pine, eastern white pine,
						Chestnut oak	80	62	white oak, northern red oak,
						Black oak**	80	62	loblolly pine.
						Yellow-poplar	90	90	
						Shortleaf pine	70	110	
						Eastern white pine	96	178	
						White oak	75	57	
						Northern red oak	87	69	
GnD2	Moderate	Moderate	Slight	Slight	Moderate	Virginia pine	71	110	Yellow-poplar, shortleaf
Gilpin						Scarlet oak	76	58	pine, eastern white pine,
						Chestnut oak	80	62	white oak, northern red oak,
						Northern red oak	80	62	loblolly pine.
						Black oak**	80	62	
						Yellow-poplar	90	90	
						Shortleaf pine	70	110	
						Eastern white pine	96	178	
						White oak	75	57	
						Northern red oak	87	69	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
GnD3---------- Gilpin	Moderate	Moderate	Moderate	Slight	Moderate	Eastern white pine--	82	148	Shortleaf pine, white oak, loblolly pine.
						Virginia pine-------	---	---	
						Scarlet oak---------	72	54	
						Chestnut oak--------	68	50	
						Northern red oak----	69	51	
						Black oak**---------	74	56	
						Shortleaf pine------	60	88	
						White oak-----------	61	44	
Gr---------- Grigsby	Slight	Slight	Moderate	Slight	Severe	Red maple-----------	---	---	Black walnut, yellow-poplar, white oak, northern red oak, shortleaf pine, eastern white pine.
						Hickory-------------	---	---	
						Sweetgum------------	---	---	
						American sycamore---	---	---	
						Black walnut--------	---	---	
						Yellow-poplar**-----	110	124	
						White oak-----------	85	67	
						Northern red oak----	85	67	
JfD***:									
Jefferson------	Moderate	Moderate	Moderate	Slight	Severe	Red maple-----------	---	---	Yellow-poplar, shortleaf pine, white oak, black walnut, eastern white pine, northern red oak.
						Hickory-------------	---	---	
						Blackgum------------	---	---	
						American sycamore---	---	---	
						Chestnut oak--------	82	64	
						Yellow-poplar-------	102	110	
						Shortleaf pine------	80	130	
						White oak**---------	84	66	
Lily----------	Moderate	Moderate	Slight	Slight	Moderate	Hickory-------------	---	---	Shortleaf pine, white oak, eastern white pine, northern red oak.
						Virginia pine-------	72	54	
						Scarlet oak---------	73	55	
						Southern red oak----	65	47	
						Chestnut oak--------	76	58	
						Black oak-----------	80	62	
						Shortleaf pine**----	63	95	
						White oak-----------	69	51	
Rock outcrop.									

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
JfE***:									
Jefferson (cool aspect)	Moderate	Moderate	Moderate	Slight	Moderate	Red maple	---	---	Yellow-poplar, shortleaf pine, white oak, black walnut, eastern white pine, northern red oak.
						Hickory	---	---	
						Blackgum	---	---	
						American sycamore	---	---	
						Chestnut oak	82	---	
						Yellow-poplar	102	110	
						Shortleaf pine	80	130	
						White oak**	84	66	
Lily (cool aspect)	Moderate	Moderate	Slight	Slight	Moderate	Hickory	---	---	Shortleaf pine, white oak, eastern white pine, northern red oak.
						Virginia pine	72	54	
						Scarlet oak	73	55	
						Southern red oak	65	47	
						Chestnut oak	76	58	
						Black oak	80	62	
						Shortleaf pine**	63	95	
						White oak	69	51	
Rock outcrop.									
JfE***:									
Jefferson (warm aspect)	Moderate	Moderate	Moderate	Slight	Moderate	Red maple	---	---	Shortleaf pine, white oak, eastern white pine, northern red oak.
						Hickory	---	---	
						Blackgum	---	---	
						American sycamore	---	---	
						Chestnut oak	63	46	
						Shortleaf pine	65	99	
						White oak**	65	47	
Lily (warm aspect)	Moderate	Moderate	Slight	Slight	Moderate	Virginia pine	---	---	Shortleaf pine, white oak, eastern white pine, northern red oak.
						Scarlet oak	65	47	
						Southern red oak	---	---	
						Chestnut oak	---	---	
						Black oak	---	---	
						Shortleaf pine**	63	95	
						White oak	---	---	
Rock outcrop.									

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Jo Johnsburg	Slight	Moderate	Slight	Moderate	Severe	Red maple Hickory White ash Black oak Sweetgum Yellow-poplar** White oak	--- --- --- 77 --- 94 73	--- --- --- 59 --- 97 55	Sweetgum, yellow-poplar, white oak, loblolly pine.
Ka, Kb Karnak	Slight	Moderate	Severe	Severe	Severe	Silver maple Eastern cottonwood Swamp white oak Green ash Pin oak**	--- --- --- --- 96	--- --- --- --- ---	Green ash, pin oak, sweetgum, baldcypress.
LaC2, LaD2 Latham	Moderate	Moderate	Slight	Moderate	Moderate	Hickory Virginia pine Scarlet oak Chestnut oak Black oak Shortleaf pine White oak**	--- 72 74 60 69 75 64	--- 54 56 43 51 120 47	Shortleaf pine, white oak, eastern white pine.
Le Lawrence	Slight	Moderate	Moderate	Slight	Severe	Red maple Hackberry Pin oak Black oak Sweetgum Yellow-poplar** White oak Willow oak	--- --- --- 78 89 85 74 76	--- --- --- 60 103 81 56 68	Sweetgum, yellow-poplar, white oak, willow oak, green ash, eastern white pine, American sycamore.
LnC2, LnD2 Lenberg	Moderate	Moderate	Slight	Slight	Moderate	Hickory Virginia pine** Scarlet oak Chestnut oak Post oak Black oak White oak	--- 61 66 56 46 60 62	--- 93 48 39 31 43 45	White oak, shortleaf pine, loblolly pine.

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
LyB, LyC2---- Lily	Slight	Moderate	Slight	Slight	Moderate	Hickory	---	---	Shortleaf pine, white oak, eastern white pine, northern red oak.
						Virginia pine	72	93	
						Scarlet oak	73	55	
						Southern red oak	65	47	
						Chestnut oak	76	58	
						Black oak	80	62	
						Shortleaf pine**	63	95	
						White oak	69	51	
LyD2---- Lily	Moderate	Moderate	Slight	Slight	Moderate	Hickory	---	---	Shortleaf pine, white oak, eastern white pine, northern red oak.
						Virginia pine	72	93	
						Scarlet oak	73	55	
						Southern red oak	65	47	
						Chestnut oak	76	58	
						Black oak	80	62	
						Shortleaf pine**	63	95	
						White oak	69	51	
Me---- Melvin	Slight	Moderate	Moderate	Severe	Severe	Red maple	---	---	American sycamore, pin oak, green ash, sweetgum, willow oak, baldcypress.
						Hickory	---	---	
						Hackberry	---	---	
						Eastern cottonwood	101	130	
						Cherrybark oak	91	119	
						Black willow	---	---	
						American sycamore	---	---	
						Pin oak**	100	---	
Mu---- Mullins	Slight	Moderate	Moderate	Moderate	Severe	Yellow-poplar	89	88	Sweetgum, shortleaf pine, white oak, green ash, pin oak.
						Virginia pine	66	102	
						Southern red oak	64	47	
						Sweetgum	---	---	
						Shortleaf pine**	77	124	
						White oak	66	48	
Ne---- Newark	Slight	Moderate	Moderate	Moderate	Severe	Cherrybark oak	---	---	Green ash, sweetgum, eastern cottonwood, American sycamore.
						Overcup oak	---	---	
						Pin oak**	100	---	
						Green ash	---	---	
						Sweetgum	85	93	
						Eastern cottonwood	94	113	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
No Nolin	Slight	Slight	Moderate	Slight	Severe	American sycamore Cherrybark oak Sweetgum Yellow-poplar** Eastern cottonwood	--- 97 92 107 ---	--- 140 112 119 ---	Sweetgum, yellow-poplar, eastern cottonwood, black walnut, eastern white pine.
OtC, OwB Otwell	Slight	Slight	Slight	Moderate	Severe	Blackgum Southern red oak Black oak Yellow-poplar** White oak	--- --- 72 95 69	--- --- 54 98 51	Yellow-poplar, white oak, eastern white pine, loblolly pine.
PeB, PeC2 Pembroke	Slight	Slight	Slight	Slight	Severe	Sugar maple Hickory Virginia pine Black cherry White ash Black walnut Yellow-poplar** Northern red oak	--- --- 82 --- --- --- 94 85	--- --- 124 --- --- --- 97 67	White ash, black walnut, yellow-poplar, northern red oak, eastern white pine, loblolly pine, white oak.
ReB2, ReC2 Riney	Slight	Moderate	Slight	Slight	Severe	Red maple White oak Chinkapin oak Black oak Yellow-poplar**	--- 78 74 80 93	--- 60 56 62 95	Yellow-poplar, white ash, black walnut, eastern white pine, loblolly pine.
ReD2, ReE Riney	Moderate	Moderate	Slight	Slight	Severe	Red maple White oak Chinkapin oak Black oak Yellow-poplar**	--- 78 74 80 93	--- 60 56 62 95	Yellow-poplar, white ash, black walnut, eastern white pine, loblolly pine.
RoB, RoC2 Rosine	Slight	Slight	Slight	Slight	Severe	Pignut hickory American beech Black walnut Black cherry Black oak** White ash Yellow-poplar White oak	--- --- --- --- 80 --- 90 80	--- --- --- --- 62 --- 104 62	White ash, yellow-poplar, white oak, shortleaf pine, eastern white pine, northern red oak.

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
RoD2---------- Rosine	Moderate	Moderate	Slight	Slight	Severe	Pignut hickory------	---	---	White ash, yellow-poplar, white oak, shortleaf pine, eastern white pine, northern red oak.
						American beech------	---	---	
						Black walnut--------	---	---	
						Black cherry--------	---	---	
						Black oak**---------	80	62	
						White ash-----------	---	---	
						Yellow-poplar-------	90	104	
						White oak-----------	80	62	
RsC3---------- Rosine	Slight	Slight	Slight	Slight	Severe	Pignut hickory------	---	---	White ash, yellow-poplar, white oak, shortleaf pine, eastern white pine, northern red oak.
						American beech------	---	---	
						Black walnut--------	---	---	
						Black cherry--------	---	---	
						Black oak**---------	80	62	
						White ash-----------	---	---	
						Yellow-poplar-------	90	104	
						White oak-----------	80	62	
RsD3---------- Rosine	Moderate	Moderate	Slight	Slight	Severe	Pignut hickory------	---	---	White oak, shortleaf pine.
						Scarlet oak---------	---	---	
						Black oak**---------	70	52	
						White oak-----------	68	50	
SaB---------- Sadler	Slight	Slight	Slight	Slight	Severe	Red maple-----------	---	---	Yellow-poplar, white oak, eastern white pine, loblolly pine.
						American beech------	---	---	
						Sweetgum------------	---	---	
						Black cherry--------	---	---	
						Black oak-----------	70	52	
						Yellow-poplar**-----	85	81	
						White oak-----------	65	47	
ScB, ScC2------- Sciotoville	Slight	Slight	Slight	Slight	Severe	Sugar maple---------	---	---	White ash, yellow-poplar, white oak, northern red oak, eastern white pine, eastern cottonwood.
						Black cherry--------	---	---	
						White ash-----------	---	---	
						Yellow-poplar-------	90	90	
						White oak-----------	78	60	
						Northern red oak**--	80	62	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
SgD2***, SgD3***:									
Shelocta	Moderate	Moderate	Slight	Slight	Severe	Hickory	---	---	Yellow-poplar, shortleaf
						American beech	---	---	pine, white oak, northern
						Blackgum	---	---	red oak, white ash, black
						Virginia pine	79	121	walnut, eastern white pine.
						Black oak	79	61	
						Yellow-poplar	102	110	
						Shortleaf pine	77	124	
						White oak**	79	61	
						Northern red oak	---	---	
Latham	Moderate	Moderate	Moderate	Moderate	Moderate	Hickory	---	---	Shortleaf pine, white oak,
						Virginia pine	72	112	scarlet oak, eastern white
						Chestnut oak	60	43	pine.
						Black oak	69	51	
						Shortleaf pine	75	120	
						White oak**	64	47	
						Scarlet oak	74	56	
Gilpin	Moderate	Moderate	Slight	Slight	Moderate	Virginia pine	71	110	Yellow-poplar, shortleaf
						Scarlet oak	76	58	pine, eastern white pine,
						Chestnut oak	80	62	white oak, northern red
						Black oak**	80	62	pine, loblolly pine.
						Yellow-poplar	90	90	
						Shortleaf pine	70	110	
						Eastern white pine	96	178	
						White oak	75	57	
						Northern red oak	87	---	
SgE***:									
Shelocta (cool aspect)	Moderate	Moderate	Slight	Slight	Severe	Hickory	---	---	Yellow-poplar, shortleaf
						American beech	---	---	pine, white oak, northern
						Blackgum	---	---	red oak, white ash, black
						Virginia pine	79	121	walnut, eastern white pine.
						Black oak	79	61	
						Yellow-poplar	102	110	
						Shortleaf pine	77	124	
						White oak**	79	61	
						Northern red oak	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
SgE***:									
Latham									
(cool aspect)	Moderate	Moderate	Moderate	Moderate	Moderate	Hickory	---	---	Shortleaf pine, white oak, eastern white pine.
						Virginia pine	72	112	
						Scarlet oak	74	56	
						Chestnut oak	60	43	
						Black oak	69	51	
						Shortleaf pine	75	120	
						White oak**	64	47	
Gilpin									
(cool aspect)	Moderate	Moderate	Slight	Slight	Moderate	Virginia pine	71	110	Yellow-poplar, shortleaf pine, eastern white pine, white oak, northern red oak, loblolly pine.
						Scarlet oak	76	58	
						Chestnut oak	80	62	
						Black oak**	80	62	
						Yellow-poplar	90	90	
						Shortleaf pine	70	110	
						Easten white pine	96	178	
						White oak	75	57	
						Northern red oak	87	---	
SgE***:									
Shelocta									
(warm aspect)	Moderate	Moderate	Slight	Slight	Severe	Hickory	---	---	Shortleaf pine, white oak, eastern white pine.
						American beech	---	---	
						Blackgum	---	---	
						Black oak	73	55	
						Shortleaf pine	77	124	
						White oak**	79	61	
						Northern red oak	---	---	
Latham									
(warm aspect)	Moderate	Moderate	Moderate	Moderate	Moderate	Hickory	---	---	Shortleaf pine, white oak, eastern white pine.
						Virginia pine	---	---	
						Scarlet oak	---	---	
						Chestnut oak	60	43	
						Black oak	---	---	
						White oak**	64	47	
						Northern red oak	59	42	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
SgE***:									
Gilpin									
(warm aspect)	Moderate	Moderate	Slight	Slight	Moderate	Virginia pine	---	---	Shortleaf pine, eastern white pine, white oak, loblolly pine.
						Scarlet oak	---	---	
						Chestnut oak	---	---	
						Black oak**	80	62	
						White oak	---	---	
						Northern red oak	70	52	
WbE***:									
Wallen									
(cool aspect)	Slight	Moderate	Moderate	Moderate	Slight	Northern red oak**	60	43	Shortleaf pine, Virginia pine, loblolly pine.
						Shortleaf pine	60	88	
						Virginia pine	65	100	
Bledsoe									
(cool aspect)	Moderate	Moderate	Slight	Slight	Severe	Sugar maple	---	---	White ash, yellow-poplar, white oak, northern red oak.
						Black walnut	---	---	
						Black cherry	---	---	
						Slippery elm	---	---	
						White ash	---	---	
						Yellow-poplar**	104	114	
Donahue									
(cool aspect)	Moderate	Moderate	Slight	Slight	Moderate	Black oak**	80	62	Yellow-poplar, white oak, northern red oak, eastern white pine.
						Yellow-poplar	90	90	
						White oak	80	62	
						Northern red oak	---	---	
WbE***:									
Wallen									
(warm aspect)	Slight	Moderate	Moderate	Moderate	Slight	Northern red oak**	50	34	Shortleaf pine, Virginia pine, loblolly pine.
						Shortleaf pine	50	68	
						Virginia pine	55	78	
Bledsoe									
(warm aspect)	Moderate	Moderate	Slight	Slight	Severe	Virginia pine	65	100	White ash, white oak.
						Pignut hickory	74	---	
						Yellow-poplar**	85	81	
Donahue									
(warm aspect)	Moderate	Moderate	Slight	Slight	Moderate	Black oak**	70	52	White oak, shortleaf pine.
						White oak	70	52	
						Shortleaf pine	70	110	
						Virginia pine	---	---	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
WbF***:									
Wallen									
(cool aspect)-	Moderate	Severe	Moderate	Moderate	Slight	Northern red oak**--	60	43	Shortleaf pine, Virginia
						Shortleaf pine------	60	88	pine, loblolly pine.
						Virginia pine-------	65	100	
Bledsoe									
(cool aspect)-	Severe	Severe	Slight	Slight	Severe	Sugar maple---------	---	---	White ash, yellow-poplar,
						Black walnut--------	---	---	white oak, northern red oak.
						Black cherry--------	---	---	
						Slippery elm--------	---	---	
						White ash-----------	---	---	
						Yellow-poplar**-----	104	114	
Donahue									
(cool aspect)-	Severe	Severe	Slight	Slight	Moderate	Black oak**---------	80	62	Yellow-poplar, white oak,
						Yellow-poplar-------	90	90	northern red oak, eastern
						White oak-----------	80	62	white pine.
						Northern red oak----	---	---	
WbF***:									
Wallen									
(warm aspect)-	Moderate	Severe	Moderate	Moderate	Slight	Northern red oak**--	50	34	Shortleaf pine, Virginia
						Shortleaf pine------	50	68	pine, loblolly pine.
						Virginia pine-------	55	---	
Bledsoe									
(warm aspect)-	Severe	Severe	Slight	Slight	Severe	Virginia pine-------	65	100	White ash, white oak.
						Pignut hickory------	74	---	
						Yellow-poplar**-----	85	81	
Donahue									
(warm aspect)-	Severe	Severe	Slight	Slight	Moderate	Black oak**---------	70	52	White oak, shortleaf pine.
						White oak-----------	70	52	
						Shortleaf pine------	70	110	
WeB, WeC2-------	Slight	Slight	Slight	Slight	Severe	Sugar maple---------	---	---	White ash, yellow-poplar,
Wellston						Hickory-------------	---	---	white oak, black walnut,
						Virginia pine-------	68	105	shortleaf pine, eastern
						Chestnut oak--------	78	60	white pine, loblolly pine,
						Black oak**---------	82	64	northern red oak.
						White ash-----------	---	---	
						Yellow-poplar-------	93	95	
						White oak-----------	74	56	

See footnotes at end of table.

Table 7.--Woodland Management and Productivity--Continued

Soil name and map symbol	Management concerns					Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
WeD---------- Wellston	Moderate	Moderate	Slight	Slight	Severe	Sugar maple----------	---	---	White ash, yellow-poplar, white oak, black walnut, shortleaf pine, eastern white pine, loblolly pine, northern red oak.
						Hickory----------	---	---	
						Virginia pine-------	68	105	
						Chestnut oak--------	78	60	
						Black oak**---------	82	64	
						White ash----------	---	---	
						Yellow-poplar-------	93	95	
						White oak----------	74	56	
WsC3---------- Wellston	Slight	Slight	Slight	Slight	Severe	Sugar maple----------	---	---	White ash, yellow-poplar, white oak, black walnut, shortleaf pine, eastern white pine, loblolly pine.
						Hickory----------	---	---	
						Virginia pine-------	68	105	
						Chestnut oak--------	78	60	
						Black oak**---------	82	64	
						White ash----------	---	---	
						Yellow-poplar-------	93	95	
						White oak----------	74	56	
ZaB, ZaC2------- Zanesville	Slight	Slight	Slight	Slight	Severe	Hickory----------	---	---	Yellow-poplar, eastern white pine, northern red oak, white ash, loblolly pine.
						Sweetgum----------	---	---	
						Virginia pine**-----	67	104	
						White oak----------	70	52	
						Chestnut oak--------	76	58	
						Black oak----------	77	59	
						Yellow-poplar-------	88	86	
						Eastern white pine--	81	146	
						Northern red oak----	---	---	
ZnC3---------- Zanesville	Slight	Slight	Slight	Moderate	Severe	Hickory----------	---	---	Yellow-poplar, eastern white pine, northern red oak, white ash, loblolly pine.
						Sweetgum----------	---	---	
						Virginia pine**-----	67	104	
						White oak----------	70	52	
						Chestnut oak--------	76	58	
						Black oak----------	77	59	
						Yellow-poplar-------	88	86	
						Eastern white pine--	81	146	
						Northern red oak----	---	---	

* 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.

** This species is the indicator species for this soil. It generally is the most common species on the soil and is the one that determines the ordination class.

*** See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.--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
AlB Allegheny	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
AlC2, AlC3 Allegheny	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
AlD2, AlD3 Allegheny	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
BaB Baxter	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
BaC2 Baxter	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
BaD2 Baxter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
BaE Baxter	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
BfB*: Bethesda	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight	Severe: small stones, droughty.
Fairpoint	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones, droughty.
BfC*: Bethesda	Moderate: slope, small stones, percs slowly.	Moderate: small stones, slope, percs slowly.	Severe: slope, small stones.	Slight	Severe: small stones, droughty.
Fairpoint	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones, droughty.
BfD*: Bethesda	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, droughty, slope.
Fairpoint	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, droughty, slope.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BfE*:					
Bethesda	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, droughty, slope.
Fairpoint	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, droughty, slope.
CaB2	Moderate:	Moderate:	Moderate:	Severe:	Moderate:
Caneyville	percs slowly.	percs slowly.	slope, depth to rock, percs slowly.	erodes easily.	thin layer.
CaC2, CcC3	Moderate:	Moderate:	Severe:	Severe:	Moderate:
Caneyville	slope, percs slowly.	slope, percs slowly.	slope.	erodes easily.	slope, thin layer.
CeD*:					
Caneyville	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
Lenberg	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
CgE*:					
Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
CkD*:					
Caneyville	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
Rock outcrop.					
CkE*:					
Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
CmD*:					
Carpenter	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CmE*:					
Carpenter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Cn	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
CoB	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Severe: erodes easily.	Moderate: wetness.
CoC	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Cp	Severe: flooding.	Moderate: flooding, small stones.	Severe: small stones, flooding.	Moderate: flooding.	Severe: flooding.
CrB	Slight	Slight	Moderate: slope.	Slight	Slight.
CrC2	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
DAM*. Dam					
Dt*. Dumps					
Du	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
EkB	Severe: flooding.	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
EkC	Severe: flooding.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
EpB	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
EpC	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
FaB*: Fredonia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock.	Severe: erodes easily.	Moderate: thin layer.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FaB*:					
Hagerstown	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
FaC2*, FaC3*:					
Fredonia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
Hagerstown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
FdC2	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
Frondorf					
FdD2, FoD3	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Frondorf					
FwF*:					
Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Weikert	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: droughty, depth to rock.
GnB2	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: thin layer.
Gilpin					
GnC2, GnC3	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
Gilpin					
GnD2, GnD3	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Gilpin					
Gr	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Grigsby					
JfD*:					
Jefferson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Lily	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Rock outcrop.					
JfE*:					
Jefferson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Lily	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Jo Johnsburg	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Ka, Kb Karnak	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
LaC2 Latham	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope, thin layer.
LaD2 Latham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Le Lawrence	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness, flooding.
LnC2 Lenberg	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
LnD2 Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
LyB Lily	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
LyC2 Lily	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
LyD2 Lily	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Me Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Mu Mullins	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Ne Newark	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
No Nolin	Severe: flooding.	Moderate: flooding.	Slight	Severe: erodes easily.	Severe: flooding.
OtC Otwell	Severe: flooding, percs slowly.	Moderate: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
OwB Otwell	Severe: flooding, percs slowly.	Moderate: percs slowly.	Severe: percs slowly.	Slight	Moderate: flooding.
PeB Pembroke	Slight	Slight	Moderate: slope.	Slight	Slight.
PeC2 Pembroke	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Ps*, Pt*. Pits					
ReB2 Riney	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
ReC2 Riney	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
ReD2 Riney	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ReE Riney	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RoB Rosine	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.	Slight.
RoC2 Rosine	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
RoD2 Rosine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
RsC3 Rosine	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
RsD3 Rosine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
SaB Sadler	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
ScB Sciotoville	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Moderate: wetness.
ScC2 Sciotoville	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.

See footnote at end of table.

Table 8.--Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SgD2*, SgD3*:					
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Latham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
SgE*:					
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Latham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
W*.					
Water					
WbE*, WbF*:					
Wallen	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Bledsoe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Donahue	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
WeB	Slight	Slight	Moderate: slope.	Slight	Slight.
Wellston					
WeC2	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Wellston					
WeD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Wellston					
WsC3	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Wellston					
ZaB	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
Zanesville					
ZaC2, ZnC3	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Zanesville					

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 9.--Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AlB---Allegheny	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AlC2, AlC3---Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AlD2, AlD3---Allegheny	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BaB---Baxter	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BaC2---Baxter	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BaD2---Baxter	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BaE---Baxter	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BfB*:										
Bethesda	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
Fairpoint	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
BfC*, BfD*, BfE*:										
Bethesda	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Fairpoint	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
CaB2---Caneyville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaC2, CcC3---Caneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CeD*:										
Caneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Lenberg	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CgE*:										
Caneyville	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lenberg	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
CkD*:										
Caneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
CkE*:										
Caneyville	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
CmD*:										
Carpenter	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lenberg	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CmE*:										
Carpenter	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lenberg	Very poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cn	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Chagrin										
CoB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Clarkrange										
CoC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Clarkrange										
Cp	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Clifty										
CrB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Crider										
CrC2	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Crider										
DAM*.										
Dam										
Dt*.										
Dumps										
Du	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Dunning										
EkB	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Elk										
EkC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Elk										

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
EpB---------- Epley	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
EpC---------- Epley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FaB*:										
Fredonia----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Hagerstown--------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FaC2*, FaC3*:										
Fredonia----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hagerstown--------	Fair	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
FdC2---------- Frondorf	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FdD2, FoD3--------- Frondorf	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FwF*:										
Frondorf----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
GnB2---------- Gilpin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
GnC2, GnC3--------- Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GnD2, GnD3--------- Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Gr---------- Grigsby	Fair	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
JfD*:										
Jefferson---------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lily----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
JfE*:										
Jefferson---------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lily----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Jo---- Johnsburg	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ka, Kb---- Karnak	Very poor.	Poor	Poor	Fair	Very poor.	Good	Good	Poor	Fair	Good.
LaC2---- Latham	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LaD2---- Latham	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Le---- Lawrence	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LnC2---- Lenberg	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LnD2---- Lenberg	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LyB---- Lily	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LyC2---- Lily	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LyD2---- Lily	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Me---- Melvin	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Mu---- Mullins	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
Ne---- Newark	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
No---- Nolin	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Fair	Very poor.
OtC---- Otwell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
OwB---- Otwell	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
PeB---- Pembroke	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PeC2---- Pembroke	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ps*, Pt*. Pits										

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
ReB2--Riney	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ReC2--Riney	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ReD2--Riney	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ReE--Riney	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
RoB, RoC2--Rosine	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
RoD2--Rosine	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
RsC3--Rosine	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
RsD3--Rosine	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
SaB--Sadler	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ScB--Sciotoville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ScC2--Sciotoville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SgD2*, SgD3*:										
Shelocta	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Latham	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.
SgE*:										
Shelocta	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Latham	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.
W*. Water										

See footnote at end of table.

Table 9.--Wildlife Habitat--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
WbE*:										
Wallen	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Bledsoe	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Donahue	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WbF*:										
Wallen	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Bledsoe	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Donahue	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
WeB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Wellston										
WeC2	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Wellston										
WeD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wellston										
WsC3	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Wellston										
ZaB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Zanesville										
ZaC2, ZnC3	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Zanesville										

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.--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
AlB---------- Allegheny	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
AlC2, AlC3-------- Allegheny	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
AlD2, AlD3-------- Allegheny	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BaB---------- Baxter	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
BaC2---------- Baxter	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
BaD2, BaE--------- Baxter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
BfB*: Bethesda---------	Moderate: dense layer, large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: unstable fill, large stones.	Moderate: unstable fill, large stones.	Moderate: droughty, large stones.
Fairpoint--------	Moderate: large stones.	Moderate: large stones.	Moderate: unstable fill, large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: droughty, large stones.
BfC*: Bethesda---------	Moderate: dense layer, large stones, slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: droughty, slope.
Fairpoint--------	Moderate: large stones, slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: slope.	Moderate: droughty, slope.
BfD*, BfE*: Bethesda---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Fairpoint--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
CaB2---------- Caneyville	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: depth to rock.

See footnote at end of table.

Table 10.--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
CaC2, CcC3 Caneyville	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope.
CeD*: Caneyville	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope.
Lenberg	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
CgE*: Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						
CkD*: Caneyville	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope.
Rock outcrop.						
CkE*: Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						
CmD*, CmE*: Carpenter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Cn Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
CoB Clarkrange	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Moderate: wetness.
CoC Clarkrange	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: low strength, wetness, slope.	Moderate: wetness, slope.

See footnote at end of table.

Table 10.--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
Cp Clifty	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
CrB Crider	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
CrC2 Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
DAM*. Dam						
Dt*. Dumps						
Du Dunning	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
EkB Elk	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength.	Slight.
EkC Elk	Moderate: slope.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Severe: low strength.	Moderate: slope.
EpB Epley	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Moderate: wetness.
EpC Epley	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
FaB*: Fredonia	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: low strength.	Moderate: thin layer.
Hagerstown	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
FaC2*, FaC3*: Fredonia	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope.
Hagerstown	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.

See footnote at end of table.

Table 10.--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
FdC2---------- Frondorf	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
FdD2, FoD3-------- Frondorf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
FwF*:						
Frondorf---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Weikert----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: droughty, depth to rock.
GnB2---------- Gilpin	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: depth to rock.	Moderate: depth to rock.
GnC2, GnC3-------- Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
GnD2, GnD3-------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gr---------- Grigsby	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
JfD*, JfE*:						
Jefferson--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lily----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
Jo---------- Johnsburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Ka, Kb---------- Karnak	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, flooding.
LaC2---------- Latham	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope, depth to rock.
LaD2---------- Latham	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Le---------- Lawrence	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding.	Moderate: wetness, flooding.

See footnote at end of table.

Table 10.--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
LnC2--- Lenberg	Severe: depth to rock, too clayey, slope.	Moderate: shrink-swell.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
LnD2--- Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
LyB--- Lily	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
LyC2--- Lily	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, depth to rock.
LyD2--- Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Me--- Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Mu--- Mullins	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Ne--- Newark	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
No--- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
OtC--- Otwell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, slope.	Severe: low strength.	Moderate: slope.
OwB--- Otwell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
PeB--- Pembroke	Moderate: too clayey.	Slight---	Moderate: shrink-swell.	Moderate: slope.	Severe: low strength.	Slight.
PeC2--- Pembroke	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Ps*, Pt*. Pits						
ReB2--- Riney	Severe: cutbanks cave.	Slight---	Slight---	Moderate: slope.	Slight---	Slight.

See footnote at end of table.

Table 10.--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
ReC2--Riney	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
ReD2, ReE--Riney	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RoB--Rosine	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
RoC2--Rosine	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
RoD2--Rosine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
RsC3--Rosine	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
RsD3--Rosine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
SaB--Sadler	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Moderate: wetness.
ScB--Sciotoville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness.
ScC2--Sciotoville	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.
SgD2*, SgD3*, SgE*:						
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Latham	Severe: wetness, slope, slippage.	Severe: shrink-swell, slope.	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
W*. Water						
WbE*, WbF*:						
Wallen	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 10.--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
WbE*, WbF*:						
Bledsoe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: low strength, slope.	Severe: slope.
Donahue	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope.	Severe: slope.
WeB	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight	Slight.
Wellston						
WeC2	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Wellston						
WeD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wellston						
WsC3	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Wellston						
ZaB	Moderate: depth to rock, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Slight.
Zanesville						
ZaC2, ZnC3	Moderate: slope, wetness, depth to rock.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: slope.	Moderate: slope.
Zanesville						

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.--Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AlB Allegheny	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
AlC2, AlC3 Allegheny	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
AlD2, AlD3 Allegheny	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
BaB Baxter	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
BaC2 Baxter	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
BaD2, BaE Baxter	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, slope, hard to pack.
BfB*:					
Bethesda	Severe: percs slowly, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
Fairpoint	Severe: percs slowly, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
BfC*:					
Bethesda	Severe: percs slowly, unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
Fairpoint	Severe: percs slowly, unstable fill.	Severe: slope, unstable fill.	Severe: unstable fill.	Severe: unstable fill.	Poor: small stones.
BfD*, BfE*:					
Bethesda	Severe: percs slowly, slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.
Fairpoint	Severe: percs slowly, slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Poor: small stones, slope.

See footnote at end of table.

Table 11.--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
CaB2---------- Caneyville	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
CaC2, CcC3---------- Caneyville	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
CeD*:					
Caneyville---------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Lenberg----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
CgE*:					
Caneyville---------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Lenberg----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
CkD*:					
Caneyville---------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
CkE*:					
Caneyville---------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
CmD*, CmE*:					
Carpenter----------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Lenberg----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

Table 11.--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
Cn Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: thin layer.
CoB Clarkrange	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: depth to rock, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
CoC Clarkrange	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock, wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Cp Clifty	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: small stones.
CrB Crider	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
CrC2 Crider	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
DAM*. Dam					
Dt*. Dumps					
Du Dunning	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
EkB Elk	Moderate: flooding, percs slowly.	Moderate: seepage, slope.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey, thin layer.
EkC Elk	Moderate: flooding, percs slowly.	Severe: slope.	Moderate: flooding, slope, too clayey.	Moderate: flooding, slope.	Fair: too clayey, slope, thin layer.
EpB Epley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness, too clayey.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
EpC Epley	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: depth to rock, wetness, too clayey.	Moderate: depth to rock, wetness, slope.	Poor: too clayey, hard to pack.
FaB*: Fredonia	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.

See footnote at end of table.

Table 11.--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
FaB*:					
Hagerstown	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
FaC2*, FaC3*:					
Fredonia	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Hagerstown	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
FdC2					
Frondorf	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
FdD2, FoD3					
Frondorf	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
FwF*:					
Frondorf	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Weikert	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, seepage, small stones.
GnB2					
Gilpin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GnC2, GnC3					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GnD2, GnD3					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: slope, area reclaim, thin layer.
Gr					
Grigsby	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
JfD*, JfE*:					
Jefferson	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.

See footnote at end of table.

Table 11.--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
JfD*, JfE*:					
Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Rock outcrop.					
Jo Johnsburg	Severe: wetness, percs slowly.	Moderate: seepage, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: wetness.
Ka, Kb Karnak	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
LaC2 Latham	Severe: depth to rock, wetness.	Severe: seepage, slope, slippage.	Severe: seepage, wetness.	Moderate: seepage, wetness, slope.	Poor: area reclaim, too clayey, hard to pack.
LaD2 Latham	Severe: depth to rock, wetness.	Severe: seepage, slope, slippage.	Severe: seepage, wetness, slope.	Severe: slope, slippage.	Poor: area reclaim, too clayey, hard to pack.
Le Lawrence	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
LnC2 Lenberg	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
LnD2 Lenberg	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
LyB Lily	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
LyC2 Lily	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock.
LyD2 Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope.
Me Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

Table 11.--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
Mu Mullins	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: wetness.
Ne Newark	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: ponding.
No Nolin	Severe: flooding, wetness.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
OtC Otwell	Severe: wetness, percs slowly.	Severe: slope.	Moderate: flooding, wetness, slope.	Moderate: flooding, wetness, slope.	Fair: too clayey, slope, wetness.
OwB Otwell	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
PeB Pembroke	Slight	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
PeC2 Pembroke	Moderate: slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Ps*, Pt* Pits					
ReB2 Riney	Moderate: depth to rock.	Severe: seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: depth to rock, too clayey.
ReC2 Riney	Moderate: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: depth to rock, too clayey, slope.
ReD2, ReE Riney	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
RoB Rosine	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
RoC2 Rosine	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
RoD2 Rosine	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

Table 11.--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
RsC3---------- Rosine	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
RsD3---------- Rosine	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
SaB---------- Sadler	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness.	Moderate: depth to rock, wetness.	Fair: area reclaim, too clayey, small stones.
ScB---------- Sciotoville	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
ScC2---------- Sciotoville	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
SgD2*, SgD3*, SgE*:					
Shelocta----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: small stones, slope.
Latham----------	Severe: depth to rock, wetness.	Severe: seepage, slope, slippage.	Severe: seepage, wetness, slope.	Severe: slope, slippage.	Poor: area reclaim, too clayey, hard to pack.
Gilpin----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: slope, area reclaim, thin layer.
W*. Water					
WbE*, WbF*:					
Wallen----------	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.
Bledsoe----------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Donahue----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, slope.

See footnote at end of table.

Table 11.--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
WeB Wellston	Moderate: thin layer.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Slight	Fair: area reclaim, too clayey.
WeC2 Wellston	Moderate: thin layer, slope.	Severe: slope.	Severe: depth to rock, seepage.	Moderate: slope.	Fair: area reclaim, too clayey, slope.
WeD Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.
WsC3 Wellston	Moderate: thin layer, slope.	Severe: slope.	Severe: depth to rock, seepage.	Moderate: slope.	Fair: area reclaim, too clayey, slope.
ZaB Zanesville	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock.	Moderate: depth to rock, wetness.	Fair: too clayey, area reclaim.
ZaC2, ZnC3 Zanesville	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: depth to rock.	Moderate: depth to rock, wetness, slope.	Fair: slope, too clayey, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.--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
AlB Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
AlC2, AlC3 Allegheny	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
AlD2, AlD3 Allegheny	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
BaB, BaC2 Baxter	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BaD2 Baxter	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BaE Baxter	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BfB*, BfC*:				
Bethesda	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Fairpoint	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BfD*:				
Bethesda	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Fairpoint	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BfE*:				
Bethesda	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Fairpoint	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CaB2, CaC2 Caneyville	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CcC3 Caneyville	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CeD*:				
Caneyville	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Lenberg	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
CgE*:				
Caneyville	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Lenberg	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
CkD*:				
Caneyville	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rock outcrop.				
CkE*:				
Caneyville	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
CmD*:				
Carpenter	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lenberg	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
CmE*:				
Carpenter	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lenberg	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Cn	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Chagrin				

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CoB Clarkrange	Fair: depth to rock, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
CoC Clarkrange	Fair: depth to rock, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, slope.
Cp Clifty	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CrB Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
CrC2 Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
DAM*. Dam				
Dt*. Dumps				
Du Dunning	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
EkB Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
EkC Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
EpB, EpC Epley	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
FaB*: Fredonia	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
FaC2*, FaC3*: Fredonia	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
FdC2 Frondorf	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
FdD2, FoD3 Frondorf	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
FwF*: Frondorf	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Weikert	Poor: depth to rock, slope.	Improbable: small stones.	Improbable: thin layer.	Poor: depth to rock, cemented pan, small stones.
GnB2, GnC2, GnC3 Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GnD2, GnD3 Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Gr Grigsby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
JfD*: Jefferson	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop.				
JfE*: Jefferson	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Lily	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rock outcrop.				
Jo Johnsburg	Fair: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Ka, Kb Karnak	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LaC2 Latham	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
LaD2 Latham	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Le Lawrence	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
LnC2 Lenberg	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
LnD2 Lenberg	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
LyB, LyC2 Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
LyD2 Lily	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Me Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Mu Mullins	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ne Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
No Nolin	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
OtC Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
OwB Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
PeB Pembroke	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
PeC2 Pembroke	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Ps*, Pt*. Pits				

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ReB2, ReC2	Fair:	Improbable:	Improbable:	Poor:
Riney	depth to rock.	excess fines.	excess fines.	small stones.
ReD2	Fair:	Improbable:	Improbable:	Poor:
Riney	depth to rock, slope.	excess fines.	excess fines.	small stones, slope.
ReE	Poor:	Improbable:	Improbable:	Poor:
Riney	slope.	excess fines.	excess fines.	small stones, slope.
RoB	Fair:	Improbable:	Improbable:	Fair:
Rosine	low strength.	excess fines.	excess fines.	small stones, area reclaim.
RoC2	Fair:	Improbable:	Improbable:	Fair:
Rosine	low strength.	excess fines.	excess fines.	small stones, area reclaim, slope.
RoD2	Fair:	Improbable:	Improbable:	Poor:
Rosine	slope.	excess fines.	excess fines.	small stones, area reclaim, slope.
RsC3	Fair:	Improbable:	Improbable:	Fair:
Rosine	low strength.	excess fines.	excess fines.	small stones, area reclaim, slope.
RsD3	Fair:	Improbable:	Improbable:	Poor:
Rosine	low strength, slope.	excess fines.	excess fines.	small stones, area reclaim, slope.
SaB	Fair:	Improbable:	Improbable:	Fair:
Sadler	depth to rock, low strength, wetness.	excess fines.	excess fines.	small stones, area reclaim.
ScB	Fair:	Improbable:	Improbable:	Fair:
Sciotoville	wetness.	excess fines.	excess fines.	small stones.
ScC2	Fair:	Improbable:	Improbable:	Fair:
Sciotoville	wetness.	excess fines.	excess fines.	small stones, slope.
SgD2*, SgD3*:				
Shelocta	Fair:	Improbable:	Improbable:	Poor:
	slope.	excess fines.	excess fines.	small stones, area reclaim, slope.
Latham	Poor:	Improbable:	Improbable:	Poor:
	depth to rock, shrink-swell, low strength.	excess fines.	excess fines.	thin layer, slope.
Gilpin	Poor:	Improbable:	Improbable:	Poor:
	thin layer.	excess fines.	excess fines.	small stones, slope.

See footnote at end of table.

Table 12.--Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SgE*:				
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Latham	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
W*.				
Water				
WbE*, WbF*:				
Wallen	Poor: depth to rock, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, too acid, slope.
Bledsoe	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
Donahue	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
WeB, WeC2	Fair:			
Wellston	depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
WeD	Fair:			
Wellston	depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
WsC3	Fair:			
Wellston	depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
ZaB, ZaC2, ZnC3	Fair:			
Zanesville	low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.--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	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
AlB---Allegheny	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
AlC2, AlC3, AlD2, AlD3---Allegheny	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
BaB---Baxter	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Favorable	Favorable.
BaC2, BaD2---Baxter	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Slope	Slope.
BaE---Baxter	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope	Slope.
BfB*:					
Bethesda	Moderate: slope.	Severe: seepage, piping.	Deep to water	Large stones	Large stones, droughty.
Fairpoint	Moderate: slope.	Severe: piping.	Deep to water	Large stones	Large stones, droughty.
BfC*:					
Bethesda	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Fairpoint	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
BfD*, BfE*:					
Bethesda	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Fairpoint	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
CaB2---Caneyville	Moderate: depth to rock, slope.	Severe: thin layer, hard to pack.	Deep to water	Depth to rock	Depth to rock.
CaC2---Caneyville	Moderate: depth to rock, slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
CcC3---Caneyville	Moderate: depth to rock, slope.	Moderate: hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Drainage	Features affecting-- Terraces and diversions	Grassed waterways
CeD*:					
Caneyville	Moderate: depth to rock, slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Lenberg	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
CgE*:					
Caneyville	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Lenberg	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.					
CkD*:					
Caneyville	Moderate: depth to rock, slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.					
CkE*:					
Caneyville	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.					
CmD*:					
Carpenter	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Lenberg	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
CmE*:					
Carpenter	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
Lenberg	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Cn	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Chagrin					
CoB	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Clarkrange					
CoC	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Clarkrange					

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Drainage	Features affecting-- Terraces and diversions	Grassed waterways
Cp---------- Clifty	Severe: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
CrB---------- Crider	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
CrC2---------- Crider	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Slope----------	Slope.
DAM*. Dam					
Dt*. Dumps					
Du---------- Dunning	Slight----------	Severe: wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
EkB---------- Elk	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
EkC---------- Elk	Severe: slope.	Severe: piping.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
EpB---------- Epley	Moderate: seepage, depth to rock, slope.	Severe: hard to pack.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
EpC---------- Epley	Severe: slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
FaB*: Fredonia---------	Moderate: depth to rock, slope.	Severe: hard to pack.	Deep to water----	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Hagerstown-------	Moderate: seepage, depth to rock, slope.	Moderate: hard to pack.	Deep to water----	Favorable--------	Favorable.
FaC2*, FaC3*: Fredonia---------	Severe: slope.	Severe: hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Hagerstown-------	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water----	Slope----------	Slope.
FdC2, FdD2, FoD3-- Frondorf	Severe: slope.	Severe: piping.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
FwF*:					
Frondorf	Severe: slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Weikert	Severe: depth to rock, slope.	Severe: seepage.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
GnB2 Gilpin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Large stones, depth to rock.	Large stones, depth to rock.
GnC2, GnC3, GnD2, GnD3 Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Gr Grigsby	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
JfD*:					
Jefferson	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope, depth to rock.
Rock outcrop.					
JfE*:					
Jefferson	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope, depth to rock.
Rock outcrop.					
Jo Johnsburg	Moderate: seepage, depth to rock.	Severe: piping.	Percs slowly	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
Ka, Kb Karnak	Slight	Severe: hard to pack, wetness.	Percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.
LaC2, LaD2 Latham	Severe: slope.	Severe: thin layer.	Percs slowly, thin layer.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Le Lawrence	Slight	Severe: piping.	Percs slowly, flooding.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
LnC2, LnD2---- Lenberg	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
LyB---- Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Depth to rock	Depth to rock.
LyC2, LyD2---- Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope, depth to rock.
Me---- Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
Mu---- Mullins	Moderate: seepage, depth to rock.	Severe: piping, wetness.	Percs slowly	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
Ne---- Newark	Moderate: seepage.	Severe: piping.	Flooding	Wetness	Wetness.
No---- Nolin	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.
OtC---- Otwell	Severe: slope.	Moderate: wetness.	Percs slowly	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
OwB---- Otwell	Moderate: slope.	Moderate: wetness.	Percs slowly, flooding.	Erodes easily, wetness.	Erodes easily, rooting depth.
PeB---- Pembroke	Moderate: seepage, slope.	Moderate: hard to pack.	Deep to water	Favorable	Favorable.
PeC2---- Pembroke	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope	Slope.
Ps*, Pt*. Pits					
ReB2---- Riney	Severe: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
ReC2, ReD2, ReE--- Riney	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
RoB---- Rosine	Moderate: seepage, depth to rock, slope.	Severe: hard to pack.	Deep to water	Erodes easily	Erodes easily.
RoC2, RoD2, RsC3, RsD3---- Rosine	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily.

See footnote at end of table.

Table 13.--Water Management--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Drainage	Features affecting-- Terraces and diversions	Grassed waterways
SaB---------- Sadler	Moderate: seepage, depth to rock, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
ScB---------- Sciotoville	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
ScC2---------- Sciotoville	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
SgD2*, SgD3*, SgE*: Shelocta--------	Severe: seepage, slope.	Severe: piping.	Deep to water----	Slope----------	Slope.
Latham----------	Severe: slope.	Severe: thin layer.	Percs slowly, thin layer.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Gilpin----------	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
W*. Water					
WbE*, WbF*: Wallen----------	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Bledsoe----------	Severe: slope.	Moderate: hard to pack.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
Donahue----------	Severe: slope.	Moderate: thin layer, piping.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.
WeB---------- Wellston	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
WeC2, WeD, WsC3--- Wellston	Severe: slope.	Severe: piping.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
ZaB---------- Zanesville	Moderate: depth to rock, seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
ZaC2, ZnC3-------- Zanesville	Moderate: depth to rock, seepage, slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.--Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
AlB--------- Allegheny	0-9	Loam----------	ML, CL	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	9-20	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	20-65	Clay loam, sandy loam, gravelly sandy loam, loam, loamy sand.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
AlC2, AlC3, AlD2, AlD3---------- Allegheny	0-4	Loam----------	ML, CL	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	4-20	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	20-65	Clay loam, sandy loam, gravelly sandy loam, loam, loamy sand.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
BaB, BaC2, BaD2-- Baxter	0-9	Gravelly silt loam.	ML, GM, CL-ML, GM-GC	A-4	0-10	60-90	55-80	45-70	45-70	25-35	4-10
	9-14	Gravelly silty clay loam, gravelly silt loam.	CL, SC-SM, GC, CL-ML	A-4, A-6	0-10	60-90	55-80	55-80	45-80	25-40	5-20
	14-37	Gravelly silty clay, gravelly clay.	CH, CL, GC, SC	A-7	0-20	55-90	45-85	45-85	45-80	40-60	20-35
	37-70	Gravelly clay, very gravelly silty clay.	GC, CH, SC, CL	A-7	0-40	50-90	40-75	35-70	35-70	45-70	20-40
BaE--------- Baxter	0-9	Gravelly silt loam.	ML, GM, CL-ML, GM-GC	A-4	0-10	60-90	55-80	45-70	45-70	25-35	4-10
	9-14	Gravelly silty clay loam, gravelly silt loam.	CL, SC-SM, GC, CL-ML	A-4, A-6	0-10	60-90	55-80	55-80	45-80	25-40	5-20
	14-37	Gravelly silty clay, gravelly clay.	CH, CL, GC, SC	A-7	0-20	55-90	45-85	45-85	45-80	40-60	20-35
	37-70	Gravelly clay, very gravelly silty clay.	GC, CH, SC, CL	A-7	0-40	50-90	40-75	35-70	35-70	45-70	20-40
BfB*, BfC*, BfD*, BfE*: Bethesda-------	0-6	Channery silty clay loam.	GC, SC	A-6, A-7, A-2	5-25	65-80	50-65	45-60	45-60	35-50	12-24
	6-62	Very channery clay loam, very channery silty clay loam, channery clay loam.	GM-GC, ML, CL, GM	A-4, A-6, A-7, A-2	10-50	45-80	25-65	25-65	20-60	24-50	3-23

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
BfB*, BfC*, BfD*, BfE*:											
Fairpoint	0-4	Channery silt loam.	CL, CL-ML, SC, GC	A-4, A-6, A-2	5-15	55-90	45-80	40-80	30-75	25-40	4-14
	4-63	Channery clay loam, very channery silty clay loam.	GC, CL, CL-ML, SC	A-4, A-6, A-7, A-2	15-30	55-75	25-65	20-65	15-60	25-50	4-24
CaB2, CaC2	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
Caneyville	5-21	Silty clay, clay, silty clay loam.	CL, CH	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-28	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CcC3	0-2	Silty clay loam	CL	A-7, A-6	0-3	90-100	85-100	75-100	65-100	35-50	20-35
Caneyville	2-13	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	13-28	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CeD*:											
Caneyville	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	5-21	Silty clay, clay, silty clay loam.	CL, CH	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-28	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lenberg	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6, A-7	0-5	75-100	75-100	75-95	65-90	20-45	2-22
	5-15	Silty clay loam, silty clay.	CL, CH	A-6, A-7	0-5	75-100	60-100	55-95	50-90	35-70	15-40
	15-30	Silty clay, clay, channery clay.	CL, CH, ML, MH	A-7	0-5	75-100	55-100	54-95	50-90	45-70	19-40
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
CgE*:											
Caneyville	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	5-21	Silty clay, clay, silty clay loam.	CL, CH	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-28	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lenberg	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6, A-7	0-5	75-100	75-100	75-95	65-90	20-45	2-22
	5-15	Silty clay loam, silty clay.	CL, CH	A-6, A-7	0-5	75-100	60-100	55-95	50-90	35-70	15-40
	15-30	Silty clay, clay, channery clay.	CL, CH, ML, MH	A-7	0-5	75-100	55-100	54-95	50-90	45-70	19-40
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
CkD*, CkE*:											
Caneyville	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	5-21	Silty clay loam	CL, CH	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-28	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
CmD*, CmE*:											
Carpenter	0-7	Silt loam	ML, CL-ML	A-4	0-5	80-95	80-95	55-85	55-85	<35	NP-10
	7-23	Gravelly silty clay loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0-10	60-95	60-90	55-80	55-80	25-45	5-20
	23-57	Channery silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-10	65-95	65-95	65-90	65-90	30-60	15-40
	57	Weathered bedrock	---	---	---	---	---	---	---	---	---
Lenberg	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6, A-7	0-5	75-100	75-100	75-95	65-90	20-45	2-22
	5-15	Silty clay loam, silty clay.	CL, CH	A-6, A-7	0-5	75-100	60-100	55-95	50-90	35-70	15-40
	15-23	Silty clay, clay, channery clay.	CL, CH, ML, MH	A-7	0-5	75-100	55-100	54-95	50-90	45-70	19-40
	23-30	Channery silty clay, clay, silty clay.	CL, CH, SC, GC	A-7	0-40	60-95	40-95	40-95	36-90	45-70	20-40
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cn	0-15	Loam	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
Chagrin	15-65	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
CoB, CoC	0-11	Silt loam	CL, CL-ML, ML	A-4, A-6	0	85-100	80-100	70-100	60-90	21-32	3-12
Clarkrange	11-32	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	85-100	80-100	75-95	70-90	23-39	3-16
	32-48	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6	0	85-100	80-100	75-95	65-90	23-39	3-16
	48-68	Silty clay loam, silty clay.	CL, CL-ML, CH	A-4, A-6	0-10	45-90	25-85	25-80	20-75	23-40	15-40
	68	Weathered shale	---	---	---	---	---	---	---	---	---
Cp	0-9	Gravelly silt loam.	ML, CL-ML, GM, GM-GC	A-4	0-10	65-85	60-80	55-75	45-70	20-35	2-10
Clifty	9-38	Gravelly silt loam, gravelly loam, gravelly sandy clay loam.	ML, CL-ML, GM, GM-GC	A-4	0-15	55-75	50-70	45-65	35-60	20-35	2-10
	38-67	Gravelly silt loam, gravelly loam.	GM, GM-GC, SM	A-2, A-4, A-1	0-25	40-75	35-70	25-60	15-50	<30	NP-7
CrB, CrC2	0-7	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	3-12
Crider	7-39	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	3-20
	39-66	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
DAM*.											
Dam											
Dt*.											
Dumps											
Du	0-9	Silty clay loam	CL, CH	A-6, A-7	0	100	95-100	90-100	85-95	34-55	15-25
Dunning	9-71	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-5	90-100	70-100	60-100	60-100	45-70	20-40
EkB, EkC	0-10	Silt loam	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
Elk	10-38	Silty clay loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
	38-64	Silty clay loam, silt loam, silty clay, loam.	ML, CL, CL-ML, SC-SM	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
EpB, EpC	0-7	Silt loam	ML	A-4	0	95-100	95-100	90-100	80-100	25-35	3-10
Epley	7-28	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	28-45	Silty clay, clay	CH, CL	A-7, A-6	0	95-100	95-100	90-100	85-100	35-65	20-35
	45-65	Clay, silty clay, channery clay.	CH, CL, GC, SC	A-7	0-20	60-100	40-100	40-100	40-95	40-70	20-40
FaB*:											
Fredonia	0-5	Silt loam	CL	A-6, A-4	0-5	95-100	90-100	85-100	75-100	25-40	8-20
	5-26	Silty clay, silty clay loam, clay.	CH, CL	A-7	0-5	95-100	90-100	85-100	80-100	45-75	20-45
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hagerstown	0-9	Silt loam	CL, CL-ML	A-4, A-6, A-7	0-15	85-100	80-100	80-100	70-95	25-50	5-25
	9-50	Clay, clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	50-55	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FaC2*:											
Fredonia	0-5	Silt loam	CL	A-6, A-4	0-5	95-100	90-100	85-100	75-100	25-40	8-20
	5-26	Silty clay, silty clay loam, clay.	CH, CL	A-7	0-5	95-100	90-100	85-100	80-100	45-75	20-45
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hagerstown	0-9	Silt loam	CL	A-4, A-6	0-3	90-100	85-100	80-100	60-90	25-32	8-12
	9-50	Silty clay loam, clay loam.	CL	A-6, A-7	0-3	90-100	85-100	80-100	70-95	38-45	15-20
	50-55	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
FaC3*:											
Fredonia	0-2	Silt loam	CL	A-6, A-4	0-5	95-100	90-100	85-100	75-100	25-40	8-20
	2-26	Silty clay, silty clay loam, clay.	CH, CL	A-7	0-5	95-100	90-100	85-100	80-100	45-75	20-45
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hagerstown	0-2	Silt loam	CL	A-4, A-6	0-3	90-100	85-100	80-100	60-90	25-32	8-12
	2-50	Silty clay loam, clay loam.	CL	A-6, A-7	0-3	90-100	85-100	80-100	70-95	38-45	15-20
	50-55	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	55	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FdC2, FdD2 Frondorf	0-12	Silt loam	ML, CL, CL-ML	A-4	0-5	90-100	90-100	85-100	75-100	25-35	5-10
	12-37	Channery silty clay loam, channery silt loam, channery loam, silt loam.	ML, CL, GM, GC	A-4, A-6, A-2, A-7	10-40	55-90	50-85	40-80	30-75	<45	NP-25
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FoD3 Frondorf	0-12	Silty clay loam	CL	A-6, A-7	0-5	90-100	90-100	85-100	75-100	35-45	15-22
	12-37	Channery silty clay loam, channery silt loam, channery loam, silt loam.	ML, CL, GM, GC	A-4, A-6, A-2, A-7	10-40	55-90	50-85	40-80	30-75	<45	NP-25
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FwF*:											
Frondorf	0-12	Silt loam	ML, CL, CL-ML	A-4	0-5	90-100	90-100	85-100	75-100	25-35	5-10
	12-37	Channery silty clay loam, channery silt loam, channery loam, silt loam.	ML, CL, GM, GC	A-4, A-6, A-2, A-7	10-40	55-90	50-85	40-80	30-75	<45	NP-25
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Weikert	0-6	Very channery silt loam.	GM, ML, SM	A-1, A-2, A-4	10-25	35-70	25-70	25-65	20-55	30-40	4-10
	6-17	Channery loam, very channery silt loam, very channery loam, gravelly loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--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	
GnB2, GnC2------- Gilpin	0-9	Loam, silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	9-14	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
	14-35	Channery loam, very channery silt loam, channery clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GnC3---------- Gilpin	0-9	Loam, silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	9-14	Channery 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
	14-35	Channery loam, very channery silt loam, channery clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GnD2---------- Gilpin	0-9	Loam, silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	9-14	Channery loam, silty clay loam, silt 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
	14-35	Channery loam, very channery silt loam, channery clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GnD3---------- Gilpin	0-9	Loam, silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	9-14	Channery loam, silty clay loam, silt 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
	14-35	Channery loam, very channery silt loam, channery clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gr---------- Grigsby	0-8	Fine sandy loam	SM, SC-SM	A-2, A-4	0-5	80-100	80-100	50-95	25-50	<20	NP-5
	8-64	Loam, fine sandy loam, silt loam.	ML, SM, SC, CL	A-2, A-4	0-5	80-100	80-100	70-100	30-70	<25	NP-10
JfD*, JfE*:											
Jefferson-------	0-13	Loam----------	SM, SC, ML, CL	A-2, A-4	0-5	85-95	80-90	40-80	25-65	20-35	2-10
	13-20	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6	0-5	75-90	50-90	50-80	30-70	15-35	2-15
	20-61	Gravelly loam, gravelly clay loam, gravelly sandy loam.	GM, SM, ML, GM-GC	A-2, A-4, A-1	0-5	55-75	25-75	20-70	10-60	20-35	2-10

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
JfD*, JfE*:											
Lily	0-12	Fine sandy loam, loam.	SM	A-4, A-2	0-5	90-100	85-100	55-80	25-50	<20	NP-4
	12-33	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Jo	0-7	Silt loam	CL, ML	A-4, A-6	0	100	100	90-100	70-95	30-40	5-15
Johnsburg	7-21	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-50	20-30
	21-54	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0-5	95-100	90-95	85-95	60-85	20-35	5-15
	54-62	Loam, sandy loam, silt loam, silty clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	5-10	90-95	85-90	60-90	35-70	20-30	5-15
Ka	0-9	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	85-95	30-50	10-25
Karnak	9-62	Silty clay, clay	CH, MH, CL, ML	A-7	0	100	100	95-100	95-100	45-80	20-40
Kb	0-4	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	85-95	30-50	10-25
Karnak	4-65	Silty clay, clay	CH, MH, CL, ML	A-7	0	100	100	95-100	95-100	45-80	20-40
LaC2, LaD2	0-3	Silt loam	CL-ML, CL, ML	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
Latham	3-33	Silty clay, silty clay loam, channery clay.	CH, CL	A-7	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---
Le	0-6	Silt loam	ML	A-4	0	100	95-100	90-100	80-100	25-35	2-10
Lawrence	6-24	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	24-49	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-100	25-42	5-20
	49-76	Silty clay, silty clay loam, silt loam.	ML, CL, MH, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	75-100	25-60	5-25
LnC2, LnD2	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6, A-7	0-5	75-100	75-100	75-95	65-90	20-45	2-22
Lenberg	5-15	Silty clay loam, silty clay, gravelly clay.	CL, CH	A-6, A-7	0-5	75-100	60-100	55-95	50-90	35-70	15-40
	15-30	Silty clay, clay, channery clay.	CL, CH, ML, MH	A-7	0-5	75-100	55-100	54-95	50-90	45-70	19-40
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
LyB, LyC2, LyD2	0-12	Fine sandy loam, loam.	SM	A-4, A-2	0-5	90-100	85-100	55-80	25-50	<20	NP-4
Lily	12-33	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
Me Melvin	0-8	Silt loam	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	8-38	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-98	25-40	5-20
	38-65	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	60-98	25-40	5-20
Mu Mullins	0-11	Silt loam	ML, CL	A-4	0	95-100	95-100	85-100	75-100	25-35	2-10
	11-23	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	23-39	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	39-62	Silty clay loam, silt loam, silty clay.	ML, CL, GM, SM	A-4, A-6, A-7	0-10	70-100	65-100	55-100	45-100	20-50	2-30
Ne Newark	0-16	Silt loam	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-90	22-35	3-12
	16-32	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	70-95	25-40	5-20
	32-63	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0-3	85-100	80-100	75-100	60-95	25-40	5-20
No Nolin	0-7	Silt loam	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	7-25	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
	25-63	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
OtC, OwB Otwell	0-7	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	7-26	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-20
	26-42	Silty clay loam, loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	85-100	65-90	35-50	15-30
	42-68	Silty clay loam, silt loam.	CL	A-6, A-7	0	95-100	75-100	75-100	65-95	35-50	15-30
PeB, PeC2 Pembroke	0-12	Silt loam	ML, CL	A-4, A-6	0	95-100	90-100	80-100	70-100	25-40	3-16
	12-39	Silty clay loam	CL	A-6, A-7	0	95-100	90-100	85-100	75-100	30-45	11-25
	39-54	Silty clay loam, silty clay.	CH, CL	A-7, A-6	0	90-100	75-100	75-100	65-100	35-65	20-45
	54-73	Silty clay, clay	CH, CL	A-7	0	85-100	75-100	70-100	60-95	45-70	20-45
Ps*, Pt*. Pits											
ReB2, ReC2, ReD2, ReE Riney	0-10	Loam, silt loam	CL, ML, SM, SC	A-4	0	90-100	85-100	65-80	35-75	10-30	NP-10
	10-40	Clay loam, sandy loam, fine sandy loam, loam.	ML, CL, SC, SC-SM	A-6, A-2, A-4	0	80-100	70-100	70-85	25-75	20-35	2-15
	40-56	Sandy loam, sandy clay loam, loamy sand, gravelly sandy loam.	SC, SM, GM, ML, CL	A-4, A-6, A-2, A-1	0	80-100	70-100	40-80	15-55	0-35	NP-15
	56-72	Sandy clay loam, gravelly sandy clay loam.	ML, CL, SC, SM, GM, GC	A-6, A-2, A-4	0	80-100	70-100	70-85	25-75	20-35	2-15

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
RoB, RoC2, RoD2--Rosine	0-14	Silt loam	ML, CL, CL-ML	A-4	0-5	95-100	90-100	85-100	70-95	20-30	3-10
	14-22	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	22-52	Silty clay, silty clay loam, clay.	CL, CH	A-6, A-7	0-15	75-100	75-100	75-95	60-90	35-60	20-40
	52-65	Channery silty clay loam, clay, channery silty clay, channery clay.	CH, CL	A-7, A-6	10-40	65-90	55-90	55-90	50-70	35-60	20-40
RsC3, RsD3--Rosine	0-4	Silty clay loam	CL	A-6	0-5	95-100	90-100	85-100	75-95	25-35	11-20
	4-22	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	22-52	Silty clay, silty clay loam, clay.	CL, CH	A-6, A-7	0-15	75-100	75-100	75-95	60-90	35-60	20-40
	52-65	Channery silty clay loam, clay, channery silty clay, channery clay.	CH, CL	A-7, A-6	10-40	65-90	55-90	55-90	50-70	35-60	20-40
SaB--Sadler	0-6	Silt loam	ML, CL-ML	A-4	0	95-100	95-100	85-100	80-100	25-35	4-10
	6-23	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-20
	23-53	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6	0-10	85-100	80-100	70-100	55-95	20-40	2-20
	53-61	Loam, silty clay loam, gravelly loam.	ML, CL, SM, GM	A-4, A-6, A-7	0-20	65-100	60-95	50-95	35-90	20-50	2-30
ScB, ScC2--Sciotoville	0-8	Silt loam, loam	CL-ML, ML	A-4	0	95-100	95-100	90-100	65-95	25-35	4-10
	8-32	Silt loam, silty clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	70-90	20-35	4-15
	32-48	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	65-90	25-40	4-18
	48-66	Sandy clay loam	CL, GM, SC	A-4, A-6	0-15	75-100	75-100	65-100	45-70	5-35	NP-15
SgD2*, SgD3*, SgE*:											
Shelocta	0-3	Silt loam	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	3-27	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	27-62	Silty clay, clay	CL, CH	A-6, A-7	0-20	75-100	75-100	75-95	60-90	35-60	20-40
Latham	0-3	Silt loam	CL-ML, CL, ML	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	3-33	Silty clay, silty clay loam, channery clay.	CH, CL	A-7	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	33	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
SgD2*, SgD3*, SgE*:											
Gilpin	0-9	Loam, silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	9-14	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
	14-35	Channery loam, very channery silt loam, silty clay loam, channery clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
W*. Water											
WbE*, WbF*:											
Wallen	0-6	Gravelly loam	SM, SC-SM, ML, CL-ML	A-2, A-4	0-20	70-85	60-80	40-70	30-55	<35	NP-10
	6-25	Very cobbly loam, very cobbly silt loam, very gravelly loam, very channery fine sandy loam, very stony loam.	GM, GM-GC, SC-SM, SM	A-2, A-4, A-1	25-55	35-65	30-60	20-50	10-40	<35	NP-10
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bledsoe	0-10	Silt loam, loam	CL, CL-ML	A-4, A-6	0-5	85-95	80-95	70-90	50-90	20-35	5-15
	10-17	Silty clay, silty clay loam, gravelly silty clay, clay.	CH, CL	A-7, A-6	0-15	65-95	65-95	60-90	50-90	35-60	15-35
	17-79	Gravelly silty clay loam, silty clay, clay, sandy clay, channery sandy clay loam.	CH, CL, GC, SC	A-7, A-6	0-25	50-100	50-100	40-90	35-90	35-60	15-40
Donahue	0-9	Loam	SM, SC-SM, ML, CL-ML	A-4, A-2	0-20	80-100	70-100	50-90	25-70	<30	NP-7
	9-16	Clay loam, sandy clay loam, gravelly clay loam.	SM, SC, ML, CL	A-4, A-6	0-20	80-100	75-100	55-95	40-75	20-40	2-15
	16-34	Silty clay, channery clay, clay, gravelly silty clay.	CH, CL	A-7	0-10	85-100	85-100	75-100	65-95	45-70	20-40
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
WeB-------------- Wellston	0-11 11-26	Silt loam-------- Silt loam, silty clay loam.	ML CL, CL-ML	A-4 A-6, A-4	0 0	95-100 80-100	90-100 75-100	85-100 65-95	70-95 60-90	25-35 25-40	3-10 5-20
	26-40	Silt loam, loam, channery loam.	CL-ML, CL, SC, SC-SM	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	40-60	Very channery loam, gravelly sandy loam, channery clay loam, clay loam, sandy loam.	SC-SM, SC, GM-GC, CL	A-1-b, A-2, A-4, A-6	0-15	60-80	45-75	30-70	15-55	20-35	5-15
WeC2------------- Wellston	0-11 11-26	Silt loam-------- Silt loam, silty clay loam.	ML CL, CL-ML	A-4 A-6, A-4	0 0-5	95-100 75-100	90-100 70-100	85-100 60-95	70-95 60-90	25-35 25-40	3-10 5-20
	26-40	Silt loam, loam, channery loam.	CL-ML, CL, SC, SC-SM	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	40-60	Very channery loam, gravelly sandy loam, channery clay loam, clay loam, sandy loam.	SC-SM, SC, GM-GC, CL	A-1-b, A-2, A-4, A-6	0-15	60-80	45-75	30-70	15-55	20-35	5-15
WeD-------------- Wellston	0-11 11-26	Silt loam-------- Silt loam, silty clay loam.	ML CL, CL-ML	A-4 A-6, A-4	0 0	95-100 80-100	90-100 75-100	85-100 65-95	70-95 60-90	25-35 25-40	3-10 5-20
	26-40	Silt loam, loam, channery loam.	CL-ML, CL, SC, SC-SM	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	40-60	Very channery loam, gravelly sandy loam, channery clay loam, clay loam, sandy loam.	SC-SM, SC, GM-GC, CL	A-1-b, A-2, A-4, A-6	0-15	60-80	45-75	30-70	15-55	20-35	5-15
WsC3------------- Wellston	0-3 3-26	Silty clay loam Silt loam, silty clay loam.	ML CL, CL-ML	A-4 A-6, A-4	0 0-5	95-100 75-100	90-100 70-100	85-100 60-95	70-95 60-90	25-35 25-40	3-10 5-20
	26-40	Silt loam, loam, channery loam.	CL-ML, CL, SC, SC-SM	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	40-60	Very channery loam, gravelly sandy loam, channery clay loam, clay loam, sandy loam.	SC-SM, SC, GM-GC, CL	A-1-b, A-2, A-4, A-6	0-15	60-80	45-75	30-70	15-55	20-35	5-15
ZaB, ZaC2-------- Zanesville	0-11	Silt loam--------|	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	11-24	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	24-40	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	40-60	Sandy clay loam, silt loam, loam.	SC, CL, SM, GM	A-6, A-4, A-2, A-1-b	0-10	65-100	50-100	40-100	20-85	20-40	2-20

See footnote at end of table.

Table 14.--Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	3-10 inches	4	10	40	200		
	In				Pct					Pct	
ZnC3---------- Zanesville	0-24	Silty clay loam, silt loam.	CL, CL-ML, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	24-40	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	40-60	Sandy clay loam, silt loam, loam.	SC, CL, SM, GM	A-6, A-4, A-2, A-1-b	0-10	65-100	50-100	40-100	20-85	20-40	2-20

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.--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		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AlB	0-9	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low	0.32	5	1-4
Allegheny	9-20	18-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low	0.28		
	20-65	10-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low	0.28		
AlC2, AlC3, AlD2, AlD3	0-4	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low	0.32	5	1-4
Allegheny	4-20	18-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low	0.28		
	20-65	10-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low	0.28		
BaB, BaC2, BaD2	0-9	12-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-6.5	Low	0.28	5	2-4
Baxter	9-14	18-40	1.30-1.55	0.6-2.0	0.14-0.18	4.5-6.5	Moderate	0.24		
	14-37	40-60	1.30-1.55	0.6-2.0	0.10-0.14	4.5-5.5	Moderate	0.24		
	37-70	40-60	1.35-1.65	0.6-2.0	0.08-0.13	4.5-5.5	Moderate	0.24		
BaE	0-9	12-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-6.5	Low	0.28	5	2-4
Baxter	9-14	18-40	1.30-1.55	0.6-2.0	0.14-0.18	4.5-6.5	Moderate	0.24		
	14-37	40-60	1.30-1.55	0.6-2.0	0.10-0.14	4.5-5.5	Moderate	0.24		
	37-70	40-60	1.35-1.65	0.6-2.0	0.08-0.13	4.5-5.5	Moderate	0.24		
BfB*, BfC*, BfD*, BfE*:										
Bethesda	0-6	27-35	1.45-1.65	0.2-0.6	0.04-0.10	3.6-5.5	Low	0.28	5	0-.5
	6-62	18-35	1.60-1.90	0.2-0.6	0.04-0.10	3.6-5.5	Low	0.32		
Fairpoint	0-4	18-27	1.40-1.55	0.6-2.0	0.09-0.18	5.6-7.3	Low	0.28	5	0-.5
	4-63	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.1-7.3	Moderate	0.28		
CaB2, CaC2	0-5	10-25	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low	0.43	2	2-4
Caneyville	5-21	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate	0.28		
	21-28	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate	0.28		
	28	---	---	---	---	---	---	---		
CcC3	0-2	30-40	1.25-1.50	0.2-0.6	0.17-0.20	4.5-7.3	Moderate	0.37	2	<2
Caneyville	2-13	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate	0.28		
	13-28	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate	0.28		
	28	---	---	---	---	---	---	---		
CeD*:										
Caneyville	0-5	10-25	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low	0.43	3	2-4
	5-21	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate	0.28		
	21-28	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate	0.28		
	28	---	---	---	---	---	---	---		
Lenberg	0-5	12-35	1.30-1.50	0.6-2.0	0.18-0.23	4.5-7.3	Low	0.43	3	.5-3
	5-15	35-60	1.40-1.60	0.2-0.6	0.10-0.19	4.5-7.3	Moderate	0.37		
	15-30	40-60	1.40-1.65	0.2-0.6	0.10-0.18	4.5-5.5	Moderate	0.28		
	30	---	---	---	---	---	---	---		
CgE*:										
Caneyville	0-5	10-25	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low	0.43	3	2-4
	5-21	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate	0.28		
	21-28	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate	0.28		
	28	---	---	---	---	---	---	---		

See footnote at end of table.

Table 15.--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
CgE*:										
Lenberg	0-5	12-35	1.30-1.50	0.6-2.0	0.18-0.23	4.5-7.3	Low	0.43	3	.5-3
	5-15	35-60	1.40-1.60	0.2-0.6	0.10-0.19	4.5-7.3	Moderate	0.37		
	15-30	40-60	1.40-1.65	0.2-0.6	0.10-0.18	4.5-5.5	Moderate	0.28		
	30	---	---	---	---	---	---	---		
Rock outcrop.										
CkD*, CkE*:										
Caneyville	0-5	10-25	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low	0.43	3	2-4
	5-21	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate	0.28		
	21-28	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate	0.28		
	28	---	---	---	---	---	---	---		
Rock outcrop.										
CmD*, CmE*:										
Carpenter	0-7	10-27	1.20-1.40	2.0-6.0	0.16-0.22	4.5-6.5	Low	0.32	4	1-4
	7-23	18-35	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low	0.28		
	23-57	30-55	1.20-1.60	0.06-0.6	0.07-0.16	4.5-6.0	Moderate	0.28		
	57	---	---	---	---	---	---	---		
Lenberg	0-5	12-35	1.30-1.50	0.6-2.0	0.18-0.23	4.5-7.3	Low	0.43	3	.5-3
	5-15	35-60	1.40-1.60	0.2-0.6	0.10-0.19	4.5-5.5	Moderate	0.37		
	15-30	40-60	1.40-1.65	0.2-0.6	0.10-0.18	4.5-5.5	Moderate	0.28		
	30	---	---	---	---	---	---	---		
Cn	0-15	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.32	5	2-4
Chagrin	15-65	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low	0.32		
CoB, CoC	0-11	15-25	1.30-1.50	0.6-2.0	0.18-0.22	4.5-5.5	Low	0.43	4	.5-2
Clarkrange	11-32	20-32	1.35-1.55	0.6-2.0	0.16-0.20	4.5-5.5	Low	0.43		
	32-48	20-32	1.55-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Low	0.43		
	48-68	25-45	1.35-1.55	0.6-2.0	0.08-0.12	4.5-5.5	Low	0.37		
	68	---	---	---	---	---	---	---		
Cp	0-9	12-27	1.20-1.40	2.0-6.0	0.10-0.18	4.5-6.0	Low	0.28	5	1-4
Clifty	9-38	18-35	1.20-1.45	2.0-6.0	0.08-0.16	4.5-6.0	Low	0.28		
	38-67	12-35	1.20-1.45	2.0-20	0.05-0.12	4.5-6.0	Low	0.28		
CrB, CrC2	0-7	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	5	2-4
Crider	7-39	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low	0.28		
	39-66	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.28		
DAM*.										
Dam										
Dt*.										
Dumps										
Du	0-9	27-45	1.20-1.40	0.6-2.0	0.19-0.23	5.6-7.8	Moderate	0.32	5	2-10
Dunning	9-71	35-60	1.40-1.65	0.06-0.2	0.14-0.18	5.6-7.8	Moderate	0.28		
EkB, EkC	0-10	10-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low	0.37	5	.5-3
Elk	10-38	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low	0.28		
	38-64	15-40	1.20-1.50	0.6-2.0	0.14-0.20	4.5-6.5	Low	0.28		
EpB, EpC	0-7	12-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-7.3	Low	0.43	3	.5-4
Epley	7-28	18-35	1.20-1.45	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.37		
	28-45	40-60	1.30-1.55	0.06-0.2	0.13-0.18	4.5-6.0	Moderate	0.28		
	45-65	40-60	1.35-1.60	0.06-0.2	0.08-0.18	5.6-7.3	Moderate	0.28		

See footnote at end of table.

Table 15.--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
FaB*:										
Fredonia	0-5	18-40	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low	0.37	2	3-5
	5-26	40-60	1.30-1.60	0.06-0.6	0.13-0.18	5.1-7.3	Moderate	0.28		
	26	---	---	---	---	---	---			
Hagerstown	0-9	15-35	1.20-1.40	0.6-6.0	0.16-0.24	4.5-6.5	Low	0.32	5	1-5
	9-50	25-60	1.20-1.60	0.6-2.0	0.10-0.24	4.5-7.3	Moderate	0.28		
	50-55	35-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate	0.28		
	55	---	---	---	---	---	---			
FaC2*:										
Fredonia	0-5	18-40	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low	0.37	2	3-5
	5-26	40-60	1.30-1.60	0.06-0.6	0.13-0.18	5.1-7.3	Moderate	0.28		
	26	---	---	---	---	---	---			
Hagerstown	0-9	22-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-6.5	Low	0.32	3	1-3
	9-50	35-40	1.30-1.50	0.6-2.0	0.15-0.22	4.5-6.5	Moderate	0.28		
	50-55	35-60	1.35-1.60	0.6-2.0	0.10-0.20	5.1-7.3	Moderate	0.28		
	55	---	---	---	---	---	---			
FaC3*:										
Fredonia	0-2	18-40	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low	0.37	2	3-5
	2-26	40-60	1.30-1.60	0.06-0.6	0.13-0.18	5.1-7.3	Moderate	0.28		
	26	---	---	---	---	---	---			
Hagerstown	0-2	22-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-6.5	Low	0.32	3	1-3
	2-50	35-40	1.30-1.50	0.6-2.0	0.15-0.22	4.5-6.5	Moderate	0.28		
	50-55	35-60	1.35-1.60	0.6-2.0	0.10-0.20	5.1-7.3	Moderate	0.28		
	55	---	---	---	---	---	---			
FdC2, FdD2	0-12	18-27	1.20-1.40	0.6-2.0	0.18-0.22	4.5-5.5	Low	0.37	3	1-3
Frondorf	12-37	18-35	1.20-1.45	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.17		
	37	---	---	---	---	---	---			
FoD3	0-12	27-35	1.20-1.40	0.6-2.0	0.18-0.23	4.5-5.5	Low	0.32	3	.5-2
Frondorf	12-37	18-35	1.20-1.45	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.17		
	37	---	---	---	---	---	---			
FwF*:										
Frondorf	0-12	18-27	1.20-1.40	0.6-2.0	0.18-0.22	4.5-5.5	Low	0.37	3	1-3
	12-37	18-35	1.20-1.45	0.6-2.0	0.08-0.16	4.5-5.5	Low	0.17		
	37	---	---	---	---	---	---			
Weikert	0-6	15-27	1.20-1.40	2.0-6.0	0.06-0.12	4.5-6.0	Low	0.17	2	1-4
	6-17	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low	0.20		
	17	---	---	---	---	---	---			
GnB2, GnC2	0-9	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	9-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.24		
	14-35	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low	0.24		
	35	---	---	---	---	---	---			
GnC3	0-9	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	9-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.24		
	14-35	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low	0.24		
	35	---	---	---	---	---	---			
GnD2	0-9	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	9-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.24		
	14-35	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low	0.24		
	35	---	---	---	---	---	---			

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
GnD3	0-9	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	9-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.24		
	14-35	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low	0.24		
	35	---	---	---	---	---		---		
Gr	0-8	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low	0.28	5	1-4
Grigsby	8-64	5-18	1.20-1.50	0.6-6.0	0.10-0.20	5.6-7.3	Low	0.28		
JfD*, JfE*:										
Jefferson	0-13	10-20	1.30-1.50	2.0-6.0	0.10-0.18	4.5-5.5	Low	0.24	5	.5-5
	13-20	18-34	1.30-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low	0.28		
	20-61	15-30	1.30-1.65	2.0-6.0	0.08-0.14	4.5-5.5	Low	0.17		
Lily	0-12	5-20	1.20-1.40	2.0-6.0	0.09-0.16	3.6-5.5	Low	0.28	2	.5-4
	12-33	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.28		
	33	---	---	---	---	---		---		
Rock outcrop.										
Jo	0-7	12-20	1.30-1.45	0.6-2.0	0.20-0.24	4.5-6.5	Low	0.43	4	1-2
Johnsburg	7-21	24-32	1.40-1.55	0.6-2.0	0.18-0.22	3.6-5.5	Moderate	0.43		
	21-54	22-30	1.60-1.80	<0.06	0.06-0.08	3.6-5.5	Low	0.43		
	54-62	14-20	1.40-1.55	0.6-2.0	0.12-0.14	3.6-5.5	Low	0.43		
Ka	0-9	27-35	1.30-1.45	0.2-0.6	0.21-0.23	5.6-7.3	Moderate	0.32	5	1-3
Karnak	9-40	40-60	1.30-1.50	<0.2	0.09-0.13	5.1-7.3	High	0.32		
	40-62	35-60	1.35-1.55	0.06-0.2	0.10-0.18	5.6-7.8	High	0.32		
Kb	0-4	27-35	1.30-1.45	0.2-0.6	0.21-0.23	5.6-7.3	Moderate	0.32	5	1-3
Karnak	4-65	40-60	1.30-1.50	<0.2	0.09-0.13	5.1-7.3	High	0.32		
LaC2, LaD2	0-3	20-27	1.30-1.50	0.6-2.0	0.16-0.20	3.6-6.5	Low	0.43	3	1-3
Latham	3-33	35-55	1.40-1.70	0.06-0.2	0.11-0.15	3.6-5.0	High	0.32		
	33	---	---	---	---	---		---		
Le	0-6	12-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low	0.43	4	1-4
Lawrence	6-24	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Low	0.37		
	24-49	18-35	1.50-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Low	0.43		
	49-76	18-60	1.50-1.70	0.06-0.6	0.08-0.12	4.5-7.3	Low	0.37		
LnC2, LnD2	0-5	12-35	1.30-1.50	0.6-2.0	0.18-0.23	4.5-7.3	Low	0.43	3	.5-3
Lenberg	5-15	35-60	1.40-1.60	0.2-0.6	0.10-0.19	4.5-5.5	Moderate	0.37		
	15-30	40-60	1.40-1.65	0.2-0.6	0.10-0.18	4.5-5.5	Moderate	0.37		
	30	---	---	---	---	---		---		
LyB, LyC2, LyD2	0-12	5-20	1.20-1.40	2.0-6.0	0.09-0.16	3.6-5.5	Low	0.28	2	.5-4
Lily	12-33	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low	0.28		
	33	---	---	---	---	---		---		
Me	0-8	12-17	1.20-1.60	0.6-2.0	0.18-0.23	5.6-7.8	Low	0.43	5	.5-3
Melvin	8-38	12-35	1.30-1.60	0.6-2.0	0.18-0.23	5.6-7.8	Low	0.43		
	38-65	7-40	1.40-1.70	0.6-2.0	0.16-0.23	5.6-7.8	Low	0.43		
Mu	0-11	12-27	1.20-1.40	0.6-2.0	0.19-0.23	3.6-5.5	Low	0.43	3	1-4
Mullins	11-23	18-35	1.40-1.60	0.6-2.0	0.18-0.23	3.6-5.5	Low	0.43		
	23-39	18-35	1.50-1.70	<0.06	0.08-0.12	3.6-5.5	Low	0.43		
	39-62	18-60	1.50-1.70	0.2-2.0	0.08-0.12	3.6-5.5	Low	0.37		
Ne	0-16	18-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.8	Low	0.43	5	1-4
Newark	16-32	18-35	1.20-1.45	0.6-2.0	0.16-0.22	5.6-7.8	Low	0.32		
	32-63	18-35	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low	0.32		

See footnote at end of table.

Table 15.--Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
No---------- Nolin	0-7 7-25 25-63	12-35 18-35 10-30	1.20-1.40 1.25-1.50 1.30-1.55	0.6-2.0 0.6-2.0 0.6-6.0	0.18-0.23 0.18-0.23 0.10-0.23	5.6-8.4 5.6-8.4 5.1-8.4	Low---------- Low---------- Low----------	0.43 0.43 0.43	5	2-4
OtC, OwB--------- Otwell	0-7 7-26 26-42 42-68	18-27 22-30 18-30 20-30	1.25-1.40 1.30-1.50 1.60-1.80 1.50-1.65	0.6-2.0 0.2-0.6 <0.06 0.06-0.2	0.22-0.24 0.18-0.22 0.06-0.08 0.06-0.08	4.5-7.3 4.5-5.5 4.5-5.5 5.1-6.5	Low---------- Moderate----- Moderate----- Moderate-----	0.43 0.43 0.43 0.43	4	.5-2
PeB, PeC2-------- Pembroke	0-12 12-39 39-54 54-73	15-27 27-35 36-60 40-60	1.30-1.50 1.30-1.50 1.35-1.65 1.35-1.70	0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0	0.18-0.23 0.18-0.22 0.13-0.19 0.12-0.17	4.5-7.3 4.5-6.0 4.5-6.0 4.5-6.0	Low---------- Low---------- Moderate----- Moderate-----	0.32 0.28 0.28 0.28	5	2-4
Ps*, Pt*. Pits										
ReB2, ReC2, ReD2, ReE---------- Riney	0-10 10-40 40-56 56-72	10-25 20-35 10-35 20-35	1.20-1.40 1.20-1.50 1.20-1.50 1.20-1.50	2.0-6.0 2.0-6.0 2.0-6.0 2.0-6.0	0.12-0.18 0.13-0.17 0.05-0.14 0.13-0.17	4.5-7.3 4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low---------- Low----------	0.28 0.28 0.28 0.28	4	.5-3
RoB, RoC2, RoD2-- Rosine	0-14 14-22 22-52 52-65	13-27 22-35 30-50 30-50	1.30-1.50 1.35-1.65 1.40-1.65 1.40-1.65	0.6-2.0 0.6-2.0 0.2-0.6 0.2-0.6	0.18-0.22 0.17-0.21 0.11-0.18 0.10-0.16	4.5-5.5 4.5-5.5 4.5-5.5 4.5-6.5	Low---------- Low---------- Moderate----- Moderate-----	0.49 0.37 0.37 0.28	4	1-3
RsC3, RsD3------- Rosine	0-4 4-22 22-52 52-65	27-35 22-35 30-50 30-50	1.35-1.55 1.35-1.65 1.40-1.65 1.40-1.65	0.6-2.0 0.6-2.0 0.2-0.6 0.2-0.6	0.17-0.21 0.17-0.21 0.11-0.18 0.10-0.16	4.5-5.5 4.5-5.5 4.5-5.5 4.5-6.5	Low---------- Low---------- Moderate----- Moderate-----	0.37 0.37 0.37 0.28	4	.5-2
SaB-------------- Sadler	0-6 6-23 23-53 53-61	12-27 18-35 12-35 12-40	1.30-1.50 1.35-1.55 1.55-1.75 1.50-1.70	0.6-2.0 0.6-2.0 0.06-0.2 0.2-2.0	0.19-0.23 0.18-0.22 0.07-0.12 0.07-0.12	4.5-5.5 4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low---------- Low----------	0.43 0.43 0.43 0.43	4	.5-3
ScB, ScC2-------- Sciotoville	0-8 8-32 32-48 48-66	15-27 20-32 20-32 15-35	1.30-1.45 1.40-1.60 1.60-1.80 1.50-1.65	0.6-2.0 0.6-2.0 0.06-0.6 2.0-6.0	0.18-0.22 0.17-0.21 0.10-0.14 0.10-0.14	5.1-6.5 4.5-5.5 4.5-6.0 5.1-6.5	Low---------- Low---------- Low---------- Low----------	0.37 0.37 0.37 0.37	4	1-3
SgD2*, SgD3*, SgE*: Shelocta------- Latham--------- Gilpin--------- W*. Water	0-3 3-27 27-62 0-3 3-33 33 0-9 9-14 14-35 35	10-25 18-34 30-60 20-27 35-55 --- 15-27 18-35 15-35 ---	1.15-1.30 1.30-1.55 1.30-1.55 1.30-1.50 1.40-1.70 --- 1.20-1.40 1.20-1.50 1.20-1.50 ---	0.6-2.0 0.6-2.0 0.2-2.0 0.6-2.0 0.06-0.2 --- 0.6-2.0 0.6-2.0 0.6-2.0 ---	0.16-0.22 0.10-0.20 0.08-0.16 0.16-0.20 0.11-0.15 --- 0.12-0.18 0.12-0.16 0.08-0.12 ---	4.5-5.5 4.5-5.5 4.5-5.5 3.6-6.5 3.6-5.0 --- 3.6-5.5 3.6-5.5 3.6-5.5 ---	Low---------- Low---------- Low---------- Low---------- High---------- --- Low---------- Low---------- Low---------- ---	0.32 0.28 0.17 0.43 0.32 --- 0.32 0.24 0.24 ---	3 3 3 ---	.5-5 1-3 .5-4

See footnote at end of table.

Table 15.--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
WbE*, WbF*:										
Wallen	0-6	8-20	1.40-1.55	2.0-6.0	0.07-0.12	3.5-6.0	Low	0.17	2	1-2
	6-25	8-20	1.40-1.55	2.0-6.0	0.05-0.09	3.5-6.0	Low	0.17		
	25	---	---	---	---	---	---	---		
Bledsoe	0-10	15-30	1.20-1.50	0.6-2.0	0.16-0.21	5.6-7.8	Low	0.37	5	1-4
	10-17	35-50	1.30-1.60	0.2-0.6	0.12-0.19	5.6-7.8	Moderate	0.32		
	17-79	30-60	1.35-1.60	0.06-0.6	0.12-0.19	5.6-7.8	Moderate	0.32		
Donahue	0-9	7-20	1.20-1.40	2.0-6.0	0.10-0.16	4.5-5.5	Low	0.32	2	.5-4
	9-16	20-40	1.20-1.40	0.6-2.0	0.10-0.16	4.5-5.5	Low	0.28		
	16-34	35-60	1.30-1.55	0.2-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	34	---	---	---	---	---	---	---		
WeB	0-11	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low	0.37	3	1-3
Wellston	11-26	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low	0.37		
	26-40	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low	0.37		
	40-60	15-30	1.30-1.60	0.6-2.0	0.06-0.16	4.5-6.0	Low	0.20		
WeC2	0-11	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low	0.37	3	1-3
Wellston	11-26	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low	0.37		
	26-40	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low	0.37		
	40-60	15-30	1.30-1.60	0.6-2.0	0.06-0.16	4.5-6.0	Low	0.20		
WeD	0-11	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low	0.37	3	1-3
Wellston	11-26	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low	0.37		
	26-40	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low	0.37		
	40-60	15-30	1.30-1.60	0.6-2.0	0.06-0.16	4.5-6.0	Low	0.20		
WsC3	0-3	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-6.5	Low	0.37	3	1-3
Wellston	3-26	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low	0.37		
	26-40	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low	0.37		
	40-60	15-30	1.30-1.60	0.6-2.0	0.06-0.16	4.5-6.0	Low	0.20		
ZaB, ZaC2	0-11	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-6.0	Low	0.43	3	1-2
Zanesville	11-24	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-6.0	Low	0.37		
	24-40	18-33	1.50-1.75	0.06-0.6	0.08-0.12	4.5-6.0	Low	0.37		
	40-60	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-6.0	Low	0.28		
ZnC3	0-24	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-6.0	Low	0.37	3	
Zanesville	24-40	18-33	1.50-1.75	0.06-0.6	0.08-0.12	4.5-6.0	Low	0.37		
	40-60	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-6.0	Low	0.28		

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.--Soil and Water Features

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
AlB, AlC2, AlC3, AlD2, AlD3--- Allegheny	B	None	---	---	>6.0	---	---	>60	---	Low	High.
BaB, BaC2, BaD2, BaE--- Baxter	B	None	---	---	>6.0	---	---	>60	---	High	High.
BfB*, BfC*, BfD*, BfE*:											
Bethesda	C	None	---	---	>6.0	---	---	>60	---	Moderate	High.
Fairpoint	C	None	---	---	>6.0	---	---	>60	---	High	Moderate.
CaB2, CaC2, CcC3--- Caneyville	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
CeD*:											
Caneyville	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Lenberg	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
CgE*:											
Caneyville	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Lenberg	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
Rock outcrop.											
CkD*, CkE*:											
Caneyville	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Rock outcrop.											
CmD*, CmE*:											
Carpenter	B	None	---	---	>6.0	---	---	>40	Soft	Low	Moderate.
Lenberg	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
Cn--- Chagrin	B	Frequent	Brief	Nov-May	4.0-6.0	Apparent	Feb-Mar	>60	---	Low	Moderate.
CoB, CoC--- Clarkrange	C	None	---	---	1.5-2.5	Perched	Jan-Apr	>60	Soft	Moderate	High.
Cp--- Clifty	B	Frequent	Brief	Jan-May	>6.0	---	---	>60	---	Low	High.
CrB, CrC2--- Crider	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
DAM*. Dam											
Dt*. Dumps											

See footnote at end of table.

Table 16.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
Du Dunning	D	Occasional	Brief	Dec-May	0-0.5	Apparent	Jan-Apr	>60	---	High	Moderate.
EkB, EkC Elk	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
EpB, EpC Epley	C	None	---	---	1.5-2.5	Perched	Jan-Apr	>40	Hard	High	Moderate.
FaB*:											
Fredonia	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Hagerstown	B	None	---	---	>6.0	---	---	>40	Hard	Moderate	Low.
FaC2*, FaC3*:											
Fredonia	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Hagerstown	B	None	---	---	>6.0	---	---	>40	Hard	Moderate	Low.
FdC2, FdD2, FoD3-- Frondorf	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
FwF*:											
Frondorf	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
Weikert	B/D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate.
GnB2, GnC2, GnC3, GnD2, GnD3 Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
Gr Grigsby	B	Frequent	Very brief or brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	Low	Low.
JfD*:											
Jefferson	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
Lily	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
Rock outcrop.											
JfE*:											
Jefferson	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
Lily	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
Rock outcrop.											
Jo Johnsburg	D	None	---	---	1.0-3.0	Perched	Jan-Apr	>40	Soft	High	High.
Ka, Kb Karnak	D	Frequent	Long	Mar-May	0-3.0	Apparent	Apr-Jun	>60	---	High	Moderate.
LaC2, LaD2 Latham	D	None	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High	High.
Le Lawrence	C	Occasional	Very brief	Dec-Apr	1.0-2.0	Perched	Dec-Apr	>60	---	High	High.

See footnote at end of table.

Table 16.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
LnC2, LnD2--- Lenberg	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
LyB, LyC2, LyD2--- Lily	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
Me--- Melvin	D	Frequent	Brief or long.	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High	Low.
Mu--- Mullins	D	None	---	---	0-1.0	Perched	Jan-Apr	>60	---	High	High.
Ne--- Newark	D	Frequent	Brief	Dec-May	0.5-1.0	Apparent	Dec-May	>60	---	High	Low.
No--- Nolin	B	Frequent	Brief or long.	Jan-May	4.0-6.0	Apparent	Feb-Mar	>60	---	Low	Moderate.
OtC--- Otwell	C	Rare	---	---	2.0-3.5	Perched	Jan-Apr	>60	---	Moderate	High.
OwB--- Otwell	C	Occasional	Brief	Jan-May	2.0-3.5	Perched	Jan-Apr	>60	---	Moderate	High.
PeB, PeC2--- Pembroke	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Ps*, Pt*. Pits											
ReB2, ReC2, ReD2, ReE--- Riney	B	None	---	---	>6.0	---	---	>40	Soft	Moderate	High.
RoB, RoC2, RoD2, RsC3, RsD3--- Rosine	B	None	---	---	>6.0	---	---	>40	Soft	Moderate	High.
SaB--- Sadler	C	None	---	---	1.5-2.0	Perched	Jan-Apr	>40	Hard	Moderate	High.
ScB, ScC2--- Sciotoville	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	High.
SgD2*, SgD3*, SgE*:											
Shelocta---	B	None	---	---	>6.0	---	---	>40	Hard	Low	High.
Latham---	D	None	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High	High.
Gilpin---	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
W*. Water											
WbE*, WbF*:											
Wallen---	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Bledsoe---	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Donahue---	C	None	---	---	>6.0	---	---	20-40	Hard	High	High.

See footnote at end of table.

Table 16.--Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
WeB---------- Wellston	B	None----------	---	---	>6.0	---	---	>40	Hard	Moderate	High.
WeC2---------- Wellston	B	None----------	---	---	>6.0	---	---	>40	Hard	Moderate	High.
WeD---------- Wellston	B	None----------	---	---	>6.0	---	---	>40	Hard	Moderate	High.
WsC3---------- Wellston	B	None----------	---	---	>6.0	---	---	>40	Hard	Moderate	High.
ZaB, ZaC2, ZnC3--- Zanesville	C	None----------	---	---	2.0-3.0	Perched	Dec-Apr	>40	Hard	Moderate	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.--Physical Analyses of Selected Soils

(The symbol < means less than; > means more than. Soil samples were analyzed by the Soil Survey Laboratory, Natural Resources Conservation Service, Lincoln, Nebraska, and the Kentucky Agricultural Experiment Station, Lexington, Kentucky)

Soil name, sample number, horizon, and depth in inches	Total			Particle size distribution of sand					Textural class*
	Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	
	Pct <2mm								
Butler County:									
Bethesda silt loam:									
93KY-31-2									
A ------ 0-3	16.2	68.6	15.2	0.9	2.4	3.6	4.5	4.8	sil
BC1 ---- 3-10	18.9	59.1	22.0	3.5	2.7	2.4	4.2	6.1	sil
BC2 ---- 10-17	25.0	46.6	28.4	6.5	4.7	3.0	3.2	7.6	cl
C1 ----- 17-47	27.2	51.0	21.8	3.6	4.0	4.1	7.2	8.3	sil
C2 ----- 47-80	37.2	43.1	19.7	9.9	7.5	5.2	5.3	9.3	l
Fairpoint silt loam:									
93KY-31-1									
A ------ 0-2	20.5	55.9	23.6	2.9	2.3	3.0	5.4	6.9	sil
BC ----- 2-19	14.1	59.3	26.3	3.6	2.9	1.9	2.3	3.7	sil
C1 ----- 19-41	25.9	52.2	21.9	3.4	4.4	3.5	5.1	9.5	sil
C2 ----- 41-60	36.8	40.6	22.6	9.1	9.3	5.7	3.9	8.8	l
C3 ----- 60-80	39.3	40.5	20.2	9.7	10.2	5.8	4.8	8.8	l
Fairpoint silt loam:									
93KY-31-3									
A ------ 0-7	33.7	51.5	14.8	4.9	4.1	5.1	9.3	10.3	sil
C1 ----- 7-27	34.2	50.0	15.8	2.7	5.8	5.0	6.4	14.3	sil
C2 ----- 27-61	34.0	48.4	17.6	4.6	5.6	4.3	6.1	13.4	sil
C3 ----- 61-96	37.8	41.0	21.2	6.1	6.6	4.2	5.5	15.4	l
Edmonson County:									
Bledsoe loam**:									
92KY-61-5									
A ------ 0-3	44.7	47.5	7.8	0.6	2.3	10.2	27.9	3.7	l
E ------ 3-10	42.4	49.6	8.0	0.2	0.7	7.4	29.9	4.2	l
2Bt1 --- 10-17	28.8	30.5	40.7	0.1	0.3	4.7	19.1	4.6	c
2Bt2 --- 17-25	34.8	16.9	48.3	0.2	0.5	6.5	23.8	3.8	c
2Bt3 --- 25-37	52.7	12.1	35.2	0.2	0.4	11.2	37.5	3.4	sc
2Bt4 --- 37-52	26.0	17.7	56.3	0.3	0.2	4.9	16.9	3.7	c
2Bt5 --- 52-60	38.7	17.7	43.6	0.4	0.7	5.2	27.3	5.1	c
2Bt6 --- 60-79	62.0	10.1	27.9	0.4	0.5	7.8	48.5	4.8	scl

See footnotes at end of table.

Table 17.--Physical Analyses of Selected Soils--Continued

Soil name, sample number, horizon, and depth in inches	Total			Particle size distribution of sand					Textural class*
	Sand (2-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Very coarse (2-1 mm)	Coarse (1-0.5 mm)	Medium (0.5-0.25 mm)	Fine (0.25-0.1 mm)	Very fine (0.1-0.05 mm)	
	Pct <2mm								
Edmonson County:									
Clarkrange silt loam** ***:									
92KY-61-1									
Ap ----- 0-6	20.6	65.1	14.3	0.3	2.2	3.4	9.9	4.8	sil
BA ----- 6-11	15.0	69.1	15.9	0.2	0.7	1.5	8.0	4.6	sil
Bt1 ---- 11-21	13.9	60.7	25.5	0.1	0.4	0.8	8.1	4.5	sil
Bt2 ---- 21-25	20.7	53.7	25.6	0.3	0.4	0.9	11.7	7.4	sicl
B/E ---- 25-32	28.2	51.2	20.6	1.4	0.6	1.2	15.3	9.7	sil
2Btx --- 32-48	21.7	47.3	31.0	0.5	0.2	0.6	12.2	8.2	sicl
3BC1 --- 48-57	34.0	26.8	39.2	0.1	0.3	2.9	20.8	9.9	cl
3BC2 --- 57-68	25.6	24.9	49.5	0.0	0.1	1.1	15.3	9.1	c
Riney silt loam**:									
92KY-61-4									
Ap ----- 0-6	32.6	57.4	10.0	0.7	4.8	18.2	7.5	1.4	sil
BA ----- 6-10	25.6	60.2	14.2	0.4	3.2	15.0	5.8	1.2	sil
Bt1 ---- 10-21	23.1	48.4	28.5	0.4	3.1	14.0	4.7	0.9	cl
2Bt2 --- 21-40	46.8	31.7	21.5	1.3	5.4	28.4	10.1	1.6	l
2BC1 --- 40-43	74.7	10.4	14.9	2.6	13.8	44.2	12.6	1.5	sl
2BC2 --- 43-50	84.9	9.8	5.3	1.2	12.4	56.8	12.9	1.6	ls
2CB ---- 50-56	78.9	9.1	12.0	0.7	5.0	43.6	27.3	2.3	sl
3Bt3 --- 56-72	65.5	6.7	27.8	7.7	6.6	27.1	20.9	3.2	scl

* The letters sil mean silt loam; cl, clay loam; l, loam; c, clay; sc, sandy clay; sl, sandy loam; ls, loamy sand; scl, sandy clay loam; and sicl, silty clay loam.

** This soil is the typical pedon for the soil series in the survey area. See "Soil Series and Their Morphology" for the location of the pedon.

*** This pedon 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.

Table 18.--Chemical Analyses of Selected Soils

(Soil samples were analyzed by the Kentucky Agricultural Experiment Station, Lexington, Kentucky)

Soil name, sample number, horizon, and depth in inches	Exchangeable bases						Extractable acidity	Base saturation		Sum of cations	Soil reaction		Calcium carbonate equivalent	Organic matter	Potassium	Phosphorus
	Ca	Mg	K	Na	Total (TEB)	CEC		Ammonium acetate	Sum of cations		(H_2O) 1:1)	SMP buffer				(Bray No. 1)
	Milliequivalents/100 grams							Pct	Pct				Pct	Pct	pp/m	pp/m
Butler County:																
Bethesda silt loam:																
93KY-31-2																
A ----- 0 to 3	4.92	2.33	0.51	0.03	7.79	11.57	8.53	67	48	16.32	5.25	6.58	0.12	6.76	188.5	9.0
BC1 --- 3 to 10	2.66	2.28	0.18	0.06	5.18	9.44	8.46	55	38	13.64	5.25	6.34	0.08	1.44	72.5	3.5
BC2 --- 10 to 17	2.37	3.89	0.17	0.08	6.51	11.49	8.41	57	44	14.92	5.10	6.27	0.13	0.42	71.0	5.0
C1 ---- 17 to 47	3.26	3.01	0.21	0.06	6.54	6.33	4.12	103	61	10.66	5.33	7.10	1.18	1.61	117.0	3.0
C2 ---- 47 to 80	4.53	6.76	0.13	0.28	11.70	9.09	1.87	129	86	13.57	6.60	7.28	0.43	1.01	69.0	3.0
Fairpoint silt loam:																
93KY-31-1																
A ----- 0 to 2	6.84	1.66	0.25	0.03	8.78	10.38	3.71	84	70	12.49	6.60	7.05	0.29	2.62	105.0	4.0
BC ---- 2 to 19	2.23	3.29	0.19	0.07	5.78	10.93	9.87	53	37	15.65	4.79	6.25	0.07	0.97	86.5	2.0
C1 ---- 19 to 41	3.79	4.53	0.23	0.09	8.64	7.23	1.44	119	86	10.08	6.67	7.30	1.39	1.15	88.5	4.5
C2 ---- 41 to 60	2.19	6.76	0.13	0.14	9.22	11.19	6.40	82	59	15.62	4.89	6.61	0.08	0.20	57.5	4.0
C3 ---- 60 to 83	2.96	5.89	0.13	0.14	9.12	10.61	5.51	86	62	14.63	5.13	6.73	0.05	0.40	60.5	3.0
Fairpoint silt loam:																
93KY-31-3																
A ----- 0 to 7	4.92	1.96	0.29	0.02	7.19	7.99	3.83	90	65	11.02	6.75	7.07	0.29	3.84	117.0	3.5
C1 ---- 7 to 27	4.97	2.19	0.18	0.03	7.37	5.32	0.68	138	91	8.05	7.10	7.40	0.81	2.84	85.0	2.5
C2 ---- 27 to 61	3.76	3.68	0.20	0.05	7.69	6.88	5.00	112	60	12.69	5.20	6.99	0.14	2.98	87.0	4.5
C3 ---- 61 to 96	4.98	4.89	0.20	0.10	10.17	6.54	3.57	156	74	13.74	5.68	7.13	0.35	2.20	90.0	4.0

Table 18.--Chemical Analyses of Selected Soils--Continued

Soil name, sample number, horizon, and depth in inches	Exchangeable bases						Extractable acidity	Base saturation		Sum of cations	Soil reaction		Calcium carbonate equivalent	Organic matter	Potassium	Phosphorus (Bray No. 1)
	Ca	Mg	K	Na	Total (TEB)	CEC		Ammonium acetate	Sum of cations		(H_2O 1:1)	SMP buffer				
	Milliequivalents/100 grams							Pct	Pct				Pct	Pct	ppm	ppm
Edmonson County:																
Bledsoe loam*:																
92KY-61-5																
Ap ---- 0 to 3	2.18	0.28	0.17	0.03	2.66	6.31	5.20	42	34	7.86						
E ----- 3 to 10	0.82	0.11	0.08	0.01	1.02	4.46	3.66	23	22	4.68						
2Bt1 -- 10 to 17	9.75	0.38	0.26	0.04	10.43	14.67	4.26	71	71	4.69						
2Bt2 -- 17 to 25	12.14	0.58	0.29	0.04	13.05	16.57	6.86	79	66	19.91						
2Bt3 -- 25 to 37	9.17	0.45	0.19	0.04	9.85	13.54	6.55	73	60	6.40						
2Bt4 -- 37 to 52	16.76	0.95	0.36	0.06	18.13	28.41	6.78	64	73	24.91						
2Bt5 -- 52 to 60	10.38	0.55	0.21	0.04	11.18	15.08	5.55	74	76	16.73						
2Bt6 -- 60 to 79	6.66	0.36	0.14	0.02	7.18	10.62	3.74	68	66	10.92						
Clarkrange silt loam*:																
92KY-61-1																
Ap ---- 0 to 6	0.33	0.19	0.18	0.01	0.71	7.25	7.46	10	9	8.17						
BA ---- 6 to 11	0.24	0.13	0.08	0.01	0.46	5.62	7.52	8	6	7.98						
Bt1 --- 11 to 21	0.56	0.86	0.16	0.04	1.62	10.48	9.40	15	15	11.02						
Bt2 --- 21 to 25	0.33	0.86	0.14	0.02	1.35	10.00	9.53	13	12	10.88						
B/E --- 25 to 32	0.18	0.71	0.09	0.03	1.01	9.77	8.91	10	10	9.92						
2Btx -- 32 to 48	0.13	1.10	0.11	0.07	1.41	13.29	14.15	11	9	15.56						
3BC1 -- 48 to 57	0.08	1.96	0.14	0.24	2.42	16.16	18.47	15	11	20.89						
3BC2 -- 57 to 68	0.16	3.50	0.24	0.47	4.37	28.12	24.45	15	15	28.82						
Riney silt loam*:																
92KY-61-4																
Ap ---- 0 to 6	2.92	0.58	0.27	0.03	3.85	6.71	6.15	57	38	10.00						
BA ---- 6 to 10	0.72	0.45	0.19	0.04	1.40	5.52	6.51	25	18	7.91						
Bt1 --- 10 to 21	1.23	1.35	0.26	0.06	2.90	13.20	10.37	22	22	13.27						
2Bt2 -- 21 to 40	0.75	0.95	0.80	0.04	1.92	7.42	9.04	26	17	10.96						
2BC1 -- 40 to 43	0.14	0.21	0.04	0.01	0.40	2.15	3.54	19	10	3.94						
2BC2 -- 43 to 50	0.26	0.33	0.06	0.01	0.66	3.07	2.79	21	19	3.45						
2CB --- 50 to 56	0.61	0.48	0.16	0.02	1.77	7.59	8.36	23	17	10.13						
3Bt3 -- 56 to 72	0.52	0.73	0.12	0.05	1.42	6.56	6.84	22	17	8.26						

* This soil is the typical pedon for the soil series in the survey area. See "Soil Series and Their Morphology" for the location of the pedon. The following chemical analyses were not run on this pedon: pH, calcium carbonate equivalent, organic matter, potassium, and phosphorus.

Table 19.--Mineralogy of Selected Soils

(The determinations were made by x-ray diffraction (XRD) analysis on soil material smaller than 2 millimeters in diameter. Dashes indicate that the mineral was not detected. The soil sample was analyzed by the Kentucky Agricultural Experiment Station, Lexington, Kentucky)

Soil name, sample number, horizon, and depth in inches	Resistant minerals			Weatherable minerals	
	Quartz	Kaolinite	Total	Feldspar	Mica
	Pct			Pct	
Edmonson County:					
Clarkrange silt loam*: 92KY-61-1					
Bt1 ---- 11 to 21	95	2	97	3	---
Bt2 ---- 21 to 25	90	---	90	7	3
B/E ---- 25 to 32	98	---	98	2	---

* This soil is the typical pedon for the soil series in the survey area. See "Soil Series and Their Morphology" for the location of the pedon.

Table 20.--Engineering Index Test Data

(Dashes indicate data were not available. NP means nonplastic. Soil samples were tested by the Soil Mechanics Laboratory, Natural Resources Conservation Service, Fort Worth, Texas)

Soil name, sample number, horizon, and depth in inches	Classification		Grain-size distribution						Liquid limit	Plasticity index	Moisture density		Specific gravity
			Percentage passing sieve--			Percentage smaller than--					Maximum dry density	Optimum moisture	
	AASHTO	Unified	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm					
									Pct		Lb/ cu ft	Pct	
Clarkrange silt loam*:													
92KY-61-1													
Bt1, Bt2 -- 11 to 25	A-6	CL	100	---	86	65	33	25	34	13	107.5	16	2.70
2Btx ------ 32 to 48	A-7-6	CL	100	---	80	65	43	34	41	19	106.0	19	2.70
2Bt3 ------ 48 to 57	A-7-5	CH	100	---	80	67	58	45	67	36	93.5	27	2.70
Riney silt loam*:													
92KY-61-4													
2Bt2 ------ 21 to 40	A-7-6	CL	100	---	86	65	38	29	42	17	104.0	19	2.60
2BC1 ------ 40 to 43	A-2-4	SM	100	76	24	15	13	11	NP	---	124.0	10	2.69

* This soil is the typical pedon for the soil series in the survey area. See "Soil Series and Their Morphology" for the location of the pedon.

Table 21.--Classification of the Soils

(The series were classified using the fifth edition of the "Keys to Soil Taxonomy," which was published in 1992. 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
*Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Baxter	Fine, mixed, mesic Typic Paleudalfs
Bethesda	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Bledsoe	Fine, mixed, mesic Typic Hapludalfs
Caneyville	Fine, mixed, mesic Typic Hapludalfs
Carpenter	Fine-loamy, mixed, mesic Ultic Hapludalfs
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Clarkrange	Fine-silty, siliceous, mesic Typic Fragiudults
Clifty	Fine-loamy, mixed, mesic Fluventic Dystrochrepts
Crider	Fine-silty, mixed, mesic Typic Paleudalfs
Donahue	Fine, mixed, mesic Typic Hapludalfs
Dunning	Fine, mixed, mesic Fluvaquentic Endoaquolls
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Epley	Fine-silty, mixed, mesic Oxyaquic Hapludalfs
Fairpoint	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Fredonia	Fine, mixed, mesic Typic Hapludalfs
Frondorf	Fine-loamy, mixed, mesic Ultic Hapludalfs
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Grigsby	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Hagerstown	Fine, mixed, mesic Typic Hapludalfs
*Jefferson	Fine-loamy, siliceous, mesic Typic Hapludults
Johnsburg	Fine-silty, mixed, mesic Aquic Fragiudults
*Karnak	Fine, montmorillonitic, nonacid, mesic Vertic Endoaquepts
Latham	Clayey, mixed, mesic Aquic Hapludults
Lawrence	Fine-silty, mixed, mesic Aquic Fragiudalfs
Lenberg	Fine, mixed, mesic Ultic Hapludalfs
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Mullins	Fine-silty, mixed, mesic Typic Fragiaquults
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Otwell	Fine-silty, mixed, mesic Typic Fragiudalfs
Pembroke	Fine-silty, mixed, mesic Mollic Paleudalfs
Riney	Fine-loamy, siliceous, mesic Typic Hapludults
Rosine	Fine-silty, mixed, mesic Ultic Hapludalfs
Sadler	Fine-silty, mixed, mesic Oxyaquic Fragiudalfs
*Sciotoville	Fine-silty, mixed, mesic Aquic Fragiudalfs
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
Wallen	Loamy-skeletal, siliceous, mesic Typic Dystrochrepts
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wellston	Fine-silty, mixed, mesic Ultic Hapludalfs
Zanesville	Fine-silty, mixed, mesic Oxyaquic Fragiudalfs

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