United States Department of Agriculture

Soil Conservation Service

In cooperation with Kentucky Natural Resources and Environmental Protection Cabinet and Kentucky Agricultural Experiment Station

Soil Survey of Bullitt and Spencer Counties, Kentucky

HOW TO USE

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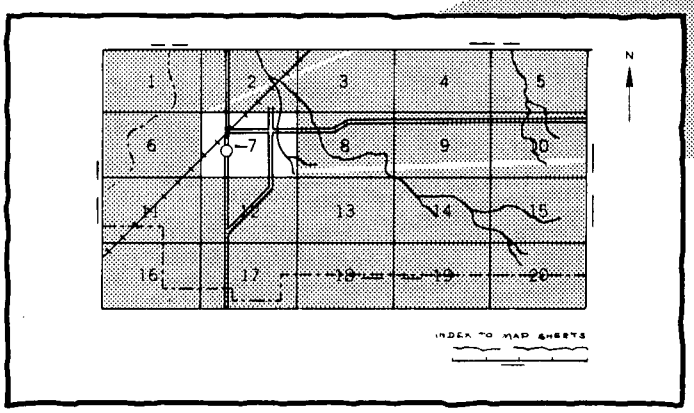

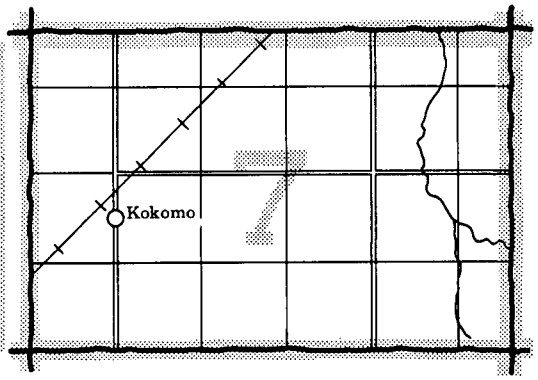

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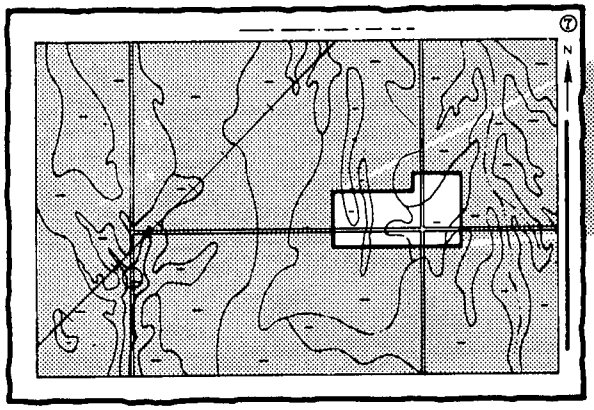

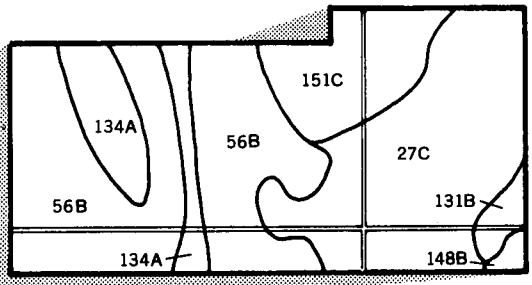

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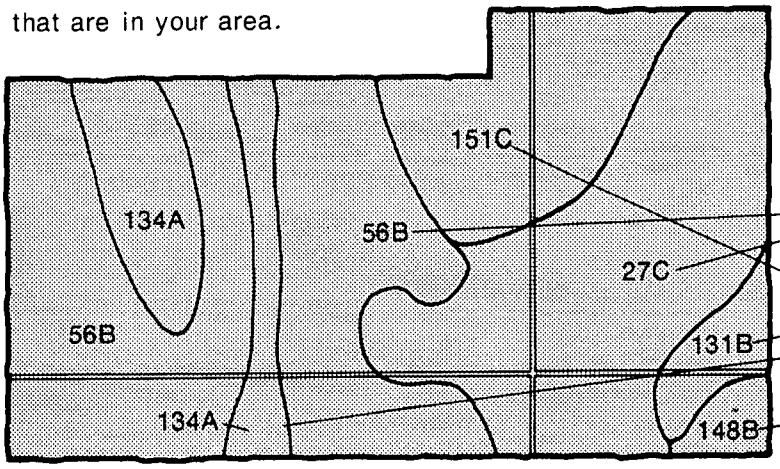

Symbols

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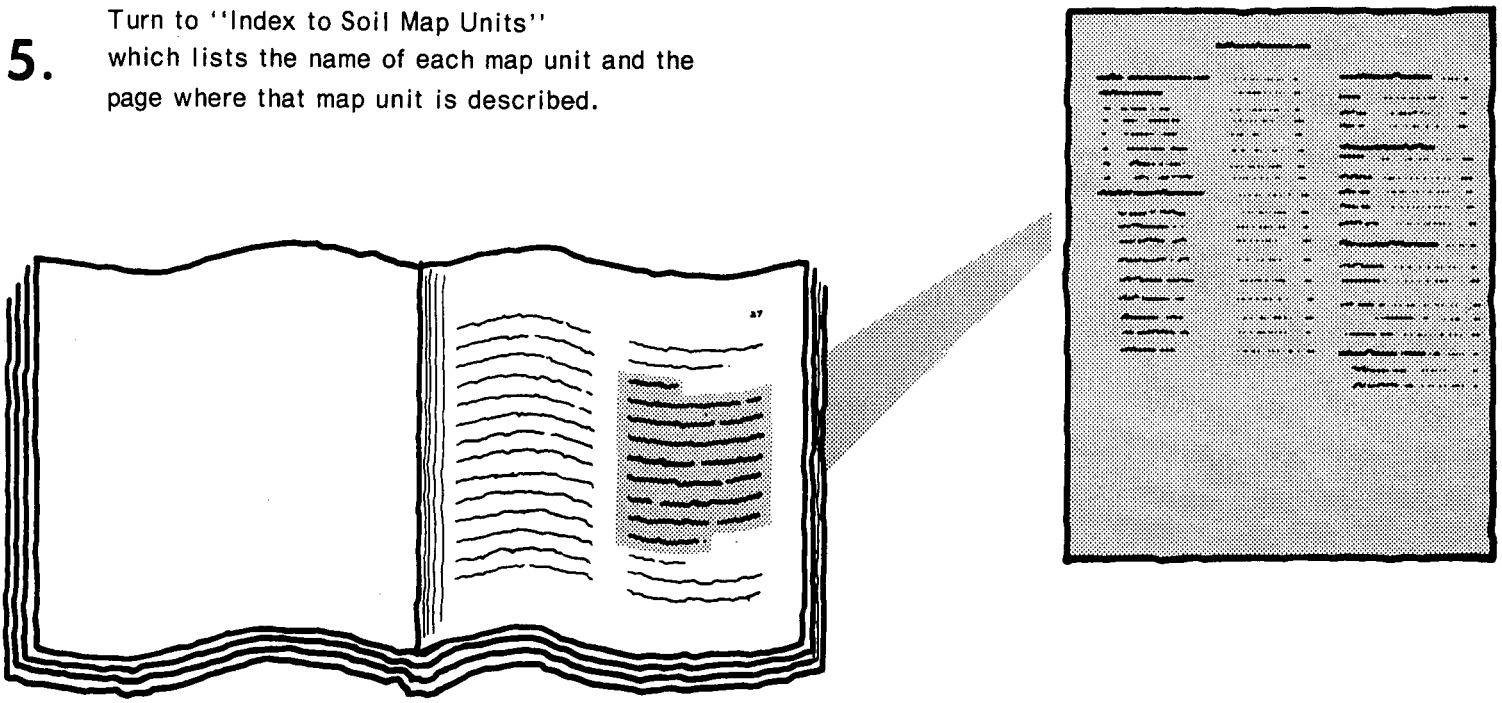
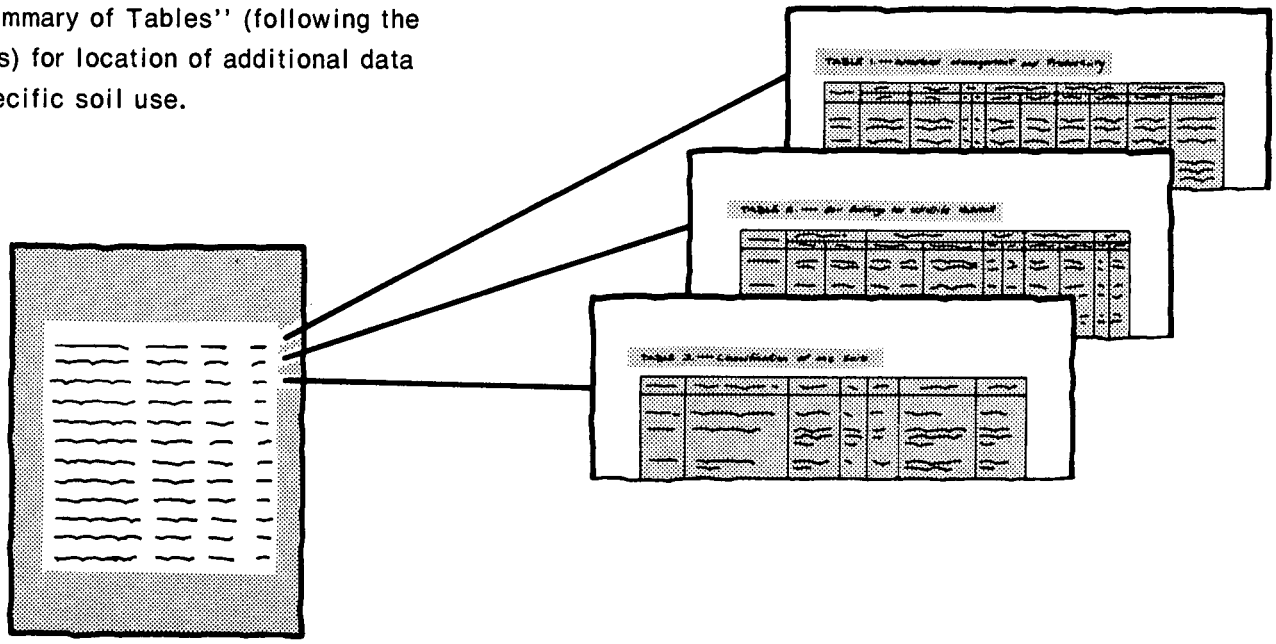
THIS SOIL SURVEY

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



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



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

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

Major fieldwork for this soil survey was completed in 1982. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This soil survey was made cooperatively by the Soil Conservation Service and the Kentucky Natural Resources and Environmental Protection Cabinet and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Bullitt County Conservation District and the Spencer County Conservation District.

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

Cover: An aerial view of farmland being crowded out by urban development in an area of Crider silt loam, 2 to 6 percent slopes.

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Foreword

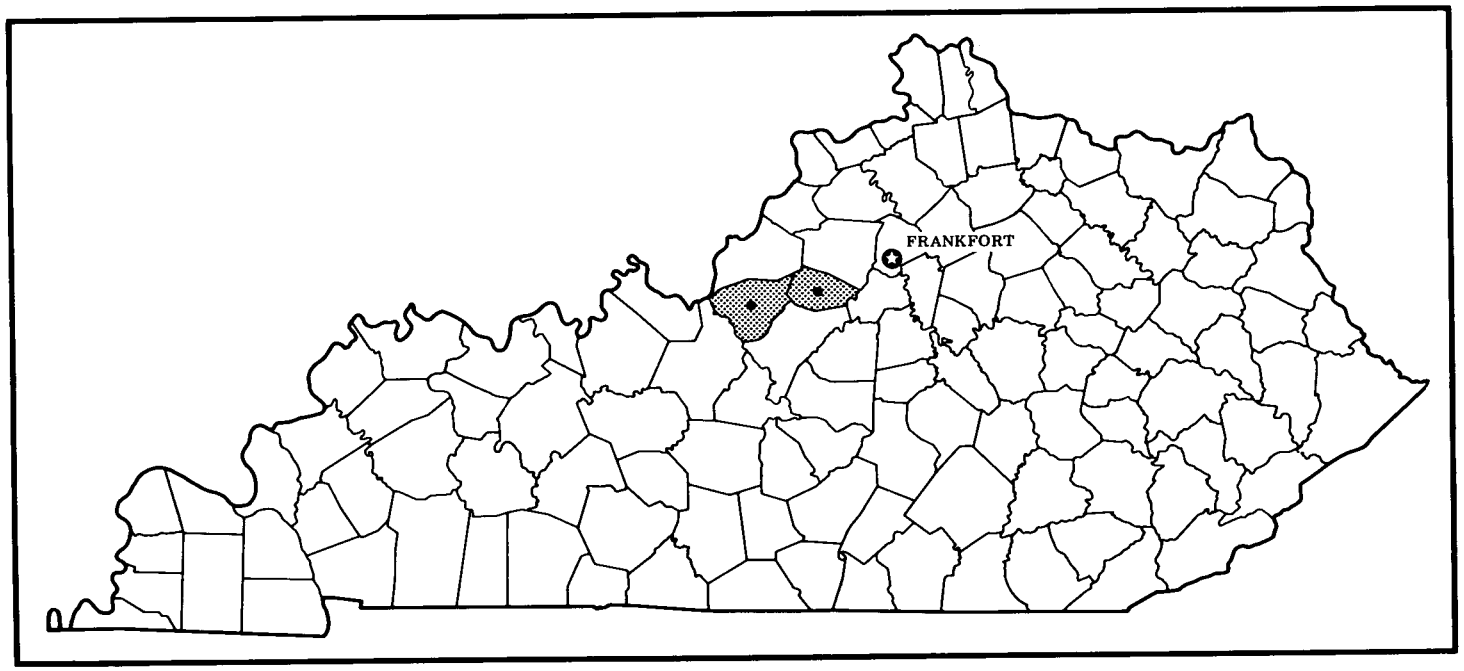
This soil survey contains information that can be used in land-planning programs in Bullitt and Spencer Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations,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

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

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

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

Randall W. Giessler
State Conservationist
Soil Conservation Service



Location of Bullitt and Spencer Counties in Kentucky.

Soil Survey of Bullitt and Spencer Counties, Kentucky

By Orville J. Whitaker and Bruce A. Waters, Soil Conservation Service

Soils surveyed by Fred S. Arms, Michael J. Mitchell, Bruce A. Waters, Orville J. Whitaker, and Byron L. Wilson, Soil Conservation Service

Maps compiled by Dorothy H. Brown, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with
Kentucky Natural Resources and Environmental Protection Cabinet
and Kentucky Agricultural Experiment Station

BULLITT AND SPENCER COUNTIES are in the north-central part of Kentucky. They are in the Kentucky Bluegrass and the Highland Rim and Pennyroyal Land Resource Areas *(4)*. The total combined area is about 492 square miles. Bullitt County has 192,301 acres, and Spencer County has 122,675 acres. According to the 1980 census, the population of Bullitt County is 43,346, and the population of Spencer County is 5,929. Shepherdsville is the county seat of Bullitt County, and Taylorsville is the county seat of Spencer County.

The topography of Bullitt and Spencer Counties is very diversified. The eastern part of Spencer County is in the Hills of the Bluegrass physiographic region of Kentucky *(5)*. This is a strongly dissected area of moderately steep hillsides and narrow ridgetops. The remainder of Spencer County and the northeastern part of Bullitt County are in the Outer Bluegrass region. This area is less hilly than the Hills of the Bluegrass and has broader ridgetops and less sloping hillsides. The southern and western parts of Bullitt County are in the Knobs physiographic region of Kentucky. In the southeastern part of the county, these Knobs are conical shaped hills and long, narrow, sloping ridges (fig. 1). In the western part of Bullitt County, this region is very steep hillsides capped with broad ridges.

The Salt River dissects the survey area from east to west. A dam constructed across the Salt River Valley in southeastern Spencer County forms the Taylorsville Lake. Below the Taylorsville Dam and extending westward, the valley widens into broad flood plains and stream terraces. In Bullitt County, west of Shepherdsville, this valley opens into an area of broad slack water stream terraces interrupted only by the knobs. The Rolling Fork River forms the southeastern boundary of the survey area. Its valley is also a broad area of slack water stream terraces.

The elevation of the survey area ranges from 380 feet at the point where the Salt River leaves Bullitt County to about 998 feet at the top of a knob in Bullitt County about 1.2 miles east of the intersection of Kentucky Highways 61 and 733 *(17, 22)*.

General Nature of the Survey Area

This section gives general information concerning the survey area. It discusses history; geology; climate; natural resources; farming; industry, transportation, and markets; and recreation in Bullitt and Spencer Counties.

History

Bullitt County was established in 1796 from parts of Jefferson and Nelson Counties. It was named in honor of

Figure 1.—A typical knob in the southeastern part of Bullitt County.

Kentucky's first lieutenant governor, Alexander S. Bullitt *(6)*. Bullitt's Lick, about 3 miles from Shepherdsville, was the first salt works established in Kentucky and was the most important source of salt west of the Alleghenies during pioneer days. During the mid 1800's, deposits of low grade iron ore were smelted into "pig iron" in three large furnaces located in the county *(11)* (fig. 2). Shepherdsville, the county seat, was organized in 1793 by Adam Shepherd. Mount Washington, incorporated in 1882, was a major crossroad for stage coach lines between Louisville and Bardstown and Shepherdsville and Taylorsville. Lebanon Junction was established in the 1850's as a railroad station and prospered as a railroad town for many years.

Spencer County was established in 1824 from parts of Bullitt, Shelby, and Nelson Counties. The county was named in honor of Captain Spear Spencer, who died in the Battle of Tippecanoe. Taylorsville, the county seat, was incorporated in 1829. It was named after Richard Taylor, the owner of the land at the junction of Salt River and Brashear's Creek where the town is located. The farming community of Mount Eden, on the Shelby-Spencer County line, dates from 1861. William Quantrill, the notorious Civil War guerrilla, was captured in Spencer County *(7)*.

Geology

Bullitt and Spencer Counties lie on the edge of an immense structural arch known as the Jessamine Dome or Cincinnati Arch. In the Bluegrass area of central Kentucky, this arch rises to its greatest height, and erosion of this dome has exposed the oldest geologic formations in the state *(5)*. Westward from the Bluegrass area, progressively younger formations occur. Because of their location on the side of the arch, these formations eroded less rapidly. Consequently, from eastern Spencer County to western Bullitt County, a wide range of geologic formations occur. This gives rise to a diversity of topography and soils.

These counties are in the Hills of the Bluegrass, Outer Bluegrass, and Knobs physiographic regions of Kentucky. Most of the soils on the uplands formed in parent material derived from the Ordivician, Sulurian, Devonian, and Mississippian Systems *(18, 19, 20, 21,*

Figure 2.—The ruins of an early iron ore smelting furnace in Bullitt County.

23). Most of the soils on the flood plains and stream terraces are derived from alluvium and lacustrine deposits of the Quaternary System. Table 1 shows the major geologic systems of Bullitt and Spencer Counties and the predominant soils that formed on them.

Climate

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

Table 2 gives data on temperature and precipitation for the survey area as recorded at Bernheim Forest in the period 1970 to 1980. Table 3 shows probable dates of the first freeze in fall and the last freeze in spring. Table 4 provides data on length of the growing season.

In winter the average temperature is 35 degrees F, and the average daily minimum temperature is 25 degrees. The lowest temperature on record, which occurred at Bernheim Forest on January 17, 1977, is -19 degrees. In summer the average temperature is 75 degrees, and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred at Bernheim Forest on July 17, 1980, is 102 degrees.

Growing degree days are shown in table 2. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 55 inches. Of this, 30 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 23 inches. The heaviest 1-day rainfall during the period of record was 6.1 inches at Bernheim Forest on September 14, 1979. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 19 inches. The greatest snow depth at any one time during the period of record was 22 inches. On an average of 17 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, early in spring.

Natural Resources

Soil is the most important natural resource in Bullitt and Spencer Counties. Pasture, hay, grain, tobacco, and livestock are marketable products derived either directly or indirectly from the soil.

Water is adequate for domestic use throughout the survey area. All of the incorporated towns and many rural areas are served by community water systems. Many of the outlying areas are served by wells and cisterns. Salt River supplies water for the Shepherdsville and Taylorsville communities. The Salt and Rolling Fork Rivers and Taylorsville Lake also provide water for fishing and boating. Farm ponds, small lakes, and creeks are used throughout the survey area for livestock water, irrigation, fishing, and swimming.

Bullitt and Spencer Counties have about 131,800 acres of woodland *(10)*. Most of these forested areas have been logged heavily in the past but represent an important timber reserve for the future.

Farming

According to the U. S. Census of Agriculture, in 1978 there were 621 farms in Bullitt County averaging 120 acres each. Spencer County had 655 farms averaging 158 acres each. The census reported that 39 percent of the soils in Bullitt County and 85 percent of the soils in Spencer County were used for farming *(16)*.

Although Spencer County is smaller than Bullitt County, it is more agriculturally oriented. The total cash receipts from all Spencer County agricultural products in 1982 were about twice those from Bullitt County products *(9)*. An estimated 35,000 acres of the land area of Bullitt County is in the Fort Knox Military Reservation (fig. 3). Urban expansion from the metropolitan Louisville area has replaced vast areas of Bullitt County's farmland (fig. 4), but Spencer County has retained a basically rural nature. The Taylorsville Lake Project, however, is increasing the pressures for more urban growth in Spencer County.

In 1982, about 10,200 acres of Bullitt County and 16,700 acres of Spencer County were planted to row crops, mainly corn, soybeans, and tobacco. Spencer County's burley tobacco quota was about three times that of Bullitt County's. The two counties were nearly equal in beef production, but differed widely in dairy production. Spencer County had about 6,400 dairy cows, and Bullitt County had about 1,800. Swine production is also an important enterprise in both counties. Horses used primarily for pleasure are raised in both counties.

The production of specialized crops, such as fruits, vegetables, and nursery stock, has increased in recent years in both counties. The close proximity to Louisville provides a good market for such products.

Industry, Transportation, and Markets

Many residents of Bullitt and Spencer Counties commute to work in the Louisville metropolitan area. The two counties are not industralized to a great degree, but

Figure 3.—Fort Knox Military Reservation covers about 18 percent of the land area of Bullitt County.

there are some manufacturing enterprises. Shepherdsville is the site of most of the manufacturing in the survey area.

The distilling industry is important to the economy of Bullitt County and employs about 600 people (fig. 5). Bourbon whiskey is shipped from the distillery at Clermont to all states and over 100 countries.

Both counties have local newspapers. Magazines and specialized business publications are printed in Shepherdsville.

Conveyer systems are produced in Shepherdsville and shipped throughout the eastern and midwestern United States. Specialized lock systems also are produced there and shipped worldwide.

Three limestone quarries are operated in the survey area, one in Spencer County and two in Bullitt County. The limestone is used for road materials and agricultural lime. A quarry in Bullitt County excavates soft greenish gray shale and refines it into materials to make light-color concrete blocks. Another quarry in Bullitt County removes black shale for landfill cover and roadfill material.

Transportation facilities of Bullitt and Spencer Counties include a network of federal, state, and county highways that give access to all parts of the area. Several new roads have been constructed in Spencer County, and others have been relocated to accommodate traffic to the Taylorsville Lake area. Interstate Highway 65 crosses Bullitt County and is accessible at Shepherdsville, Bernheim Forest, and Lebanon Junction. The Louisville and Nashville Railroad also crosses Bullitt County, and some products are shipped and received by rail.

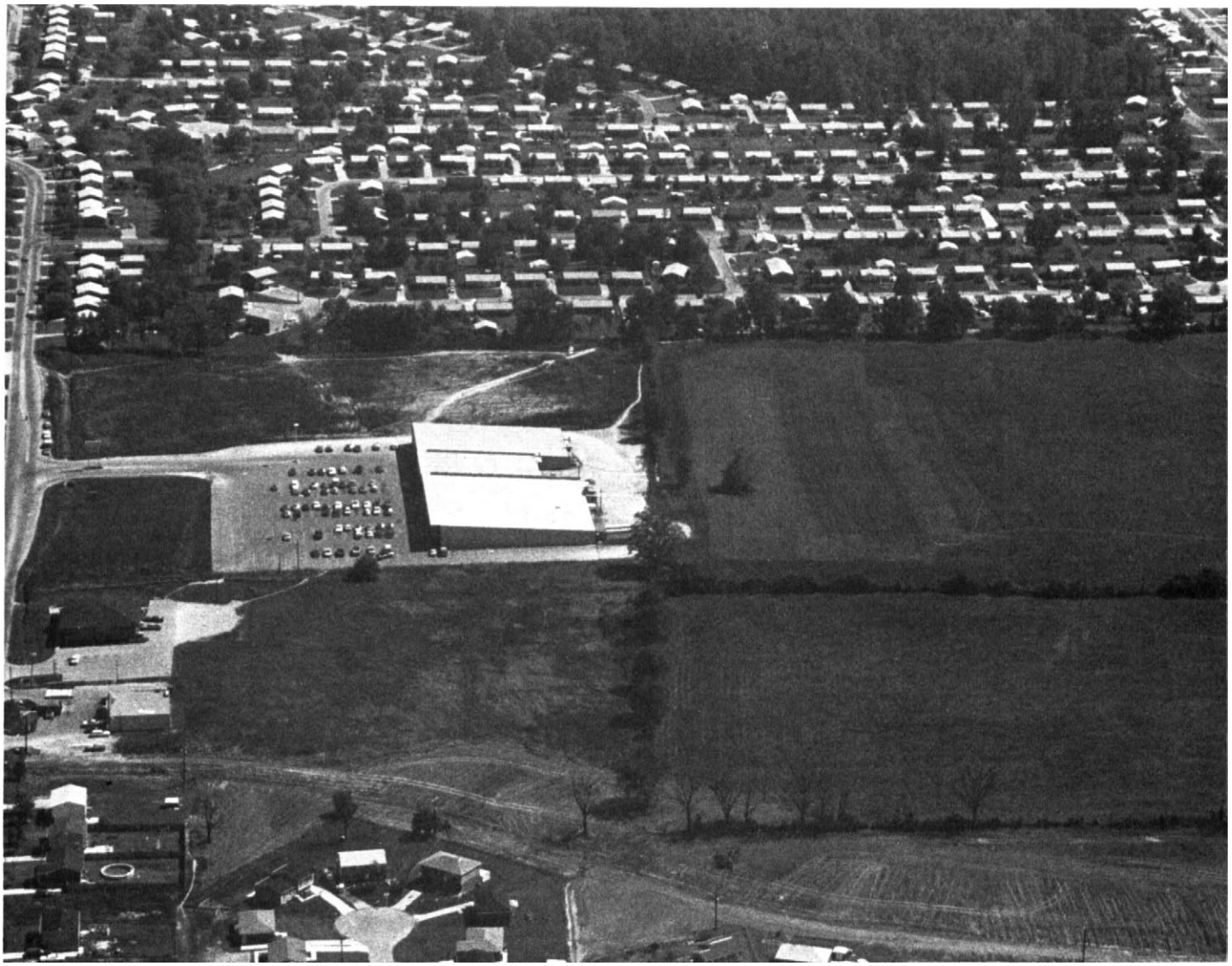


Figure 4.—Urban development in northern Bullitt County has replaced large areas of farmland. This development is in an area of Nicholson silt loam, 2 to 6 percent slopes.

Most of the agricultural products of the survey area are marketed outside of these counties. Burley tobacco is sold at warehouses in Shelbyville, Bloomfield, and Louisville. Most cattle and hogs are trucked to stockyards and meat packing plants in Louisville. One small stockyard is at Shepherdsville. Most dairy products are marketed through dairy cooperatives and sold to processors primarily in Louisville, Lawrenceburg, and Cincinnati.

Grains that are not consumed locally are sold to processors, millers, and elevators mostly in Louisville, but some are sold in Shelbyville, Bloomfield, and Germantown.

Recreation

Several areas of Bullitt and Spencer Counties have recreational value. Bernheim Forest in Bullitt County is a 10,000-acre game preserve owned by a private foundation. This well kept forest is open to the public and provides picnic areas, hiking trails, fishing, a wildlife museum, and an arboretum.

Taylorsville Lake in Spencer County was impounded in 1983 by the U.S. Army Corps of Engineers for flood control in the Salt River valley. This 3,000-acre lake and the surrounding park provide fishing, boating, camping, and picnic facilities. The Plum Creek Pilot Watershed

Project includes 5 small flood control lakes in Spencer County. These lakes provide fishing, but the landowner's permission is required.

Numerous farm ponds and privately owned lakes in both counties provide good fishing for local residents. Small game, birds, and white-tailed deer provide adequate hunting in many areas.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from 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 in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil

Figure 5.—This large distillery is in an area of Caneyville-Beasley-Rock outcrop complex, 12 to 30 percent slopes.

scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil to be found at a specific location on the landscape.

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

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

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

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

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

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

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

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and

management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

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

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

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

Soil Descriptions of Bullitt County

1. Nolin-Otwell-Sensabaugh

Nearly level to sloping, deep, well drained and moderately well drained soils that are loamy throughout; on low stream terraces and flood plains

This map unit consists of a narrow, irregularly shaped area along Knob Creek and Pond Creek in the northwestern part of Bullitt Country. The landscape is nearly level to sloping flood plains and stream terraces extending from the streams to adjacent wooded hillsides (fig. 6). Except for a few small communities, the most noticeable structures of this map unit are scattered farmsteads.

This map unit makes up about 2 percent of Bullitt County. It is about 36 percent Nolin soils, 18 percent Otwell soils, 17 percent Sensabaugh soils, and 29 percent soils of minor extent.

The Nolin soils are deep and well drained. These nearly level soils are on flood plains and are loamy throughout.

The Otwell soils are deep and moderately well drained. These nearly level to sloping soils are on low stream terraces and are loamy throughout. They have a compact and brittle fragipan at a depth of about 26 inches.

The Sensabaugh soils are deep and well drained. These nearly level soils are on flood plains primarily in the narrow valleys of the smaller tributary streams. They are gravelly loam throughout.

Of minor extent in this map unit are Newark, Elk, and Lawrence soils. Newark soils are on flood plains, and Elk and Lawrence soils are on stream terraces.

Most of the acreage of this map unit is used for cultivated crops, hay, and pasture. The cultivated crops are mainly corn and soybeans. A large acreage of this map unit will be affected by the dam to be constructed across Pond Creek southwest of its confluence with Knob Creek. This dam is part of the Southwest Jefferson County Floodwall Project.

Most of the soils in this map unit are suited to cultivated crops, hay, and pasture. The hazard of frequent flooding on the flood plains and occasional flooding on the low stream terraces late in winter and early in spring is a limitation.

The soils in this map unit have very high to moderately high potential productivity for woodland. Equipment limitations and plant competition are management concerns in some areas.

The hazard of flooding is the main limitation for urban uses of the soils in this map unit. The soils on stream terraces not subject to flooding are suited to most urban uses. Wetness and very slow permeability are limitations in some areas.

2. Garmon-Crider

Very steep to gently sloping, moderately deep and deep, well drained soils that are mainly loamy throughout; on hillsides and ridgetops

This map unit consists of two discontinuous, irregularly shaped areas in northwestern and southwestern Bullitt County. The landscape is long, steep and very steep hillsides and broad, gently sloping to moderately steep ridgetops and shoulder slopes above deep valleys (fig. 7). A few creeks and many intermittent streams are in this map unit. A large part of this map unit is in the Fort Knox Military Reservation. Most of the ridgetops and shoulder slopes in the Fort Knox area have reverted to brush and woodland. Except for a few small communities and small housing tracts, the most noticeable structures of this map unit are scattered farmsteads.

This map unit makes up about 23 percent of Bullitt County. It is about 45 percent Garmon soils, 18 percent Crider soils, and 37 percent soils of minor extent.

Figure 6.—A farmstead and cropland on a typical area of the Nolin-Otwell-Sensabaugh general soil map unit. Garmon soils are on the hillside in the background.

The Garmon soils are moderately deep and well drained. These steep to very steep soils are primarily on hillsides and are loamy throughout.

The Crider soils are deep and well drained. These gently sloping to moderately steep soils are on ridgetops and shoulder slopes above the Garmon soils. The Crider soils are loamy in the surface layer and in the upper part of the subsoil. They are clayey in the lower part of the subsoil.

The soils of minor extent in this map unit are the Caneyville, Nicholson, Hagerstown, Lenberg, Carpenter, and Sensabaugh soils. The Caneyville, Nicholson, and Hagerstown soils are on ridgetops and shoulder slopes. Lenberg and Carpenter soils are on hillsides, and Sensabaugh soils are on narrow flood plains.

Most of the acreage on ridgetops and shoulder slopes of this map unit is used for pasture, hay, and tobacco. The acreage on hillsides is in hardwood forests.

The soils on ridgetops and shoulder slopes of this map unit are suited to general farming. The hazard of erosion is the main limitation for cultivated crops, especially on the sloping and moderately steep soils.

The soils on ridgetops and shoulder slopes of this map unit have very high potential productivity for woodland. Plant competition is a management concern. The soils on hillsides have moderately high potential productivity for woodland, but the hazard of erosion, equipment limitations, and plant competition are management concerns.

Most of the soils in forested areas of this map unit are suited to use as woodland wildlife habitat.

The soils on ridgetops of this map unit are suited to most urban uses, and the soils on shoulder slopes to some. The soils on hillsides are poorly suited to urban uses because of steepness of slope.

3. McGary-Markland

Nearly level to steep, deep, somewhat poorly drained to well drained soils that have a clayey subsoil; on stream terraces

This map unit consists of an irregularly shaped area in the west-central part of Bullitt County. The landscape consists primarily of extensive slack water flats extending from the Salt and Rolling Fork Rivers, broken only by the wooded hills of the Knobs. The stream terraces are nearly level except for areas near the streams where they are sloping to steep. In addition to

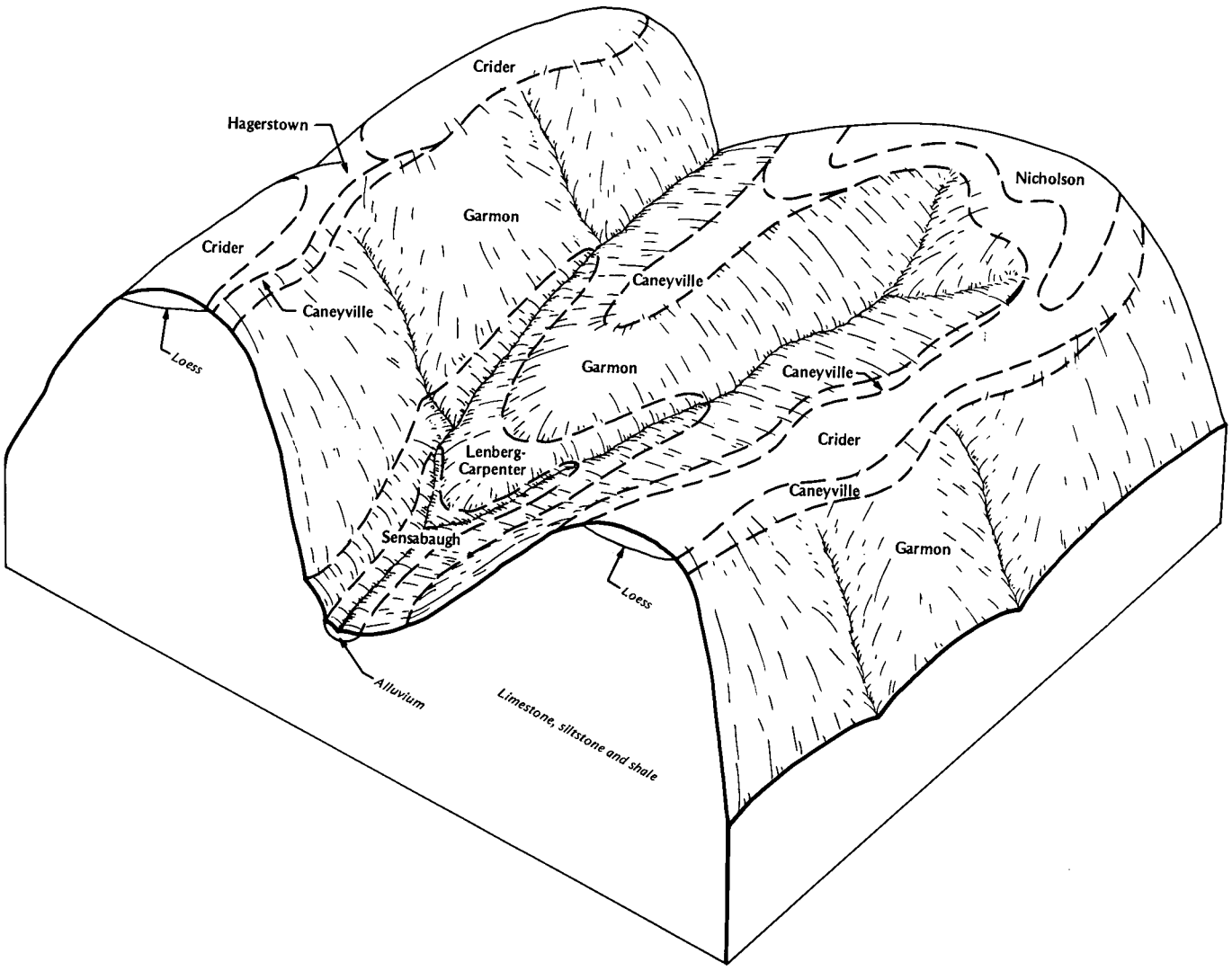


Figure 7.—The relationship of soils to topography and underlying material in the Garmon-Crider general soil map unit.

the Salt and Rolling Fork Rivers, several creeks and intermittent streams cross these flats. Several small commercial lakes used for recreation are also in this map unit.

This map unit makes up about 18 percent of Bullitt County. It is about 45 percent McGary soils, 22 percent Markland soils, and 33 percent soils of minor extent.

The McGary soils are deep and somewhat poorly drained. These nearly level soils are on broad stream terraces. The subsoil is clayey.

The Markland soils are deep and well drained to moderately well drained. These gently sloping to steep soils are on short side slopes below the McGary soils. The subsoil is clayey.

Of minor extent in this map unit are Newark, Nolin, Lawrence, Elk, and Otwell soils. Newark and Nolin soils are on flood plains. Lawrence, Elk, and Otwell soils are on stream terraces.

About half of the acreage of this map unit is in the Fort Knox Military Reservation. Most of the remaining acreage is in farms and is used primarily for hay and pasture.

Most of the soils in this map unit are poorly suited to cultivated crops. Wetness and the clayey texture are the main limitations. The soils in this map unit are suited to pasture and hay crops that will tolerate wetness. Most of the soils in this map unit are subject to rare flooding.

The soils in this map unit have high potential productivity for woodland. Plant competition is a management concern in the nearly level areas. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns in the sloping to steep areas.

The soils in this map unit are poorly suited to most urban uses. Wetness, the clayey texture, very slow and slow permeability, shrinking and swelling, and the hazard of flooding are the main limitations (fig. 8).

4. Trappist-Lenberg-Carpenter

Sloping to very steep, moderately deep and deep, well drained soils that have a clayey or loamy subsoil; on ridgetops and hillsides

This map unit consists of two discontinuous, irregularly shaped areas in north-central and southeastern Bullitt County. The landscape is conical shaped knobs connected by long, narrow ridges and steep to very steep hillsides and ridgetops (fig. 9). The outer and lower extremities of these ridges are sloping to moderately steep. These ridges and knobs are dissected by intermittent streams, and several creeks are in this map unit. A few small communities and scattered housing developments are the major structures in this map unit.

This map unit makes up about 23 percent of Bullitt County. It is about 23 percent Trappist soils, 23 percent

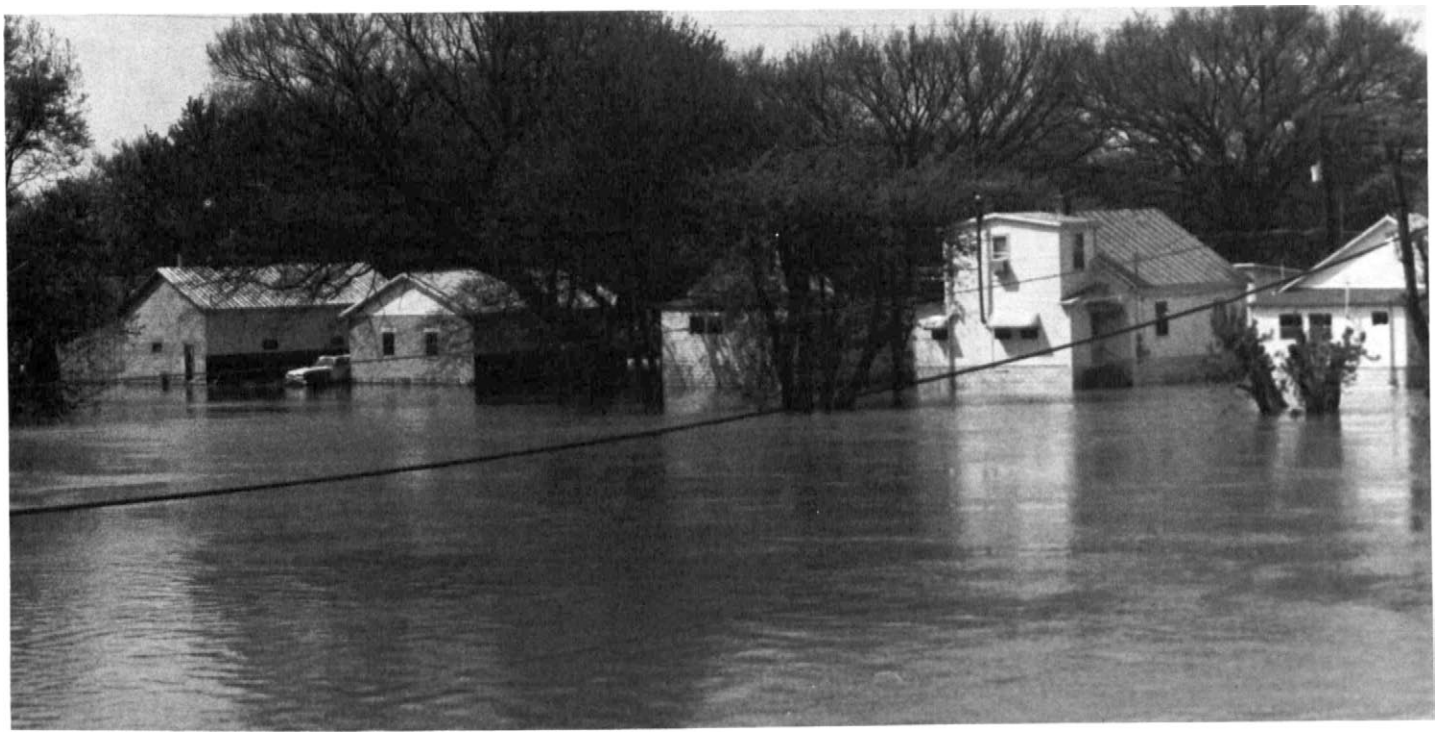


Figure 8.—Flooding is a hazard on areas of the McGary-Markland general soil map unit.

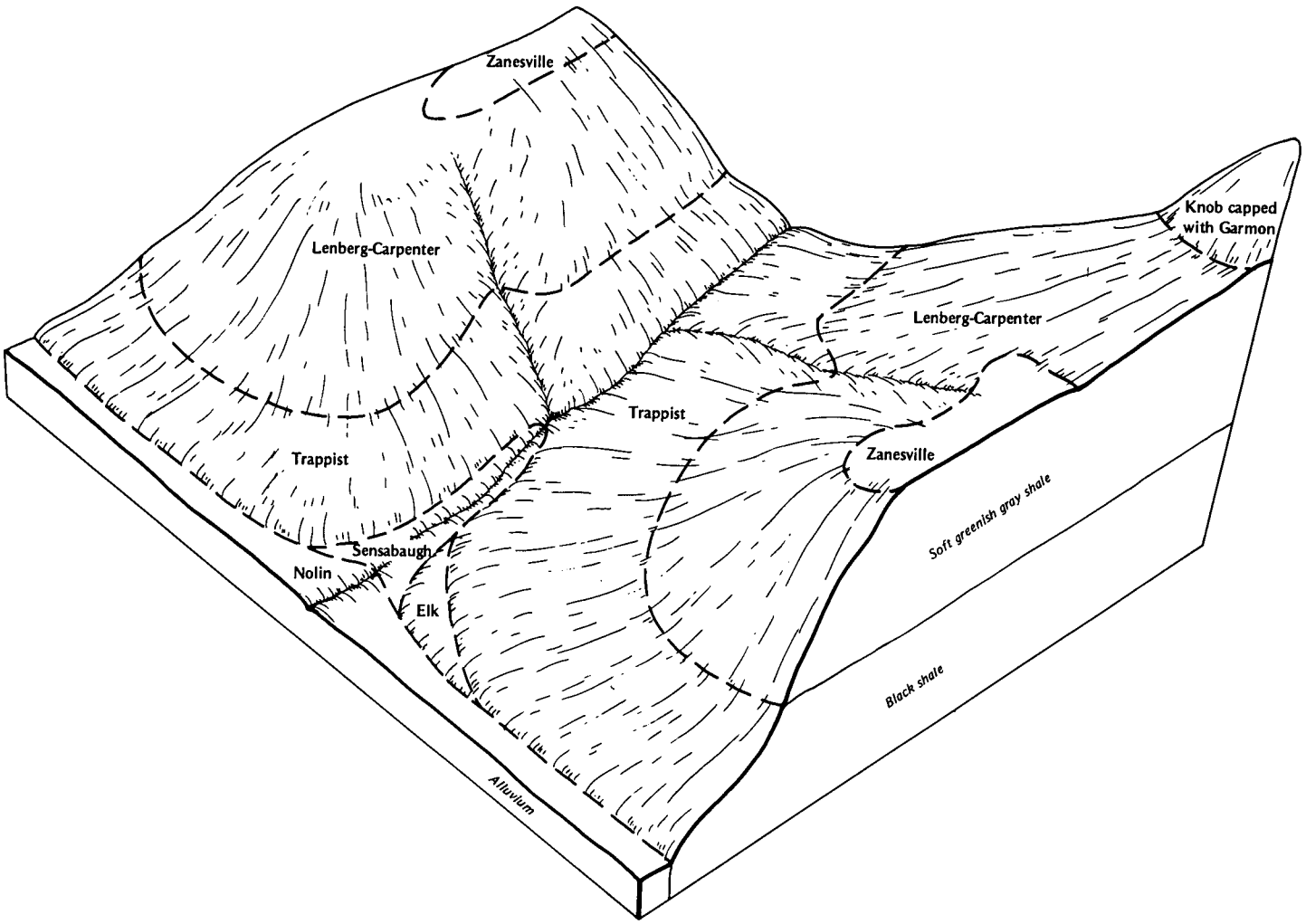


Figure 9.—The relationship of soils to topography and underlying material in the Trappist-Lenberg-Carpenter general soil map unit.

Lenberg soils, 22 percent Carpenter soils, and 32 percent soils of minor extent.

The Trappist soils are moderately deep and well drained. These sloping to steep soils are on hillsides and low ridges below the Lenberg and Carpenter soils. The subsoil is clayey and is underlain by black acid shale.

The steep to very steep Lenberg and Carpenter soils are in a complex pattern primarily on upper hillsides and ridgetops. The Lenberg soils are moderately deep and well drained. The subsoil is clayey and is underlain by soft greenish gray shale. Carpenter soils are deep and well drained. They are loamy throughout and are underlain by soft greenish gray shale. Siltstone fragments are common on the surface of the Lenberg and Carpenter soils.

Of minor extent in this map unit are Zanesville, Caneyville, Otwell, Elk, Newark, Sensabaugh, and Nolin soils. Zanesville soils are on ridgetops, and Caneyville soils are on hillsides. Otwell and Elk soils on stream terraces. Newark, Sensabaugh, and Nolin soils are on flood plains.

Most of the acreage of this map unit is used for hardwood forest. Bernheim Forest is in this map unit. Small acreages on the stream terraces and flood plains are in corn, tobacco, hay, and pasture.

Most of the soils in this map unit are poorly suited to cultivated crops because of steepness of slope. Some soils of minor extent on ridgetops, stream terraces, and flood plains are suited to cultivated crops, hay, and pasture.

The soils in this map unit have moderately high or moderate potential productivity for woodland. The hazard of erosion, equipment limitations, and plant competition are management concerns.

The soils in forested areas of this map unit are well suited to use as woodland wildlife habitat.

The soils in this map unit are poorly suited to most urban uses primarily because of the clayey texture, steepness of slope, moderately slow permeability, and danger of slippage in the unstable clay shales (fig. 10). Some of the soils of minor extent on stream terraces, which are not subject to flooding, and soils on ridgetops are suited to urban uses. Moderately slow permeability is a limitation in some areas.

5. Caneyville-Crider

Gently sloping to very steep, moderately deep and deep, well drained soils that have a clayey and loamy subsoil; on ridgetops and hillsides

This map unit consists of two discontinuous, irregularly shaped areas in northeastern and south-central Bullitt County. The landscape is broad, gently sloping to sloping ridgetops surrounded by sloping and moderately steep shoulder slopes above relatively short, moderately steep to very steep hillsides (fig. 11). The Floyds Fork and Salt River cross this map unit. Many small creeks and intermittent streams are in this area. The communities of Mount Washington and Hillview and many scattered residential developments are in this map unit.

This map unit makes up about 26 percent of Bullitt County. It is about 36 percent Caneyville soils, 30 percent Crider soils, and 34 percent soils of minor extent.

The Caneyville soils are moderately deep and well drained. These gently sloping to very steep soils are on narrow ridgetops, shoulder slopes, and hillsides. The subsoil is clayey.

The Crider soils are deep and well drained. These gently sloping to moderately steep soils are on broad ridgetops and shoulder slopes. They are loamy in the surface layer and upper part of the subsoil. The lower part of the subsoil is clayey. Some of the ridges in this map unit are karst.

Of minor extent in this map unit are Beasley, Nicholson, Woolper, Lawrence, Elk, and Nolin soils. Beasley and Nicholson soils are on ridgetops. Woolper soils are on foot slopes and are lower on hillsides than the Caneyville and Crider soils. Lawrence and Elk soils are on stream terraces, and Nolin soils are on flood plains.

Most of the acreage in this map unit is used for cultivated crops, hay, and pasture. A large acreage is in urban developments, particularly in the Mount Washington and Hillview areas. Some of the steeper areas are in woodland, pasture, and brush.

The gently sloping and sloping soils on ridgetops in this map unit are suited to cultivated crops. The moderate or severe hazard of erosion is a limitation. The strongly sloping soils on shoulder slopes are best suited to permanent pasture or hay.

The gently sloping to sloping soils on ridgetops and shoulder slopes in this map unit have moderately high to very high potential productivity for woodland. Plant competition is a management concern. The moderately steep to very steep soils on hillsides have moderate or moderately high potential productivity for woodland. The hazard of erosion, equipment limitations, and plant competition are management concerns. The moderately steep to steep soils on hillsides are best suited to woodland and to use as wildlife habitat.

Most of the gently sloping and sloping soils in this map unit are suited to urban uses. The moderately slow permeability of the subsoil and depth to bedrock are limitations in some areas. The moderately steep to very steep soils are poorly suited to urban uses. Steepness of slope and moderate and moderately slow permeability are limitations. Depth to bedrock and rock outcrops are also limitations in many areas.

6. Beasley-Faywood

Gently sloping to very steep, deep and moderately deep, well drained soils that have a clayey subsoil; on ridgetops and hillsides

This map unit consists of an irregularly shaped area in the eastern part of Bullitt County. The landscape is an undulating pattern of relatively narrow, gently sloping and sloping ridgetops, sloping and moderately steep shoulder slopes, and moderately steep to very steep hillsides (fig. 12). A few small creeks and many intermittent streams are in this map unit. Numerous embankment ponds dot the landscape. Many scattered residential developments are in this map unit.

This map unit makes up about 7 percent of Bullitt County. It is about 63 percent Beasley soils, 10 percent Faywood soils, and 27 percent soils of minor extent.

The Beasley soils are deep and well drained. These gently sloping to moderately steep soils are primarily on ridgetops and shoulder slopes, but they extend to steep hillsides. The subsoil is clayey and is underlain by soft weathered limestone and calcareous siltstone or shale.

The Faywood soils are moderately deep and well drained. These moderately steep to very steep soils are on hillsides. The subsoil is clayey and is underlain by hard limestone bedrock interbedded with thin layers of calcareous shale and siltstone.

Of minor extent in this map unit are Crider, Nicholson, Caneyville, Cynthiana, Fairmount, Boonesboro, and Nolin soils. Crider and Nicholson soils are on ridgetops. Caneyville, Cynthiana, and Fairmount soils are on shoulder slopes and hillsides, and the Boonesboro and Nolin soils are on flood plains.

Most of the acreage of this map unit is used for pasture and hay. A considerable acreage is in urban developments and housing sites. Some areas are in cultivated crops, and a few of the steeper areas are in woodland.

Figure 10.—In this area of the Trappist-Lenberg-Carpenter general soil map unit, slippage in the unstable shale underlying the Lenberg and Carpenter soils caused foundation failure in the paved ditch.

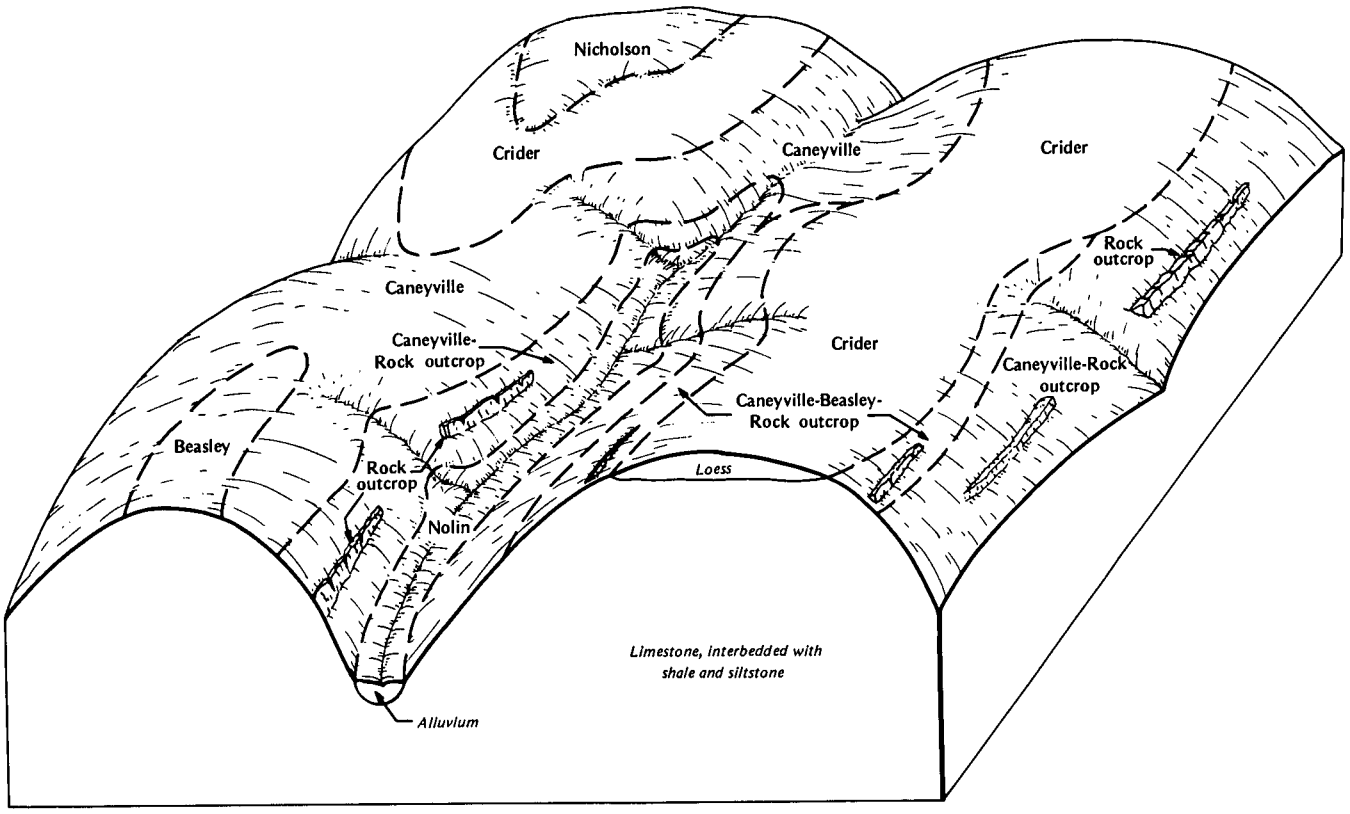


Figure 11.—The relationship of soils to topography and underlying material in the Caneyville-Crider general soil map unit.

Most of the soils in this map unit are suited to pasture and hay. The gently sloping and sloping soils on ridgetops and shoulder slopes are suited to cultivated crops, but the hazard of erosion on these soils is moderate or severe.

The soils in this map unit have moderately high to moderate potential productivity for woodland. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns. The steep and very steep soils are best suited to woodland and to use as wildlife habitat.

Most soils in this map unit are poorly suited to urban uses because of the steepness of slope, depth to bedrock, clayey texture, and the moderately slow and slow permeability. The gently sloping soils are suited to some urban uses.

7. Nolin-Lawrence-Newark

Nearly level, deep, well drained and somewhat poorly drained soils that are loamy throughout; on flood plains and low stream terraces

This map unit consists of a narrow, irregularly shaped area along the Salt River and Cox Creek in eastern Bullitt County. The landscape is nearly level flood plains and stream terraces extending from the streams to the adjacent steep hillsides and bluffs. A few scattered farmsteads are the most noticeable structures of this map unit.

This map unit makes up about 1 percent of Bullitt County. It is about 54 percent Nolin soils, 17 percent Lawrence soils, 10 percent Newark soils, and 19 percent soils of minor extent.

The Nolin soils are deep and well drained. These nearly level soils are on flood plains. They are loamy throughout.

The Lawrence soils are deep and somewhat poorly drained. These nearly level soils are on stream terraces. They have a compact and brittle fragipan at a depth of about 20 inches. Typically, the Lawrence soils are loamy throughout.

The Newark soils are deep and somewhat poorly drained. These nearly level soils are on flood plains and are loamy throughout.

Of minor extent in this map unit are Otwell, Elk, and Woolper soils. Otwell and Elk soils are on stream terraces. Woolper soils are on foot slopes.

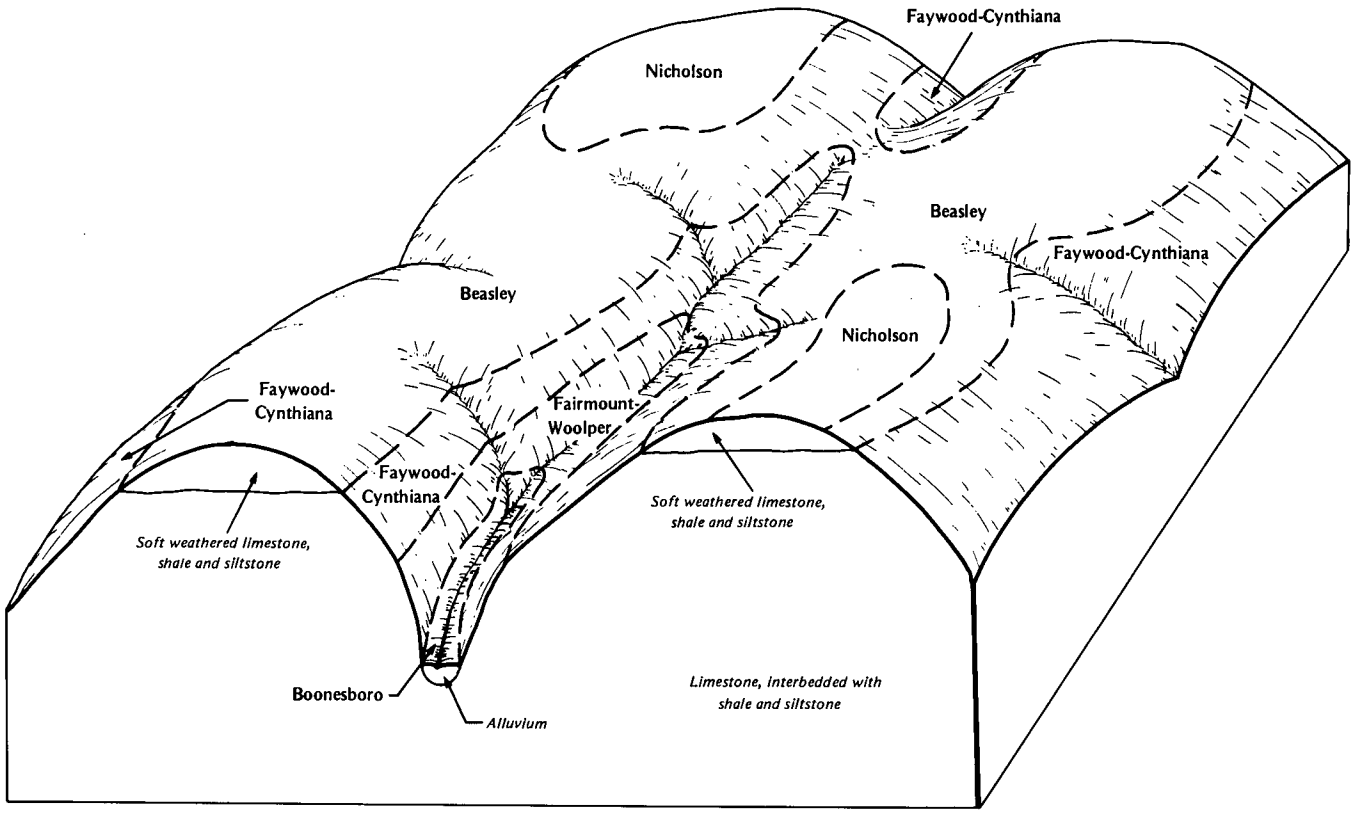


Figure 12.—The relationship of soils to topography and underlying material in the Beasley-Faywood general soil map unit.

Most of the acreage of this map unit is in cultivated crops, hay, and pasture. The cultivated crops are mainly corn and soybeans. Many of the wetter areas have been artificially drained.

Most of the soils in this map unit are suited to cultivated crops, although slow permeability and wetness are limitations in some areas. Some of the undrained, wetter areas are best suited to pasture and hay crops that tolerate wetness. Late in winter and early in spring, flooding is frequent on most areas of soils on flood plains. Soils on low stream terraces are rarely flooded.

The soils in this map unit have very high to high potential productivity for woodland. Equipment limitations and plant competition are management concerns.

Wetness and the hazard of flooding are the major limitations of the soils in this map unit for urban uses.

Soil Descriptions of Spencer County

1. Nolin-Lawrence-Newark

Nearly level, deep, well drained and somewhat poorly drained soils that are loamy throughout; on flood plains and stream terraces

This map unit consists of a small, irregularly shaped area along the Salt River and Dutchmans Creek in western Spencer County. The landscape is nearly level flood plains and stream terraces extending from the streams to the adjacent hillsides and bluffs. A few scattered farmsteads are the most noticeable structures in this map unit.

This map unit makes up about 1 percent of Spencer County. It is about 44 percent Nolin soils, 19 percent Lawrence soils, 16 percent Newark soils, and 21 percent soils of minor extent.

The Nolin soils are deep and well drained. These nearly level soils are on flood plains. They are loamy throughout.

The Lawrence soils are deep and somewhat poorly drained. These nearly level soils are on stream terraces. They have a compact and brittle fragipan at a depth of about 20 inches. Typically, the Lawrence soils are loamy throughout.

The Newark soils are deep and somewhat poorly drained. These nearly level soils are on flood plains and are loamy throughout.

Of minor extent in this map unit are McGary Variant, Elk, and Otwell soils. These soils are on stream terraces.

Most of the soils in this map unit are in cultivated crops, hay, and pasture. The cultivated crops are mainly corn and soybeans. Some of the soils have slow permeability, but many of the wetter soils have been artificially drained.

Most of the soils in this map unit are suited to cultivated crops. Some of the wetter areas that have not been drained are best suited to pasture and hay crops that tolerate wetness. Late in winter and early in spring, flooding is frequent on most areas of soils on flood plains. Soils on low stream terraces are rarely flooded.

The soils in this map unit have very high to high potential productivity for woodland. Equipment limitations and plant competition are management concerns.

The soils in this map unit are poorly suited to urban uses because of the hazard of flooding and wetness.

2. Beasley-Faywood

Gently sloping to very steep, deep and moderately deep, well drained soils that have a clayey subsoil; on ridgetops and hillsides

This map unit consists of an irregularly shaped area in the western part of Spencer County. The landscape is an undulating pattern of relatively narrow, gently sloping and sloping ridgetops, sloping and moderately steep shoulder slopes, and moderately steep to very steep hillsides (fig. 12). A few small creeks and many intermittent streams are in this map unit. Numerous embankment ponds dot the landscape. Many scattered residential developments are in this map unit.

This map unit makes up about 7 percent of Spencer County. It is about 38 percent Beasley soils, 36 percent Faywood soils, and 26 percent soils of minor extent.

The Beasley soils are deep and well drained. These gently sloping to moderately steep soils are on ridgetops, shoulder slopes, and hillsides. The subsoil is clayey and is underlain by soft weathered limestone and calcareous shale and siltstone.

The Faywood soils are moderately deep and well drained. These moderately steep to very steep soils are on hillsides. The subsoil is clayey and is underlain by hard limestone bedrock interbedded with thin layers of calcareous shale and siltstone.

Of minor extent in this map unit are Nicholson soils on ridgetops, Cynthiana and Fairmount soils on hillsides, Woolper soils on foot slopes, and Boonesboro and Nolin soils on flood plains.

Most of the acreage of this map unit is used for pasture and hay. Some acreage is in housing sites or cultivated crops. A few of the steeper areas are in woodland.

Most of the soils in this map unit are suited to pasture and hay crops. The gently sloping and sloping soils on ridgetops and shoulder slopes are suited to cultivated crops, but the hazard of erosion is moderate or severe.

The soils in this map unit have moderately high to moderate potential productivity for woodland. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns. The steep and very steep soils are best suited to woodland and to use as wildlife habitat.

Most soils in this map unit are poorly suited to urban uses. Steepness of slope, depth to bedrock, clayey texture, and the moderately slow and slow permeability in the subsoil are limitations. The gently sloping and sloping soils are suited to some urban uses.

3. Nolin-Elk-Newark

Nearly level to sloping, deep, well drained and somewhat poorly drained soils that are loamy throughout; on flood plains and stream terraces

This map unit consists of a narrow, irregularly shaped area along the Salt River and Brashears Creek in central Spencer County. The landscape is nearly level flood plains and nearly level to sloping stream terraces extending from the streams to the adjacent steep hillsides and bluffs (fig. 13). In some areas, there is a second level of stream terraces separated from the flood plain and low terraces by moderately steep hillsides. The community of Taylorsville and several scattered farmsteads are within this map unit.

This map unit makes up about 8 percent of Spencer County. It is about 30 percent Nolin soils, 22 percent Elk soils, 19 percent Newark soils, and 29 percent soils of minor extent.

The Nolin soils are deep and well drained. These nearly level soils are on flood plains. They are loamy throughout.

The Elk soils are deep and well drained. These nearly level to sloping soils are on low and high stream terraces. They are loamy throughout.

The Newark soils are deep and somewhat poorly drained. These nearly level soils are on flood plains and are loamy throughout.

Of minor extent in this map unit are Otwell, McGary Variant, Lawrence, and Eden soils. Otwell, McGary Variant, and Lawrence soils are on stream terraces. Eden soils are on intermediate side slopes between the low and high stream terraces.

Most of the acreage of this map unit is used for cultivated crops, mainly corn, soybeans, and tobacco. Some areas are in hay and pasture. A few areas are in urban developments.

Most of the soils in this map unit are well suited to cultivated crops. Soils in some areas have moderate permeability. Unless artificially drained, some of the wetter soils are best suited to pasture and hay crops that tolerate wetness. Late in winter and early in spring, flooding is frequent on soils on flood plains and occasional on most of the soils on low stream terraces.

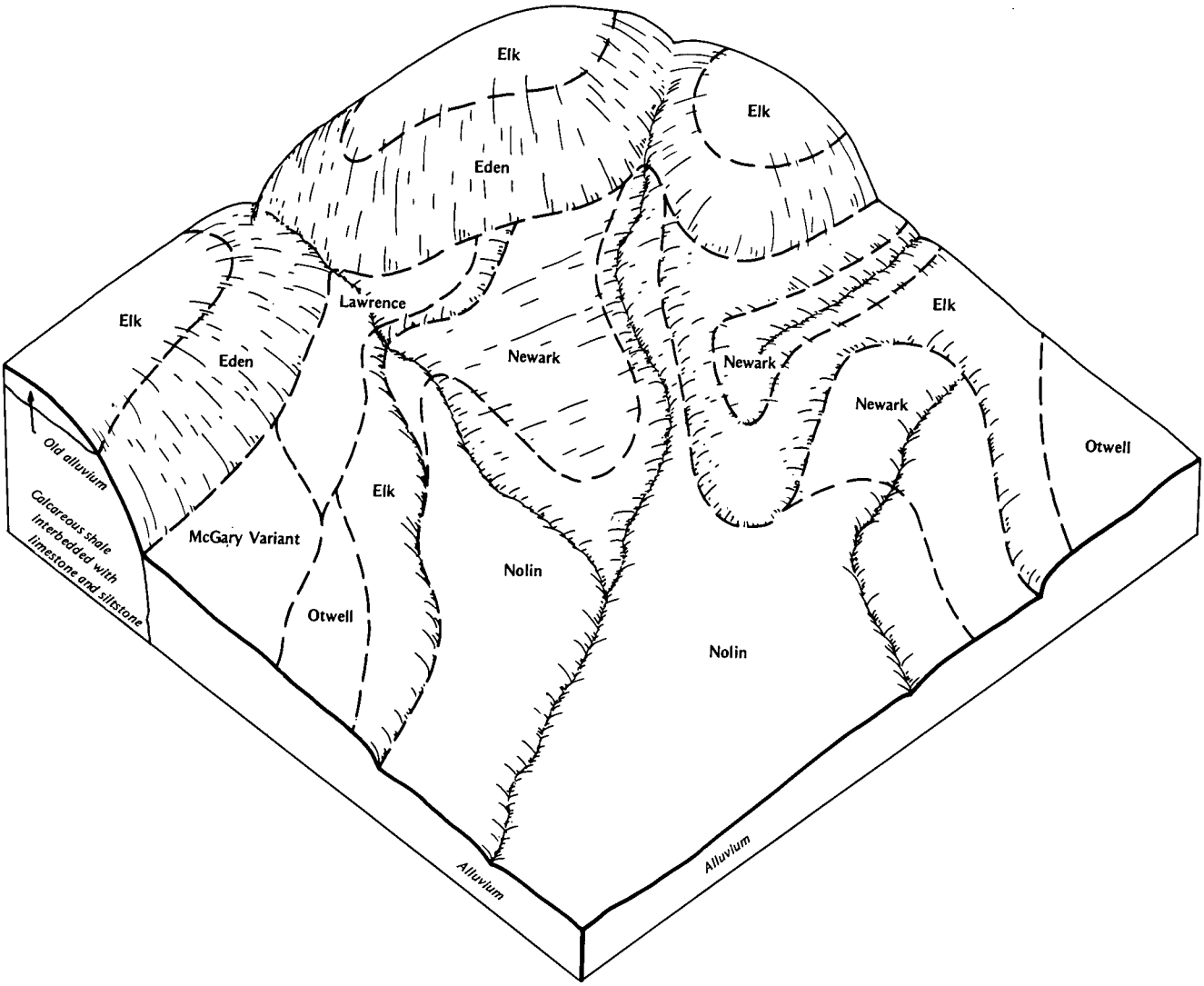


Figure 13.—The relationship of soils to topography and underlying material in the Nolin-Elk-Newark general soil map unit.

The soils in this map unit have very high to high potential productivity for woodland. Equipment limitations and plant competition are management concerns.

Most soils in this map unit that are not subject to flooding are suited to urban uses. Areas subject to flooding are not suited to urban uses.

4. Faywood-Lowell

Very steep to gently sloping, moderately deep and deep, well drained soils that have a clayey subsoil; on ridgetops and hillsides

This map unit consists of a large, irregularly shaped area in the central and south-central parts of Spencer County. The landscape is an undulating pattern of relatively broad to narrow, gently sloping to moderately steep ridgetops, shoulder slopes, and moderately steep to very steep hillsides (fig. 14). Salt River crosses the central part of this map unit. Many small creeks and intermittent streams are in the area. Numerous small embankment ponds dot the landscape. A few small communities and scattered farmsteads are in this map unit.

This map unit makes up about 54 percent of Spencer County. It is about 39 percent Faywood soils, 34 percent Lowell soils, and 27 percent soils of minor extent.

The Faywood soils are moderately deep and well drained. These sloping to very steep soils are primarily on ridgetops and shoulder slopes but extend to hillsides.

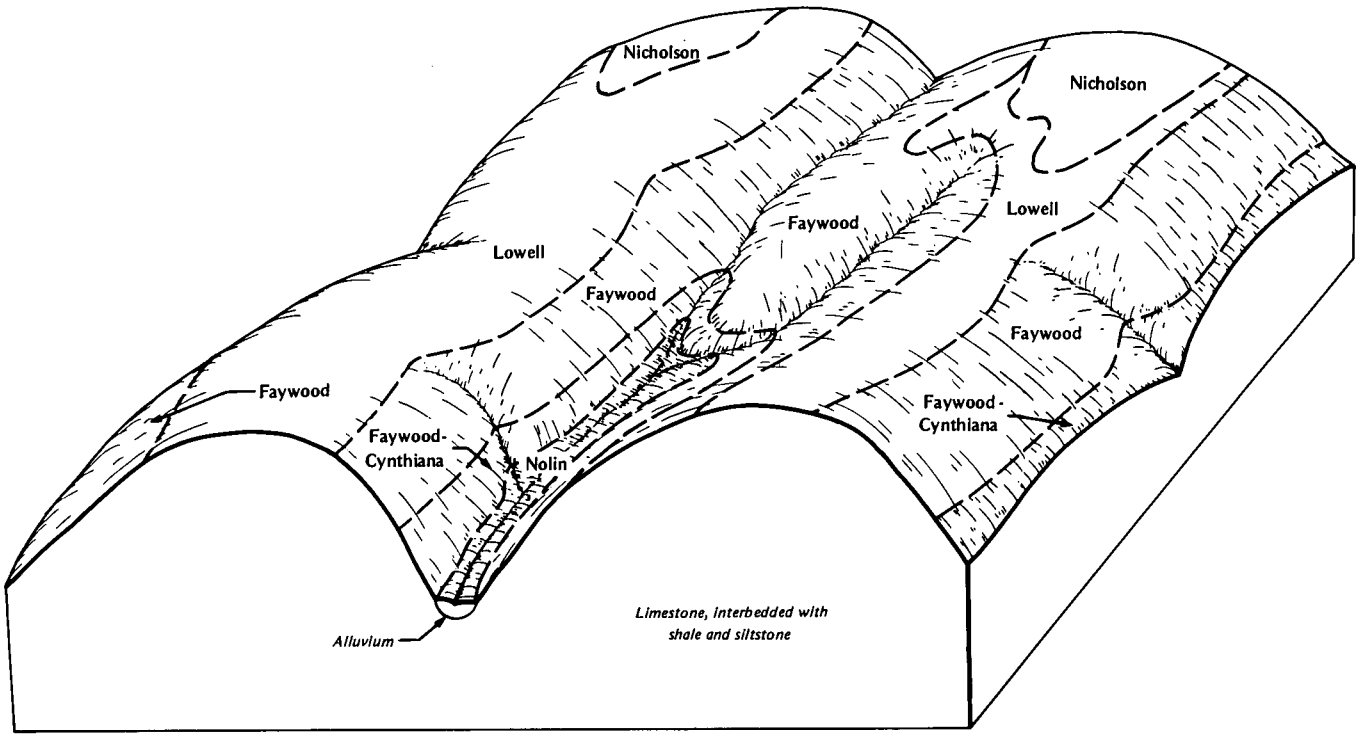


Figure 14.—The relationship of soils to topography and underlying material in the Faywood-Lowell general soil map unit.

They are usually on lower elevations than the Lowell soils. The subsoil is clayey.

The Lowell soils are deep and well drained. These gently sloping to sloping soils are on ridgetops and shoulder slopes. The subsoil is clayey. The Faywood and Lowell soils are underlain by limestone interbedded with thin layers of calcareous shale and siltstone.

Of minor extent in this map unit are Nicholson, Cynthiana, Fairmount, Elk, Otwell, Woolper, Boonesboro, and Nolin soils. Nicholson soils are on ridgetops. Cynthiana and Fairmount soils are on hillsides. Elk and Otwell soils are on stream terraces. Woolper soils are on foot slopes, and Boonesboro and Nolin soils are on flood plains.

Most of the acreage of this map unit on ridgetops and shoulder slopes is used for pasture, hay, and cultivated crops. The acreage on hillsides is generally in pasture or woodland.

The soils on ridgetops and shoulder slopes in this map unit are suited to cultivated crops, but the hazard of erosion is moderate or severe. The soils on hillsides are best suited to pasture, hay, or woodland.

The soils in this map unit have moderately high to high potential productivity for woodland. The hazard of erosion, equipment limitations, and plant competition are management concerns.

The gently sloping soils in this map unit are suited to most urban uses. Moderately slow and slow permeability of the subsoil, the clayey texture, shrinking and swelling, and depth to bedrock are limitations. The steeper soils are poorly suited to urban uses.

5. Eden

Steep to sloping, moderately deep, well drained, flaggy soils that have a clayey subsoil; on hillsides and narrow ridgetops

This map unit consists of a large, irregularly shaped area in the eastern part of Spencer County. The landscape is a highly dissected area of narrow, sloping to moderately steep ridgetops and shoulder slopes and steep hillsides. Taylorsville Lake and many creeks and intermittent streams are in this map unit. Numerous hillside and embankment ponds dot the area. A few small communities and several scattered farmsteads are in this map unit.

This map unit makes up about 30 percent of Spencer County. It is about 70 percent Eden soils and 30 percent soils of minor extent.

The Eden soils are moderately deep and well drained. These sloping to steep soils are on hillsides, ridgetops, and shoulder slopes. The subsoil is clayey. Typically, the Eden soils have limestone fragments throughout. They

are underlain by interbedded calcareous shale, siltstone, and limestone.

Of minor extent in this map unit are Lowell, Faywood, Nicholson, Boonesboro, and Nolin soils. The Lowell, Faywood, and Nicholson soils are on ridgetops, and the Boonesboro and Nolin soils are on flood plains.

Most of the acreage of this map unit is in woods or brush, although a large acreage is used for pasture. The acreage of soils of minor extent is used primarily for pasture, hay, and burley tobacco.

Most of the soils in this map unit are poorly suited to farming because of the steepness of slopes. Some of the smoother areas of soils are suited to pasture and hay, but suitable grasses and legumes are difficult to maintain.

The soils in this map unit have moderately high to moderate potential productivity for woodland. The hazard of erosion, equipment limitations, and seedling mortality are the major management concerns.

The forested areas of soils in this map unit are suited to use as woodland wildlife habitat.

The soils in this map unit are poorly suited to most urban uses. Steepness of slope, the clayey texture, slow permeability, and shrinking and swelling are the main limitations.

Detailed Soil Map Units

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

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Beasley silt loam, 6 to 12 percent slopes, is one of several phases in the Beasley series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Faywood-Cynthiana complex, 12 to 30 percent slopes, is an example.

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

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits is an example. Miscellaneous areas are shown on the soil maps.

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

BeB—Beasley silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on smooth, slightly convex ridgetops mainly in the central part of the survey area. Slopes are about 75 to 200 feet in length, and the mapped areas range from about 3 to 70 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil, to a depth of about 28 inches, is strong brown silty clay. The underlying material, to a depth of about 48 inches, is yellowish brown clay. Soft calcareous bedrock is at a depth of about 48 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, the soil is very strongly acid to neutral in the surface layer and upper part of the subsoil, medium acid to moderately alkaline in the lower part of the subsoil, and neutral to moderately alkaline in the underlying material. Permeability is moderately slow, and the available water capacity is high. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Caneyville, Crider, Lowell, and Nicholson soils. Also included are small areas of eroded soils that have a silty clay loam surface layer.

Most areas of this Beasley soil are used for pasture and hay. Some areas are in cultivated crops or are used for homesites.

This soil is suited to most cultivated crops. Crops respond well to applications of fertilizer and lime. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the

cropping system help to control erosion and to maintain good tilth.

This soil is well suited to pasture and hay and produces high yields if properly managed. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. Preferred trees are black oak, chestnut oak, white ash, and white oak. Equipment limitations and plant competition are management concerns.

This soil is suited to some urban uses. Moderately slow permeability and the clayey texture and moderate shrink-swell potential are limitations for most building site developments. Low strength limits use of this soil for local roads and streets and as roadfill material.

This Beasley soil is in capability subclass IIe and in woodland suitability group 3c.

BeC—Beasley silt loam, 6 to 12 percent slopes, eroded. This deep, well drained, sloping soil is on convex ridgetops and shoulder slopes mainly in the central part of the survey area. Slopes are about 150 to 500 feet in length, and the mapped areas range from about 5 to 150 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil, to a depth of about 26 inches, is strong brown silty clay. The underlying material, to a depth of about 46 inches, is yellowish brown clay. Soft calcareous bedrock is at a depth of about 46 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil is very strongly acid to neutral in the surface layer and upper part of the subsoil, medium acid to moderately alkaline in the lower part of the subsoil, and neutral to moderately alkaline in the underlying material. Permeability is moderately slow, and the available water capacity is high. This soil has good tilth except in spots where erosion has exposed the subsoil material. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Caneyville, Crider, Faywood, and Lowell soils. Areas of soils similar to Beasley soil but less than 40 inches deep to bedrock, and a few areas of severely eroded soils that have a surface layer of strong brown silty clay loam are also included.

Most of this Beasley soil is used for pasture and hay. Some areas are in cultivated crops, homesites, or subdivisions.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. Response of crops to applications of fertilizer and lime is fair. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and the inclusion of grasses and legumes in the cropping system help to control further erosion and to maintain good tilth.

This soil is well suited to pasture and hay and produces moderate yields if properly managed. Plants that provide satisfactory ground cover can help prevent further erosion. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. Preferred trees are black oak, chestnut oak, white ash, and white oak. Equipment limitations and plant competition are management concerns.

This soil is suited to some urban uses. Moderately slow permeability, the clayey texture, and steepness of slope are limitations for sanitary facilities. The clayey texture, steepness of slope, and moderate shrink-swell potential are limitations for most building site developments. Low strength limits use of the soil for local roads and streets and as roadfill material.

This Beasley soil is in capability subclass IIIe and in woodland suitability group 3c.

BeD—Beasley silt loam, 12 to 20 percent slopes, eroded. This deep, well drained, moderately steep soil is on complex hillsides mainly in the central part of the survey area. Slopes are about 100 to 300 feet in length, and the mapped areas range from about 3 to 100 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil, to a depth of about 26 inches, is strong brown silty clay. The underlying material, to a depth of about 46 inches, is yellowish brown clay. Soft calcareous bedrock is at a depth of about 46 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, the soil is very strongly acid to neutral in the surface layer and upper part of the subsoil, medium acid to moderately alkaline in the lower part of the subsoil, and neutral to moderately alkaline in the underlying material. Permeability is moderately slow, and the available water capacity is high. This soil has good tilth except in spots where erosion has exposed the subsoil material. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Caneyville, Crider, Faywood, and Lowell soils. Areas of soils similar to Beasley soil but less than 40 inches deep to bedrock and areas of severely eroded soils that have a surface layer of brown and strong brown silty clay loam are also included.

Most of this Beasley soil is used for pasture and hay. Some areas are in woodland or homesites.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. Response of crops to

applications of fertilizer and lime is fair. If this soil is cultivated, the hazard of erosion is very severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control further erosion and to maintain good tilth.

This soil is suited to pasture and hay and produces moderate yields if properly managed. Plants that provide satisfactory ground cover can help to prevent further erosion. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are black oak, chestnut oak, white oak, and white ash. The hazard of erosion, equipment limitations, and plant competition are management concerns.

This soil is poorly suited to most urban uses. Moderately slow permeability, the clayey texture, and steepness of slope are limitations for sanitary facilities. Steepness of slopes is the greatest limitation for most building site developments. Low strength limits use of the soil for local roads and streets and as roadfill material.

This Beasley soil is in capability subclass IVe and in woodland suitability group 3c.

BfC3—Beasley silty clay loam, 6 to 12 percent slopes, severly eroded. This deep, well drained sloping soil is on convex ridgetops and shoulder slopes mainly in the central part of the survey area. Slopes are about 150 to 500 feet in length, and the mapped areas range from about 3 to 150 acres. Erosion has removed most of the original surface layer and, in places, some of the subsoil. Some areas have rills and shallow gullies.

Typically, the surface layer is brown silty clay loam about 5 inches thick. The subsoil, to a depth of about 21 inches, is strong brown silty clay. The underlying material, to a depth of about 41 inches, is yellowish brown clay. Soft calcareous bedrock is at a depth of about 41 inches.

This soil is low in natural fertility and organic matter content. Except where the surface layer has been limed, the soil is very strongly acid to neutral in the surface layer and upper part of the subsoil, medium acid to moderately alkaline in the lower part of the subsoil, and neutral to moderately alkaline in the underlying material. Permeability is moderately slow, and the available water capacity is high. This soil is somewhat difficult to till because the surface layer consists mostly of subsoil material. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Caneyville, Crider, Lowell, and Faywood soils. Areas of soils similar to Beasley soil but less than 40 inches deep to bedrock and small areas of less eroded soils that have a surface layer of brown silt loam are also included.

Most of this Beasley soil is used for pasture and hay. Some small tracts are used for homesites, and a few areas are idle.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. Most of the original surface layer has been removed by erosion. Response of crops to applications of fertilizer and lime is fair. If this soil is cultivated, the hazard of erosion is very severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control further erosion.

This soil is suited to hay and pasture, and moderate yields can be obtained if good management practices are used. Vegetation is somewhat difficult to establish since erosion has removed most of the original surface layer. The desired plants need to be maintained through the application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control.

This soil has moderate potential productivity for woodland. Preferred trees are black oak, chestnut oak, white oak, Virginia pine, and eastern red cedar. Equipment limitations and seedling mortality are management concerns.

This soil is suited to some urban uses. Moderately slow permeability, the clayey texture, and steepness of slope are limitations for sanitary facilities. The clayey texture, steepness of slope, and moderate shrink-swell potential are limitations for most building site developments. Low strength limits use of the soil for local roads and streets and as roadfill material.

This Beasley soil is in capability subclass IVe and in woodland suitability group 4c.

BfD3—Beasley silty clay loam, 12 to 20 percent slopes, severely eroded. This deep, well drained, moderately steep soil is on complex hillsides mainly in the central part of the survey area. Slopes are about 100 to 300 feet in length, and the mapped areas range from about 3 to 320 acres. Erosion has removed most of the original surface layer and, in places, some of the subsoil. Some areas have rills and shallow gullies.

Typically, the surface layer is brown silty clay loam about 5 inches thick. The subsoil, to a depth of about 21 inches, is strong brown silty clay. The underlying material, to a depth of about 41 inches, is yellowish brown clay. Soft calcareous bedrock is at a depth of about 41 inches.

This soil is low in natural fertility and organic matter content. Except where the surface layer has been limed, the soil is very strongly acid to neutral in the surface layer and upper part of the subsoil, medium acid to moderately alkaline in the lower part of the subsoil, and neutral to moderately alkaline in the underlying material. Permeability is moderately slow, and the available water

capacity is high. This soil is somewhat difficult to till because the surface layer consists mostly of subsoil material. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Caneyville, Crider, Lowell, and Faywood soils. Areas of soils similar to Beasley soil but less than 40 inches deep to bedrock and small areas of less eroded soils that have a surface layer of brown silt loam are also included.

Most of this Beasley soil is used for pasture. Some areas are in woodland or are idle and are being revegetated naturally. Some small tracts are used for homesites.

This soil is poorly suited to cultivated crops. Past erosion and the very severe hazard of erosion are the main limitations.

This soil is suited to pasture and hay. It requires good management to prevent further erosion. Plants that provide adequate ground cover can help to prevent further erosion. The desired plants need to be maintained through renovation, the application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control.

This soil has moderate potential productivity for woodland. Preferred trees are black oak, chestnut oak, white oak, Virginia pine, and eastern red cedar. The hazard of erosion, equipment limitations, and seedling mortality are management concerns.

This soil is poorly suited to most urban uses. Moderately slow permeability, the clayey texture, and steepness of slope are limitations for sanitary facilities. Steepness of slope is the greatest limitation for most building site developments. Low strength limits use of the soil for local roads and streets and as roadfill material.

This Beasley soil is in capability subclass VIe and in woodland suitability group 4c.

Bo—Boonesboro silt loam, frequently flooded. This moderately deep, well drained, nearly level soil is on flood plains of the smaller streams in the narrow valleys. The mapped areas are about 8 to 80 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is dark brown silt loam about 12 inches thick. The subsoil extends to a depth of 28 inches. It is dark yellowish brown gravelly silt loam in the upper part and dark yellowish brown very gravelly loam in the lower part. Limestone bedrock is at a depth of 28 inches.

This soil is high in natural fertility and moderate in organic matter content. It ranges from slightly acid to mildly alkaline throughout. Permeability is moderate in the surface layer and rapid in the subsoil. The available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. This soil is subject to frequent flooding for brief periods usually from late in winter to early in spring.

Included with this soil in mapping are small areas of Newark, Nolin, and Woolper soils. Also included are some areas of soils that do not have a dark surface layer and soils that have slopes of 2 to 4 percent.

This Boonesboro soil is used mostly for hay and pasture. A few areas are in row crops or woodland.

This soil is suited to cultivated crops and produces high yields in most seasons if properly managed. Conservation tillage, return of crop residue to the soil, use of cover crops, and proper fertilization help to maintain desirable soil structure and organic matter content. Small grain cover crops are sometimes damaged by winter flooding.

This soil is well suited to pasture and hay. Some hay crops may be damaged by flooding. Maintenance of desired plants through frequent renovation, proper stocking rates, application of fertilizer, and weed control is needed.

This soil has very high potential productivity for woodland. The preferred trees are black walnut, eastern cottonwood, black oak, white oak, yellow-poplar, white ash, eastern white pine, shortleaf pine, and sweetgum. Plant competition is a management concern.

This soil is poorly suited to most urban uses. The hazard of flooding and depth to rock are the main limitations.

This Boonesboro soil is in capability subclass IIs and in woodland suitability group 1o.

CaB—Caneyville silt loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on convex ridgetops mainly in the eastern part of Bullitt County. Slopes are about 75 to 300 feet in length, and the mapped areas are about 5 to 80 acres. Some areas are karst.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil, to a depth of 23 inches, is yellowish red silty clay loam and silty clay and, to a depth of 35 inches, is yellowish red clay that has pale brown and light gray mottles. Limestone bedrock is at a depth of 35 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, the soil ranges from neutral to very strongly acid in the surface layer and upper part of the subsoil and from medium acid to mildly alkaline in the lower part of the subsoil. Permeability is moderately slow, and the available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Beasley, Crider, Hagerstown and Trappist soils.

Most of this Caneyville soil is used for pasture and hay. Some areas are in row crops or residential and urban developments.

This soil is suited to most cultivated crops. Crops respond well to applications of fertilizer and lime. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain good tilth.

This soil is suited to most pasture and hay crops. Moderate yields can be obtained by using good management practices. The desired plants should be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and control of undesirable vegetation are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are black oak, white oak, eastern white pine, northern red oak, and white ash. Equipment limitations and plant competition are management concerns.

This soil is suited to some urban uses. Depth to bedrock, the clayey texture, and moderately slow permeability are limitations for most sanitary facilities. Depth to bedrock and moderate shrink-swell potential are limitations for most building site developments. Low strength limits use of the soil for local roads and streets and as roadfill material.

This Caneyville soil is in capability subclass IIe and in woodland suitability group 3c.

CaC—Caneyville silt loam, 6 to 12 percent slopes, eroded. This moderately deep, well drained, sloping soil is on convex ridgetops and shoulder slopes mainly in the eastern part of Bullitt County. Slopes are 75 to 300 feet in length, and the mapped areas range from about 3 to 130 acres. Some areas are karst. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil, to a depth of 21 inches, is yellowish red silty clay loam in the upper part and yellowish red silty clay in the lower part. To a depth of 33 inches, it is yellowish red clay that has pale brown and light gray mottles. Limestone bedrock is at a depth of 33 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, the soil is very strongly acid to neutral in the surface layer and upper part of the subsoil and medium acid to mildly alkaline in the lower part of the subsoil. Permeability is moderately slow, and the available water capacity is moderate. This soil has good tilth except in spots where erosion has exposed the subsoil material. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Beasley, Crider, and Hagerstown soils, and an area of soils similar to Caneyville soil but less than 20 inches deep to limestone bedrock. Also included are a few areas of severely eroded soils that have a surface layer of yellowish red silty clay loam.

Most of this soil is used for pasture and hay. A small acreage is in row crops. Some areas are used for residential and urban developments.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. Response of crops to applications of lime and fertilizer is fair. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control further erosion and to maintain good tilth.

This soil is well suited to pasture and hay and produces moderate yields if properly managed. Plants that provide satisfactory ground cover can help to prevent further erosion. The desired plants should be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and control of undesirable plants are needed.

This soil has moderately high potential productivity for woodland. Preferred trees are white oak, northern red oak, eastern white pine, and white ash. Equipment limitations and plant competition are management concerns.

This soil is poorly suited to most urban uses. Moderately slow permeability, depth to bedrock, and the clayey texture are limitations for sanitary facilities. Depth to bedrock, steepness of slope, and moderate shrink-swell potential are limitations for most building site developments. Low strength limits use of the soil for local roads and streets and as roadfill material.

This Caneyville soil is in capability subclass IVe and in woodland suitability group 3c.

CbD—Caneyville-Beasley-Rock outcrop complex, 12 to 30 percent slopes. These moderately deep and deep, well drained, moderately steep and steep soils and Rock outcrop are on hillsides mainly in the north-central part of Bullitt County. The Caneyville and Beasley soils and Rock outcrop were mapped together as a complex because they are in patterns that make separation impractical at the scale selected for mapping. Generally, the Caneyville soil is on upper slopes, the Beasley soil is on middle and lower slopes, and Rock outcrop is on upper and middle slopes. Slopes are about 200 to 400 feet in length, and the mapped areas are about 30 to 300 acres.

The Caneyville soil and other closely related soils that are underlain by hard limestone bedrock make up about 43 percent of this complex. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil, to a depth of 21 inches, is yellowish red silty clay loam and

silty clay. To a depth of 33 inches, it is yellowish red clay that has pale brown and light gray mottles. Limestone bedrock is at a depth of 33 inches.

The Caneyville soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to very strongly acid in the surface layer and upper part of the subsoil and from medium acid to mildly alkaline in the lower part of the subsoil. Permeability is moderately slow, and the available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential.

The Beasley soil and other closely related soils that are underlain by soft calcareous bedrock make up about 28 percent of this complex. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil, to a depth of about 26 inches, is strong brown silty clay. The underlying material, to a depth of about 46 inches, is yellowish brown clay. Soft calcareous bedrock is at a depth of about 46 inches.

The Beasley soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil is very strongly acid to neutral in the surface layer and upper part of the subsoil, medium acid to moderately alkaline in the lower part of the subsoil, and neutral to moderately alkaline in the underlying material. Permeability is moderately slow, and the available water capacity is high. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Rock outcrop makes up about 16 percent of this complex. Typically, it is exposed limestone bedrock scattered throughout the map unit; it is most common on the upper and middle slopes. The outcrop generally parallels the slopes. In some areas, flagstones and boulders are also on the surface.

Included with this complex in mapping are small areas of Boonesboro, Woolper, and Faywood soils. Also included are some areas of severly eroded soils. The included soils make up about 13 percent of this complex.

Most of the acreage in this complex is in woodland. A few areas of moderately steep soil are used for pasture. Some small tracts are in housing developments.

This complex is not suited to cultivated crops and is poorly suited to pasture and hay. Steepness of slope and Rock outcrop are the main limitations.

The Caneyville soil has moderately high potential productivity for woodland on north-facing slopes and moderate potential productivity on south-facing slopes. Preferred trees on north-facing slopes are white oak, yellow-poplar, white ash, and eastern white pine. Virginia pine and red cedar are preferred trees on south-facing slopes. The Beasley soil has moderately high potential productivity for woodland. Preferred trees are black oak, chestnut oak, white oak, and white ash. The hazard of erosion and equipment limitations are management concerns.

The Caneyville and Beasley soils are well suited to use as woodland wildlife habitat.

This complex is poorly suited to most urban uses. Steepness of slope, Rock outcrop, the clayey texture, and moderately slow permeability are the main limitations.

The Caneyville and Beasley soils are in capability subclass VIe. Rock outcrop is in capability subclass VIIIs. The Caneyville soil is in woodland suitability group 3c on north aspects and 4c on south aspects. The Beasley soil is in woodland suitability group 3c. Rock outcrop is not assigned to a woodland suitability group.

CnD—Caneyville-Rock outcrop complex, 6 to 20 percent slopes. This moderately deep, well drained, sloping to moderately steep soil and Rock outcrop are on shoulder slopes and hillsides along the Salt River and Floyds Fork and their tributaries in Bullitt County. The Caneyville soil and Rock outcrop were mapped together as a complex because they are intermingled in patterns that make separation impractical at the scale selected for mapping. Slopes are about 150 to 400 feet in length, and the mapped areas are about 10 to 300 acres.

The Caneyville soil and other closely related soils make up about 60 percent of this complex. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of 21 inches is yellowish red silty clay loam and silty clay and to a depth of 33 inches is yellowish red clay that has pale brown and light gray mottles. Limestone bedrock is at a depth of 33 inches.

The Caneyville soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to very strongly acid in the surface layer and upper part of the subsoil and from medium acid to mildly alkaline in the lower part of the subsoil. Permeability is moderately slow, and the available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Rock outcrop makes up about 20 percent of this complex. Typically, it is exposed limestone bedrock scattered throughout the map unit. The outcrop generally parallels the slopes. In some areas, the outcrop occurs as flagstones and boulders are also on the surface.

Included with this complex in mapping are small areas of Beasley, Faywood, Hagerstown, and Woolper soils. Also included are some areas of severely eroded soils. The included soils make up about 20 percent of this complex.

Most of the acreage in this complex is in woodland. Some areas on shoulder slopes are in pasture. A few areas are in housing developments.

This complex is not suited to cultivated crops and is poorly suited to pasture and hay. Steepness of slope and Rock outcrop are the main limitations. When it is used for pasture, maintenance of the desired grasses and legumes is severely restricted. Plants need to be

selected that do not require frequent renovation and that provide adequate ground cover. Stocking rates need to be adjusted to prevent overgrazing.

The Caneyville soil has moderately high potential productivity for woodland on north-facing slopes and moderate potential productivity on south-facing slopes. The preferred trees on north-facing slopes are white oak, eastern white pine, yellow-poplar, and white ash. Virginia pine and eastern red cedar are preferred trees on south-facing slopes. The hazard of erosion equipment limitations, and seedling mortality are management concerns.

The Caneyville soil is well suited to use as woodland wildlife habitat.

This complex is poorly suited to most urban uses. Steepness of slope, Rock outcrop, depth to bedrock, the clayey texture, and moderately slow permeability are the main limitations.

The Caneyville soil is in capability subclass VIs. Rock outcrop is in capability subclass VIIIs. The Caneyville soil is in woodland suitability group 3x on north aspects and 4x on south aspects. Rock outcrop is not assigned to a woodland suitability group.

CnE—Caneyville-Rock outcrop complex, 20 to 40 percent slopes. This moderately deep, well drained, steep and very steep soil and Rock outcrop are on hillsides and bluffs along the Salt River and Floyds Fork and their tributaries in Bullitt County. The Caneyville soil and Rock outcrop were mapped together as a complex because they are in patterns that make separation impractical at the scale selected for mapping. Slopes are about 200 to 300 feet in length, and the mapped areas are about 40 to 400 acres.

The Caneyville soil and other closely related soils make up about 58 percent of this complex. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of 21 inches is yellowish red silty clay loam and silty clay and to a depth of 33 inches is yellowish red silty clay and clay that has pale brown and light gray mottles. Limestone bedrock is at a depth of 33 inches.

The Caneyville soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to very strongly acid in the surface layer and upper part of the subsoil and from medium acid to mildly alkaline in the lower part of the subsoil. Permeability is moderately slow, and the available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Rock outcrop makes up about 25 percent of this complex. Typically, it is exposed limestone bedrock scattered throughout the map unit; it is more numerous and prominent on the upper slopes and in steeper areas. The outcrop generally parallels the slopes. In some areas, the outcrop occurs as flagstones and boulders are also on the surface.

Included with this complex in mapping are small areas of Beasley, Faywood, Hagerstown, and Woolper soils. Some areas of severely eroded soils and soils that have slopes of 40 to 50 percent are also included. The included soils make up about 17 percent of this complex.

Most of the acreage in this complex is in woodland.

This complex is not suited to cultivated crops and is poorly suited to pasture and hay. Steepness of slope and Rock outcrop are the main limitations.

The Caneyville soil has moderately high potential productivity for woodland on north-facing slopes and moderate potential productivity on south-facing slopes. Preferred trees on north-facing slopes are white oak, eastern white pine, yellow-poplar, and white ash. Virginia pine and eastern red cedar are preferred trees on south-facing slopes. The hazard of erosion, equipment limitations, and seedling mortality are management concerns.

The Caneyville soil is well suited to use as woodland wildlife habitat.

This complex is poorly suited to urban uses. Steepness of slope, Rock outcrop, depth to bedrock, the clayey texture, and moderately slow permeability are the main limitations.

The Caneyville soil is in capability subclass VIIs. Rock outcrop is in capability subclass VIIIs. The Caneyville soil is in woodland suitability group 3x on north aspects and 4x on south aspects. Rock outcrop is not assigned to a woodland suitability group.

CrB—Crider silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on convex ridgetops in the northeastern and western parts of Bullitt County. Some areas are karst. Slopes are about 75 to 500 feet in length, and the mapped areas are about 5 to 280 acres.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of 37 inches is brown silt loam and silty clay loam. To a depth of 84 inches the subsoil is yellowish red silty clay loam in the upper part and red silty clay that has common pale brown mottles in the lower part.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to strongly acid to a depth of about 40 inches and from medium acid to very strongly acid below a depth of 40 inches. Permeability is moderate, and the available water capacity is high. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Beasley, Caneyville, Hagerstown, and Nicholson soils. A soil similar to the Crider soil but 40 to 60 inches deep to

bedrock and a few areas of eroded soils that have a redder surface layer are also included .

Most of the Crider soil is used for cultivated crops (fig. 15), hay, and pasture. Some large areas are used for residential and urban developments.

This soil is well suited to cultivated crops and produces high yields if properly managed (fig. 16). Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is well suited to pasture and hay. If properly managed, it produces high yields. Renovation can increase yields and maintain the desired plants. The application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has very high potential productivity for woodland. The preferred trees are eastern white pine, black oak, white oak, yellow-poplar, black walnut, white ash, and northern red oak. Plant competition is a management concern.

This soil is suited to most urban uses. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Crider soil is in capability subclass IIe and in woodland suitability group 1o.

CrC—Crider silt loam, 6 to 12 percent slopes, eroded. This deep, well drained, sloping soil is on convex ridgetops and shoulder slopes in the northeastern and western parts of Bullitt County. Some areas are karst. Slopes are about 75 to 500 feet in length, and the mapped areas are about 3 to 750 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of 33 inches is brown silt loam and silty clay loam. To a depth of 80 inches it is yellowish red silty clay loam in the upper part and red silty clay that has common pale brown mottles in the lower part.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to strongly acid to a depth of about 40 inches and from medium acid to very strongly acid below a depth of 40 inches. Permeability is moderate, and the available water capacity is high. This soil has good tilth except in spots where erosion has exposed the subsoil material. The root zone is deep. This soil has moderate shrink-swell potential.

Figure 15.—Soybeans in an area of Crider silt loam, 2 to 6 percent slopes.

Figure 16.—Tobacco in an area of Crider silt loam, 2 to 6 percent slopes.

Included with this soil in mapping are small areas of Beasley, Caneyville, Hagerstown, and Nicholson soils. A soil similar to the Crider soil but 40 to 60 inches deep to bedrock and a few areas of severely eroded soils are also included.

Most of this Crider soil is used for pasture, hay, and cultivated crops. Some areas are used for residential and urban developments.

This soil is suited to cultivated crops and produces high yields if properly managed. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is well suited to pasture and hay. If properly managed, it produces high yields. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has very high potential productivity for woodland. The preferred trees are eastern white pine, black oak, white oak, yellow-popular, black walnut, white ash, and northern red oak. Plant competition is a management concern.

This soil is suited to most urban uses. Slope is the major limitation for most sanitary facilities and building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Crider soil is in capability subclass IIIe and in woodland suitability group 1o.

CrD—Crider silt loam, 12 to 20 percent slopes, eroded. This deep, well drained, moderately steep soil is primarily on complex shoulder slopes mainly in the western part of Bullitt County. Some areas are karst. Slopes are about 100 to 400 feet in length, and the mapped areas are about 3 to 100 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of 33 inches is brown silt loam and silty clay loam. To a depth of 80 inches it is yellowish red silty clay loam in the upper part and red silty clay that has common pale brown mottles in the lower part.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to strongly acid to a depth of about 40 inches and from medium acid to very strongly acid below a depth of 40 inches. Permeability is moderate, and the available water capacity is high. This soil has good tilth except in spots where erosion has exposed the subsoil material. The root zone is deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Beasley, Caneyville, and Hagerstown soils and a soil that is similar to the Crider soil but has a cherty subsoil. A soil similar to the Crider soil but 40 to 60 inches deep to bedrock and a few areas of severely eroded soils are also included.

Most of this Crider soil is used for hay and pasture. A few areas are in woodland. Some areas are being used for homesites.

Although this soil is suited to occasional cultivation, it is best suited to pasture and hay. If this soil is cultivated, the hazard of erosion is very severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control further erosion and maintain good tilth.

This soil is suited to pasture and hay. If properly managed, it produces high yields. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has very high potential productivity for woodland. The preferred trees are eastern white pine, black oak, white oak, yellow-poplar, black walnut, white ash, and northern red oak. The hazard of erosion, equipment limitations, and plant competition are management concerns.

This soil is suited to some urban uses. Steepness of slope is the major limitation for most sanitary facilities and building site developments. Low strength is a limitation for local roads and streets and for use as roadfill material.

This Crider soil is in capability subclass IVe and in woodland suitability group 1r.

EcC—Eden silty clay loam, 6 to 20 percent slopes, eroded. This moderately deep, well drained, sloping to moderately steep soil is on narrow, convex ridgetops and shoulder slopes mainly in the eastern part of Spencer County. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 70 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silty clay loam about 5 inches thick. The subsoil, to a depth of 31 inches, is light olive brown silty clay in the upper part and olive brown flaggy clay in the lower part. The underlying material to a depth of 64 inches is olive brown and yellowish brown slightly weathered interbedded siltstone and soft calcareous shale.

This soil is medium in natural fertility and low in organic matter content. It ranges from strongly acid to moderately alkaline in the subsoil and from mildly alkaline to strongly alkaline in the underlying material. Permeability is slow, and the available water capacity is moderate. Because of the silty clay loam surface layer, this soil is somewhat difficult to till. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Faywood, Fairmount, and Lowell soils. A few areas of severly eroded soils and some areas of soils that have slopes of more than 20 percent are also included.

Most of this Eden soil is used for pasture, but a few areas are in tobacco. Some areas are idle and are being revegetated naturally by eastern redcedar. Some of the acreage of this soil is in the Taylorsville Lake recreational area.

Although this soil is suited to occasional cultivation, it is best suited to pasture and hay. Steepness of slope and the very severe hazard of erosion limit use for cultivated crops. Returning crop residue to the soil, conservation tillage, and the use of grasses and legumes in the cropping system help to control erosion.

This soil is suited to pasture and hay crops but requires good management to prevent further erosion. Plants that provide adequate ground cover can help to prevent further erosion. Forage production during midsummer is relatively low on this soil, and stocking rates should be adjusted to prevent overgrazing. The application of lime and fertilizer, frequent renovation, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. Preferred trees are black oak, white oak, white ash and Virginia pine. Equipment limitations, seedling mortality, and plant competition are management concerns.

This soil is poorly suited to most urban uses. Depth to bedrock, steepness of slope, slow permeability, the clayey texture, and moderate shrink-swell potential are the main limitations.

This Eden soil is in capability subclass IVe and in woodland suitability group 3c.

EdE3—Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded. This moderately deep, well drained, steep soil is on complex hillsides mainly in the eastern part of Spencer County. Slopes are about 100 to 600 feet in length, and the mapped areas are about 5 to 1,700 acres. Erosion has removed most of the original surface layer and, in places, some of the subsoil. Some areas have rills and shallow gullies.

Typically, the surface layer is brown flaggy silty clay about 5 inches thick. The subsoil, to a depth of 26 inches, is light olive brown silty clay in the upper part and olive brown flaggy clay in the lower part. The underlying material to a depth of 59 inches is slightly weathered olive brown and yellowish brown interbedded siltstone and soft calcareous shale.

This soil is medium in natural fertility and low in organic matter content. It ranges from strongly acid to moderately alkaline in the surface layer and subsoil and from mildly alkaline to strongly alkaline in the underlying material. Permeability is slow, and the available water capacity is low. Because of the silty clay surface layer and flagstones, this soil is difficult to till. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Faywood and Fairmount soils on hillsides and Boonesboro soils on narrow flood plains. Also included are some areas of soils that have slopes of more than

Figure 17.—Pasture and woodland in an area of Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded.

30 percent and soils that are similar to the Eden soil but are more than 40 inches deep to bedrock.

Most of this Eden soil is used as woodland or brush, although large areas are used for pasture (fig. 17). Some areas are idle and are being revegetated naturally by eastern red cedar. Some of the acreage is in the Taylorsville Lake recreational area (fig. 18).

This soil is poorly suited to cultivated crops. Steepness of slope, the very severe hazard of erosion, and flagstones on the surface are the main limitations.

This soil is suited to pasture but requires good management to prevent further erosion. Plants that provide adequate ground cover and do not require frequent renovation need to be selected. Forage production during midsummer is low on this soil, and stocking rates need to be adjusted to prevent overgrazing. The application of lime and fertilizer, brush control, and rotation grazing are needed. Steep slopes and flagstones on the surface limit the use of farm machinery.

Figure 18.—The Taylorsville Lake and Dam in Spencer County.

This soil has moderate potential productivity for woodland. Preferred trees are white oak, black oak, and eastern red cedar. The hazard of erosion, equipment limitations, and seedling mortality are management concerns. Some included soils, particularly the Boonesboro soils on narrow flood plains and deeper soils on foot slopes and bench positions, produce higher quality hardwood trees than the Eden soil.

This soil is suited to use as woodland wildlife habitat.

This soil is poorly suited to most urban uses. Steepness of slope, the clayey texture, slow permeability, and moderate shrink-swell potential are the main limitations.

This Eden soil is in capability subclass VIe and in woodland suitability group 4c.

EkA—Elk silt loam, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on stream terraces throughout the survey area. The mapped areas are about 3 to 60 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of 50 inches, is brown silty clay loam. The underlying material to a depth of 70 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from slightly acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Newark, Nolin, and Otwell soils. Some areas of soils that are subject to occasional or rare flooding are also included.

This Elk soil is used mostly for cultivated crops, hay, and pasture. Some areas are in urban developments, including most of the city of Taylorsville.

This soil is well suited to cultivated crops and produces high yields if properly managed. Crops respond well to applications of lime and fertilizer. The hazard of erosion is slight if the soil is cultivated. Conservation tillage, return of crop residue to the soil, and use of cover crops help to maintain desirable soil structure and organic matter content.

This soil is well suited to pasture and hay. If properly managed, it produces high yields. The plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. Preferred trees are eastern white pine, black oak, white oak, yellow-poplar, black walnut, eastern cottonwood, white ash, northern red oak, pin oak, and sweetgum. Plant competition is a management concern.

This soil is suited to most urban uses. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Elk soil is in capability class I and in woodland suitability group 2o.

EkB—Elk silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on stream terraces and old alluvial deposits in upland positions throughout the survey area. Slopes are about 75 to 200 feet in length, and the mapped areas are about 3 to 60 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of 50 inches, is brown silty clay loam. The underlying material to a depth of 70 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from slightly acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Newark, Nolin, and Otwell soils. Some areas of soils subject to occasional or rare flooding are also included.

Most of this Elk soil is used for cultivated crops, hay, and pasture.

This soil is well suited to cultivated crops and produces high yields if properly managed. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is well suited to pasture and hay. If properly managed, it produces high yields. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. Preferred trees are eastern white pine, black oak, white oak, yellow-poplar, black walnut, eastern cottonwood, white ash, northern red oak, pin oak, and sweetgum. Plant competition is a management concern.

This soil is suited to most urban uses. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Elk soil is in capability subclass IIe and in woodland suitability group 2o.

EkC—Elk silt loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on stream terraces and old alluvial deposits in upland positions throughout the survey area. Slopes are about 75 to 200 feet in length, and the mapped areas are about 3 to 40 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of 50 inches, is brown silty clay loam. The underlying material to a depth of 70 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from slightly acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Newark, Nolin, and Otwell soils. Some areas of soils subject to occasional or rare flooding are also included.

Most of this Elk soil is used for cultivated crops, hay, and pasture.

This soil is suited to cultivated crops and produces high yields if properly managed. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is well suited to pasture and hay. If properly managed, it produces high yields. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. Preferred trees are eastern white pine, black oak, white oak, yellow-poplar, black walnut, eastern cottonwood, white ash, northern red oak, pin oak, and sweetgum. Plant competition is a management concern.

This soil is suited to most urban uses. Slope is the major limitation for most sanitary facilities and building

site developments. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Elk soil is in capability subclass IIIe and in woodland suitability group 2o.

ElA—Elk silt loam, occasionally flooded, 0 to 2 percent slopes. This deep, well drained, nearly level soil is on stream terraces throughout the survey area. The mapped areas are about 3 to 100 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of 50 inches, is brown silty clay loam. The underlying material to a depth of 70 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from slightly acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content. This soil is subject to brief periods of occasional flooding, usually from late in winter to early in spring.

Included with this soil in mapping are small areas of Newark, Nolin, and Otwell soils. Some areas of soils subject to rare flooding and a few small areas of soils that do not flood are also included.

Most of this Elk soil is used for cultivated crops, hay, and pasture.

This soil is well suited to cultivated crops and produces high yields if properly managed. Small grain cover crops are sometimes damaged by winter flooding. The hazard of erosion is slight if the soil is cultivated. Conservation tillage, return of crop residue to the soil, and use of cover crops help to maintain desirable soil structure and organic matter content.

This soil is well suited to pasture and hay, although some hay crops can be damaged by flooding. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. Preferred trees are eastern white pine, black oak, white oak, yellow-popular, black walnut, eastern cottonwood, white ash, northern red oak, pin oak, and sweetgum. Plant competition is a management concern.

This soil is poorly suited to most urban uses. The hazard of flooding is the main limitation.

This Elk soil is in capability subclass IIw and in woodland suitability group 2o.

ElB—Elk silt loam, occasionally flooded, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on stream terraces throughout the survey area. Slopes are about 75 to 200 feet in length, and the mapped areas are about 3 to 35 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of 50 inches, is brown silty clay loam. The underlying material to a depth of 70 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from slightly acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content. This soil is subject to brief periods of occasional flooding, usually from late in winter to early in spring.

Included with this soil in mapping are small areas of Newark, Nolin, and Otwell soils. Some areas of soils subject to rare flooding and a few small areas of soils that do not flood are also included.

Most of this Elk soil is used for cultivated crops, hay, and pasture.

This soil is well suited to cultivated crops and produces high yields if properly managed. Crops respond well to applications of lime and fertilizer. Small grain cover crops are sometimes damaged by winter flooding. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is suited to pasture and hay, although some hay crops can be damaged by flooding. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. Preferred trees are eastern white pine, black oak, white oak, yellow-poplar, black walnut, eastern cottonwood, white ash, northern red oak, pin oak, and sweetgum. Plant competition is a management concern.

This soil is poorly suited to most urban uses. The hazard of flooding is the main limitation.

This Elk soil is in capability subclass IIe and in woodland suitability group 2o.

ElC—Elk silt loam, occasionally flooded, 6 to 12 percent slopes. This deep, well drained, sloping soil is on stream terraces throughout the survey area. Slopes are about 75 to 200 feet in length, and the mapped areas are about 3 to 60 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil, to a depth of 50 inches, is brown silty clay loam. The underlying material to a depth of 70 inches is strong brown silty clay loam.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from slightly acid to very

strongly acid throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content. This soil is subject to brief periods of occasional flooding usually from late in winter to early in spring.

Included with this soil in mapping are small areas of Newark, Nolin, and Otwell soils. Some areas of soils not subject to flooding are also included.

Most of this Elk soil is used for cultivated crops, hay, and pasture.

This soil is suited to cultivated crops and produces high yields if properly managed. Crops respond well to lime and fertilizer. Small grain cover crops are sometimes damaged by winter flooding. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is well suited to pasture and hay, although some hay crops are damaged by flooding. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. Preferred trees are eastern white pine, black oak, white oak, yellow-poplar, black walnut, eastern cottonwood, white ash, northern red oak, pin oak, and sweetgum. Plant competition is a management concern.

This soil is poorly suited to most urban uses. The hazard of flooding is the main limitation.

This Elk soil is in capability subclass IIIe and in woodland suitability group 2o.

FaC—Faywood silt loam, 6 to 12 percent slopes, eroded. This moderately deep, well drained, sloping soil is on convex ridgetops, shoulder slopes, and hillsides mainly in the eastern half of the survey area. Slopes are about 75 to 400 feet in length, and the mapped areas are about 3 to 200 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. Hard limestone bedrock is at a depth of 30 inches.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from strongly acid to mildly alkaline throughout. Permeability is moderately slow and slow. The available water capability is moderate. This soil has good tilth except in areas where erosion has exposed the subsoil material. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Beasley, Eden, Lowell, Nicholson, and Fairmount soils. A few areas of soils that have slopes of 2 to 6 percent and some areas of severely eroded soils that have a yellowish brown silty clay loam surface layer are also included.

Most of this Faywood soil is used for pasture and hay. A small acreage is in cultivated crops.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. With good management, it produces moderate yields of cultivated crops. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, inclusion of grasses and legumes in the cropping system, and use of cover crops help to prevent further erosion and maintain good tilth.

This soil is suited to most hay and pasture crops. Moderate yields can be obtained by using good management. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are black oak, white oak, eastern white pine, and white ash. Equipment limitations and plant competition are management concerns.

This soil is suited to some urban uses. Depth to bedrock, moderately slow permeability, and the clayey texture are limitations for most sanitary facilities and building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Faywood soil is in capability subclass IIIe and in woodland suitability group 3c.

FdD—Faywood silty clay loam, 12 to 20 percent slopes, eroded. This moderately deep, well drained, moderately steep soil is on shoulder slopes and hillsides mainly in the eastern half of the survey area. Slopes are about 75 to 400 feet in length, and the mapped areas are about 3 to 160 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silty clay loam about 5 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. Hard limestone bedrock is at a depth of 30 inches.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from strongly acid to mildly alkaline throughout. Permeability is moderately slow and slow. The available water capacity is moderate. This soil is somewhat difficult to till because of the silty clay loam surface layer. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Beasley, Cynthiana, Eden, and Lowell soils. Also

included are some areas of soils that have a silt loam surface layer and soils that are severely eroded.

Most of this Faywood soil is used for pasture (fig. 19). A few areas are in hay or cultivated crops, and some areas are in woodland.

Although this soil is suited to occasional cultivation, it is best suited to pasture or hay. If this soil is cultivated, the hazard of erosion is very severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to reduce runnoff and control further erosion.

This soil is suited to most pasture and hay crops. Moderate yields can be obtained by using good management. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. Preferred trees are black oak, white oak, eastern white pine, and white ash. The hazard of erosion, equipment limitations, and plant competition are management concerns.

This soil is poorly suited to most urban uses. Steepness of slope, depth to bedrock, moderately slow permeability, and the clayey texture are limitations for most sanitary facilities and building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Faywood soil is in capability subclass IVe and in woodland suitability group 3c.

FkF—Faywood-Beasley-Rock outcrop complex, 25 to 60 percent slopes. These moderately deep and deep, well drained, steep to very steep soils and Rock outcrop are on complex hillsides and bluffs mainly along the Salt River and Floyds Fork in Bullitt County. The Faywood and Beasley soils and Rock outcrop were mapped together as a complex because they are in patterns that make separation impractical at the scale selected for mapping. Generally, the Faywood soil is on the lower and middle slopes, and the Beasley soil is on the middle and upper slopes. Rock outcrop is primarily on the upper slopes. Slopes are about 100 to 600 feet in length, and the mapped areas are about 4 to 400 acres.

Figure 19.—Tall fescue pasture in an area of Faywood silty clay loam, 12 to 20 percent slopes, eroded.

The Faywood soil and other closely related soils that are underlain by hard limestone bedrock make up about 50 percent of this complex. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. Hard limestone bedrock interbedded with layers of calcareous shale and siltstone is at a depth of 30 inches.

The Faywood soil is medium in natural fertility and moderate in organic matter content. The soil ranges from strongly acid to mildly alkaline throughout. Permeability is moderately slow and slow. The available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential.

The Beasley soil and other closely related soils that are underlain by interbedded soft calcareous siltstone, shale, and limestone make up about 22 percent of this complex. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil, to a depth of about 26 inches, is strong brown silty clay. The underlying material, to a depth of 46 inches, is yellowish brown clay. Soft calcareous bedrock is at a depth of 46 inches.

The Beasley soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil is very strongly acid to neutral in the surface layer and upper part of the subsoil, medium to moderately alkaline in the lower part of the subsoil, and neutral to moderately alkaline in the underlying material. Permeability is moderately slow, and the available water capacity is high. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Rock outcrop makes up about 15 percent of this complex. Typically, it is exposed limestone bedrock mainly on upper slopes and bluffs. The outcrop generally parallels the slopes. In some areas, flagstones and boulders are also on the surface.

Included with this complex in mapping are small areas of Boonesboro, Caneyville, Cynthiana, Fairmount, and Woolper soils. Also included are a few areas of severely eroded soils. The included soils make up about 13 percent of this complex.

Most of this complex is in woodland. A few areas of steep soil are in pasture.

This complex is not suited to cultivated crops and is poorly suited to pasture and hay. Steepness of slope and Rock outcrop are the main limitations.

The soils in this complex have moderately high potential productivity for woodland. The preferred trees on the Faywood soil are black oak, white oak, white ash, and eastern white pine. Preferred trees on the Beasley soil are black oak, chestnut oak, white oak, Virginia pine, and white ash. The hazard of erosion, equipment limitations, and plant competition are management concerns.

The Faywood and Beasley soils are well suited to use as woodland wildlife habitat.

This complex is poorly suited to urban uses. Steepness of slope and Rock outcrop are the main limitations.

The Faywood and Beasley soils are in capability subclass VIIe. Rock outcrop is in capability subclass VIIIs. Faywood and Beasley soils are in woodland suitability group 3c. Rock outcrop is not assigned to a woodland suitability group.

FlE—Faywood-Cynthiana complex, 12 to 30 percent slopes. These moderately deep and shallow, well drained, moderately steep and steep soils are on hillsides mainly in the eastern half of the survey area. The Faywood and Cynthiana soils were mapped together as a complex because they are in patterns that make separation impractical at the scale selected for mapping. Generally, the Faywood soil is on the lower and middle slopes and the Cynthiana soil is on the upper slopes. Slopes are about 100 to 500 feet in length, and the mapped areas are about 10 to 500 acres.

The Faywood soil makes up about 50 percent of this complex. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish brown silty clay in the upper part and brown clay in the lower part. Hard limestone bedrock is at a depth of 30 inches.

The Faywood soil is medium in natural fertility and moderate in organic matter content. It ranges from strongly acid to mildly alkaline throughout. Permeability is moderately slow and slow. The available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential.

The Cynthiana soil makes up about 35 percent of this complex. Typically, the surface layer is brown silty clay loam about 5 inches thick. The subsoil extends to a depth of 17 inches. It is yellowish brown clay in the upper part and light olive brown clay in the lower part. Hard limestone bedrock is at a depth of 17 inches.

The Cynthiana soil is medium in natural fertility and moderate in organic matter content. It ranges from slightly acid to mildly alkaline throughout. Permeability is moderately slow, and the available water capacity is low. The root zone is shallow. This soil has moderate shrink-swell potential.

Included with this complex in mapping are small areas of Beasley, Boonesboro, Fairmount, Lowell, and Woolper soils. Also included are a few areas of severely eroded soils and some areas where limestone rock outcrops cover about 1 to 5 percent of the surface. The included soils make up about 15 percent of this complex.

Most of this complex is in woodland. Some of the acreage is in pasture, and a few areas are idle (fig. 20).

This complex is not suited to cultivated crops. Steepness of slope and depth to bedrock are the main limitations.

Figure 20.—An area of Faywood-Cynthiana complex, 12 to 30 percent slopes, used as pasture.

This complex is suited to pasture, but it requires good management to prevent erosion. Plants that provide adequate ground cover and do not require frequent renovation need to be selected. Forage production during midsummer is low, and stocking rates need to be adjusted to prevent overgrazing. The application of lime and fertilizer, brush control, and rotation grazing are needed. The moderately steep areas of this complex are suited to hay production, but the use of farm machinery is limited in the steep areas.

The Faywood soil has moderately high potential productivity for woodland. The preferred trees are black oak, white ash, and eastern white pine. The hazard of erosion, equipment limitations, and plant competition are management concerns. The Cynthiana soil has moderate potential productivity for woodland. The preferred trees are eastern redcedar and Virginia pine. The hazard of erosion, equipment limitations, and seedling mortality are management concerns.

The Faywood soil is well suited to use as woodland wildlife habitat. The Cynthiana soil is poorly suited to this use.

This complex is poorly suited to most urban uses. Steepness of slope, depth to bedrock, moderately slow and slow permeability, and the clayey texture are the main limitations.

This complex is in capability subclass VIe. The Faywood soil is in woodland suitability group 3c, and the Cynthiana soil is in woodland suitability group 4d.

FnF—Faywood-Fairmount-Woolper complex, 30 to 60 percent slopes. These moderately deep, shallow, and deep, well drained, very steep soils are on hillsides and bluffs mainly along the Salt River and its tributaries

in the central part of the survey area. The Faywood, Fairmount, and Woolper soils were mapped together as a complex because they are in patterns that make separation impractical at the scale selected for mapping. Generally, the Faywood and Fairmount soils are on upper slopes, and the Woolper soils are on lower slopes. Slopes are about 200 to 500 feet in length, and the mapped areas are about 5 to 450 acres.

The Faywood soils make up about 48 percent of this complex. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish brown silty clay in the upper part and yellowish brown clay in the lower part. Hard limestone bedrock interbedded with layers of calcareous shale and siltstone is at a depth of 30 inches.

The Faywood soil is medium in natural fertility and moderate in organic matter content. It ranges from strongly acid to mildly alkaline throughout. Permeability is moderately slow and slow. The available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential.

The Fairmount soil makes up about 21 percent of this complex. Typically, the surface layer is very dark grayish brown silty clay loam about 7 inches thick. The subsoil extends to a depth of 16 inches. It is dark yellowish brown silty clay in the upper part and dark yellowish brown flaggy clay in the lower part. Hard limestone bedrock is at a depth of 16 inches.

The Fairmount soil is medium in natural fertility and high in organic matter content. It ranges from neutral to moderately alkaline throughout. Permeability is moderately slow and slow. The available water capacity is very low. The root zone is shallow. This soil has moderate shrink-swell potential.

The Woolper soil and other closely related soils make up about 19 percent of this complex. Typically, the surface layer is dark brown silty clay loam about 10 inches thick. The subsoil, to a depth of 52 inches, is silty clay. It is dark brown in the upper part and yellowish brown and dark yellowish brown in the lower part. The underlying material to a depth of 80 inches is dark yellowish brown silty clay and has common light yellowish brown mottles.

The Woolper soil is high in natural fertility and organic matter content. It ranges from mildly alkaline to slightly acid throughout. Permeability is moderately slow, and the available water capacity is high. The root zone is deep. This soil has moderate shrink-swell potential.

Included with this complex in mapping are small areas of Beasley, Boonesboro, Cynthiana, and Lowell soils and Rock outcrops. Also included are small areas of eroded soils. The included soils make up about 12 percent of this complex.

Most of the acreage of this complex is in woodland.

This complex is not suited to cultivated crops and is poorly suited to pasture and hay. Steepness of slope and depth to bedrock are the main limitations.

The Faywood soil has moderately high potential productivity for woodland. The preferred trees are black oak, white oak, white ash, and eastern white pine. The Fairmount soil has moderate potential productivity. The preferred trees are eastern redcedar, black oak, Virginia pine, and white oak. The Woolper soil has high potential productivity for woodland. The preferred trees are yellow-poplar, black oak, white oak, and white ash. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

This complex is well suited to use for woodland wildlife habitat.

This complex is poorly suited to most urban uses. Steepness of slope, moderately slow and slow permeability, the clayey texture, and depth to bedrock are the main limitations.

This complex is in capability subclass VIIe. The Faywood soil is in woodland suitability group 3c, the Fairmount soil is in woodland suitability group 4d, and the Woolper soil is in woodland suitability group 2c.

GmF—Garmon silt loam, 25 to 60 percent slopes. This moderately deep, well drained, steep and very steep soil is on complex hillsides in the Knobs section of Bullitt County. In the southwestern part of the county, this soil is on the uppermost part of the conical shaped Knobs. In the western part of the county, it is on hillsides below convex ridgetops. Slopes range from about 200 to 500 feet in length, and the mapped areas are about 10 to more than 1500 acres.

Typically, the surface layer is very dark grayish brown silt loam about 2 inches thick. The subsurface layer, to a depth of 5 inches, is brown silt loam. The subsoil to a depth of 21 inches is yellowish brown silt loam and channery silty clay loam. To a depth of about 29 inches it is light yellowish brown very channery loam. Siltstone bedrock is at a depth of 29 inches.

This soil is low in natural fertility and organic matter content. It ranges from very strongly acid to neutral in the surface layer and upper part of the subsoil and from medium acid to neutral in the lower part of the subsoil. Permeability is moderately rapid, and the available water capacity is moderate. The root zone is moderately deep.

Included with this soil in mapping are small areas of Caneyville, Carpenter, Lenberg, and Sensabaugh soils. Also included are areas of a soil similar to Garmon soil but less than 20 inches deep to bedrock, areas of soils that have a channery, flaggy, or shaly surface layer, and a few areas that have slopes of 60 to 75 percent.

Most areas of this Garmon soil are in woodland.

This soil is not suited to cultivated crops and is poorly suited to hay and pasture. Steep slopes and depth to bedrock are the main limitations.

This soil has moderately high potential productivity for woodland. The preferred trees are black oak, chestnut oak, Virginia pine, white oak, and eastern white pine. The

hazard of erosion, equipment limitations, and plant competition are management concerns.

This soil is suited to use as woodland wildlife habitat.

This soil is poorly suited to urban uses. Steepness of slope and depth to bedrock are the main limitations.

This Garmon soil is in capability subclass VIIe and in woodland suitability group 3r.

HaC—Hagerstown silt loam, 6 to 12 percent slopes, eroded. This deep, well drained, sloping soil is on convex ridgetops and shoulder slopes mainly in the western and central parts of Bullitt County. Slopes are about 75 to 400 feet in length, and the mapped areas are about 3 to 300 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of 16 inches is reddish brown silt loam. To a depth of 53 inches it is red clay in the upper part and yellowish red clay in the lower part. Limestone bedrock is at a depth of 53 inches.

This soil is high in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from very strongly acid to slightly acid in the surface layer and upper part of the subsoil and from strongly acid to neutral in the lower part of the subsoil. Permeability is moderate, and the available water capacity is high. The root zone is deep. This soil has good tilth except in areas where erosion has exposed the subsoil material. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Beasley, Caneyville, and Crider soils. Also included are a few areas of severely eroded soils and areas of soils that have slopes of 12 to 20 percent.

Most of this Hagerstown soil is used for pasture, hay, and cultivated crops. Some areas are in urban developments.

This soil is suited to cultivated crops and produces high yields if properly managed. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is well suited to pasture and hay. If properly managed, it produces high yields. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has very high potential productivity for woodland. The preferred trees are northern red oak, white ash, black oak, and white oak. Equipment limitations and plant competition are management concerns.

This soil is suited to most urban uses. Steepness of slope, depth to bedrock, and the clayey texture are limitations for most sanitary facilities. Moderate shrink-swell potential, steepness of slope, and depth to bedrock are limitations for some building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Hagerstown soil is in capability subclass IIIe and in woodland suitability group 1c.

La—Lawrence silt loam, rarely flooded. This deep, somewhat poorly drained, nearly level soil is on stream terraces throughout the survey area. The mapped areas are about 3 to 200 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 54 inches. It is yellowish brown silt loam and has common light brownish gray mottles to a depth of 20 inches. A firm, compact, and brittle fragipan is at a depth of 20 to 48 inches. In the upper part, it is yellowish brown silt loam and has light brownish gray and strong brown mottles. In the lower part, it is light brownish gray silty clay loam and has strong brown and yellowish brown mottles. The lower part of the subsoil is mottled light brownish gray, yellowish brown, and strong brown silty clay loam. The underlying material is mottled light brownish gray and strong brown silty clay loam to a depth of 64 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil is slightly acid to very strongly acid in the surface layer and upper part of the subsoil. The fragipan is very strongly acid or strongly acid to neutral. Permeability of the fragipan is slow. The available water capacity is moderate. The root zone is moderately deep. A seasonal high water table is at a depth of 12 to 24 inches. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Newark, McGary, McGary Variant, and Otwell soils. Also included are a few areas of soils that have slopes of 2 to 4 percent and areas of a poorly drained soil that does not have a fragipan. Some included soils are subject to ponding.

Most of this Lawrence soil is used for pasture, hay, and cultivated crops. Some areas, particularly in the Fort Knox Military Reservation, are in woodland and brush.

The seasonal high water table and fragipan are the major limitations of this soil for cultivated crops. Planting and harvesting are sometimes delayed by wetness. When a surface drainage system is used, this soil is suited to corn and soybeans and produces moderate yields. Conservation tillage, return of crop residue to the soil, and use of cover crops help to maintain desirable soil structure and organic matter content.

This soil is suited to pasture and hay crops that tolerate some wetness. The fragipan restricts use for deep-rooted legumes. The desired plants need to be

maintained through frequent renovation. Application of lime and fertilizer, adequate drainage, proper stocking rates, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, white ash, black oak, American sycamore, white oak, and sweetgum. Equipment limitations and plant competition are management concerns.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is poorly suited to most urban uses. Wetness, flooding, and slow permeability in the fragipan are limitations for most sanitary facilities. Wetness and flooding are limitations for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Lawrence soil is in capability subclass IIIw and in woodland suitability group 2w.

Le—Lawrence silt loam. This deep, somewhat poorly drained, nearly level, soil is on stream terraces and concave uplands throughout the survey area. The mapped areas are about 5 to 450 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil to a depth of 20 inches is yellowish brown silt loam and has common light brownish gray mottles. A very firm, compact, and brittle fragipan is at a depth of 20 to 48 inches. In the upper part, it is yellowish brown silt loam and has light brownish gray and strong brown mottles. It is light brownish gray silty clay loam and has strong brown and yellowish brown mottles in the lower part. The subsoil to a depth of 54 inches is mottled light brownish gray, yellowish brown, and strong brown silty clay loam. The underlying material is mottled light brownish gray and strong brown silty clay loam to a depth of 64 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil is slightly acid to very strongly acid in the surface layer and upper part of the subsoil. The fragipan is very strongly acid or strongly acid, and the lower part of the subsoil and underlying material are very strongly acid to neutral. Permeability of the fragipan is slow, and the available water capacity is moderate. The root zone is moderately deep. A seasonal high water table is at a depth of 12 to 24 inches.

Included with this soil in mapping are small areas of Newark, McGary, and Otwell soils. Also included are a few areas of soils that have slopes of 2 to 4 percent and some areas of a poorly drained soil that does not have a fragipan. Some included soils are subject to ponding, and a few are subject to flooding.

Most of this Lawrence soil is used for pasture, hay, and cultivated crops.

The seasonal high water table and fragipan are the major limitations of this soil for cultivated crops. Planting and harvesting are sometimes delayed by wetness. When a surface drainage system is used, this soil is suited to corn and soybeans and produces moderate yields. Conservation tillage, return of crop residue to the soil, and use of cover crops help to maintain desirable soil structure and organic matter content.

This soil is suited to pasture and hay crops that tolerate some wetness. The fragipan restricts use for deep-rooted legumes. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, adequate drainage, proper stocking rates, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, white ash, black oak, American sycamore, white oak, and sweetgum. Equipment limitations and plant competition are management concerns.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is poorly suited to most urban uses. Wetness and slow permeability in the fragipan are limitations for most sanitary facilities. Wetness is a limitation for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Lawrence soil is in capability subclass IIIw and in woodland suitability group 2w.

LfE—Lenberg-Carpenter complex, 20 to 40 percent slopes. These moderately deep and deep, well drained, steep and very steep soils are on ridgetops and hillsides mainly in the western and central parts of Bullitt County. The Lenberg and Carpenter soils were mapped together as a complex because they are intermingled in patterns that make separation impractical at the scale selected for mapping. The Lenberg soil is mainly on convex slopes, and the Carpenter soil is mainly on concave slopes. Siltstone channers, flags, stones, and boulders cover from 0 to about 15 percent of the surface. Slopes are about 300 to 800 feet in length, and the mapped areas are about 15 to more than 3,000 acres.

The Lenberg soil makes up about 50 percent of this complex. Typically, the surface layer is light yellowish brown silt loam about 4 inches thick. The subsoil to a depth of 9 inches is strong brown silty clay loam. To a depth of 36 inches, it is silty clay that is strong brown in the upper part and mottled yellowish red, light olive gray, and brown in the lower part. Soft olive shale is at a depth of 36 inches.

The Lenberg soil is medium in natural fertility and moderate in organic matter content. It ranges from strongly acid to very strongly acid throughout. Permeability is moderately slow, and the available water capacity is moderate. The root zone is moderately deep. This soil has moderate shrink-swell potential.

The Carpenter soil makes up about 40 percent of this complex. Typically, the surface layer is very dark grayish

brown flaggy silt loam about 3 inches thick. The subsurface layer, to a depth of 6 inches, is yellowish brown flaggy silt loam. The subsoil to a depth of 15 inches is yellowish brown flaggy silt loam over strong brown gravelly silt loam. To a depth of 46 inches, it is strong brown and yellowish red gravelly silty clay loam over dark yellowish brown silty clay loam. The underlying material to a depth of 51 inches is dark yellowish brown silty clay loam. Soft greenish gray shale interbedded with layers of siltstone is at a depth of 51 inches.

The Carpenter soil is medium in natural fertility and moderate in organic matter content. It ranges from very strongly acid to slightly acid in the upper part of the subsoil and from very strongly acid to medium acid in the lower part of the subsoil and in the underlying material. Permeability is moderate, and the available water capacity is high. The root zone is deep.

Included with this complex in mapping are small areas of Garmon, Sensabaugh, Zanesville, and Trappist soils. Also included are a very channery soil that is less than 20 inches deep to siltstone bedrock, soils that have slopes of 40 to 60 percent, and siltstone rock outcrops on the upper slopes and in steeper areas. Detached parts of these outcrops occur as channers, flags, stones, and boulders on the surface. Some old slip scars and slide areas are also included.

Most of the acreage of this complex is in woodland (fig. 21). A few areas are in pasture.

This complex is poorly suited to cultivated crops. Steepness of slope is the main limitation.

This complex is suited to pasture but requires good management to prevent erosion. It is better suited to woodland. If this soil is used for pasture, plants that

Figure 21.—The woodland is in an area of Lenberg-Carpenter complex, 20 to 40 percent slopes. Trappist silt loam, 12 to 30 percent slopes, eroded, and Newark silt loam, frequently flooded, are used as hayland.

provide adequate ground cover and do not require frequent renovation are needed. Forage production during midsummer is low, and stocking rates should be adjusted to prevent overgrazing. The application of lime and fertilizer, brush control, and rotation grazing are needed. Steepness of slope and presence of flagstones and channers on the surface limit the use of farm machinery.

The Lenberg soil has moderately high potential productivity for woodland on north slopes and moderate potential productivity on south slopes. The preferred trees on north slopes are eastern white pine, shortleaf pine, and Virginia pine. Virginia pine, white oak, and shortleaf pine are preferred on south slopes. The hazard of erosion and equipment limitations are management concerns. The Carpenter soil has high potential productivity for woodland. The preferred trees are white oak, black oak, chestnut oak, eastern white pine, white ash, yellow-poplar, and black walnut. The hazard of erosion, equipment limitations, and plant competition are management concerns.

This complex is well suited to use as woodland wildlife habitat (fig. 22).

This complex is poorly suited to urban uses. Steepness of slope, slippage, the clayey texture, moderately slow permeability, and channers, flags, stones, and boulders on the surface are the main limitations.

This complex is in capability subclass VIe. The Lenberg soil is in woodland suitability group 3c on north

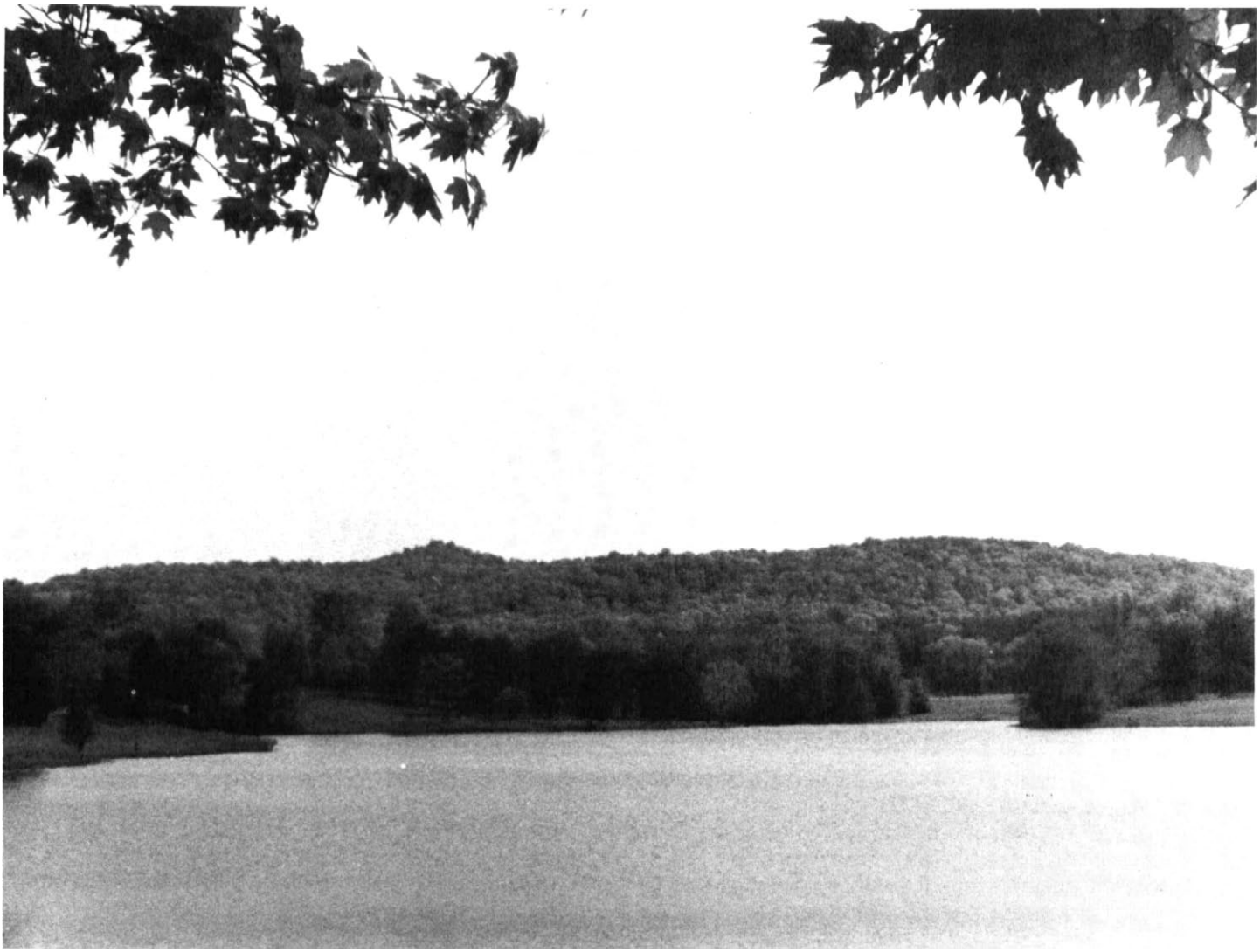


Figure 22.—Lake Nevin and a wooded area in Bernheim Forest. This is an area of Lenberg-Carpenter complex, 20 to 40 percent slopes.

aspects and 4c on south aspects. The Carpenter soil is in woodland suitability group 2r.

LoB—Lowell silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on convex ridgetops mainly in the western and central parts of Spencer County. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 200 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil to a depth of 18 inches is dark yellowish brown silty clay loam. To a depth of 56 inches, it is yellowish brown clay. The underlying material to a depth of 65 inches is yellowish brown silty clay and clay and has common strong brown and light brownish gray mottles. Limestone bedrock interbedded with layers of shale and siltstone is at a depth of 65 inches.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from slightly acid to very strongly acid to a depth of 30 inches and from strongly acid to mildly alkaline below that except in the layer immediately above bedrock, which ranges from medium acid to mildly alkaline. Permeability is moderately slow, and the available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Faywood, Nicholson, and Shelbyville soils. Also included are a few areas of eroded soils.

Most of this Lowell soil is used for cultivated crops, hay, and pasture (fig. 23). Some areas are in residential and urban developments.

This soil is well suited to cultivated crops. It produces high yields if properly managed. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is well suited to pasture and hay. If properly managed, it produces high yields. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing and weed control are needed.

This soil has high potential productivity for woodland. Preferred trees are yellow-poplar, eastern white pine, black oak, northern red oak, and white ash. Plant competition is a management concern.

This soil is suited to some urban uses. Moderately slow permeability, the clayey texture, and depth to bedrock are limitations for most sanitary facilities. Depth to bedrock and moderate shrink-swell potential are limitations for building site developments. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

Figure 23.—Hay being prepared for harvest on an area of Lowell silt loam, 2 to 6 percent slopes.

This Lowell soil is in capability subclass IIe and in woodland suitability group 2c.

LoC—Lowell silt loam, 6 to 12 percent slopes, eroded. This deep, well drained, sloping soil is on convex ridgetops and shoulder slopes mainly in the western and central parts of Spencer County. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 500 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil to a depth of 16 inches is dark yellowish brown silty clay loam. To a depth of 54 inches, it is yellowish brown silty clay and clay. The underlying material to a depth of 63 inches is yellowish brown silty clay and has common strong brown and light brownish gray mottles. Limestone bedrock interbedded with layers of shale and siltstone is at a depth of 63 inches.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from slightly acid to

very strongly acid to a depth of 30 inches and from strongly acid to mildly alkaline below that except in the layer immediately above bedrock, which ranges from medium acid to mildly alkaline. Permeability is moderately slow, and the available water capacity is high. The root zone is deep. This soil has good tilth except in areas where erosion has exposed the subsoil material. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Eden, Faywood, Nicholson, and Shelbyville soils. Also included are a few areas of severely eroded soils.

Most of this Lowell soil is used for pasture, hay, and cultivated crops. Some areas are in residential and urban developments.

This soil is suited to cultivated crops. It produces high yields if properly managed. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control further erosion and maintain high yields.

This soil is suited to pasture and hay. If properly managed, it produces high yields. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, eastern white pine, black oak, northern red oak, and white ash. Plant competition is a management concern.

This soil is suited to some urban uses. Moderately slow permeability, the clayey texture, steepness of slope, and depth to bedrock are limitations for most sanitary facilities. Depth to bedrock, moderate shrink-swell potential, and steepness of slope are limitations for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Lowell soil is in capability subclass IIIe and in woodland suitability group 2c.

LsC3—Lowell silty clay loam, 6 to 12 percent slopes, severely eroded. This deep, well drained, sloping soil is on convex ridgetops and shoulder slopes mainly in the western and central parts of Spencer County. Slopes are about 50 to 300 feet in length, and the mapped areas are about 3 to 60 acres. Erosion has removed most of the original surface layer and, in places, some of the subsoil. Some areas have rills and shallow gullies.

Typically, the surface layer is brown and dark yellowish brown silty clay loam about 5 inches thick. The subsoil to a depth of 26 inches is yellowish brown silty clay loam and silty clay. To a depth of 57 inches, it is yellowish brown clay and silty clay. Limestone bedrock interbedded with layers of shale and siltstone is at a depth of 57 inches.

This soil is low in natural fertility and organic matter content. It ranges from slightly acid to very strongly acid to a depth of 26 inches and from strongly acid to mildly alkaline below that except in the layer immediately above bedrock, which ranges from medium acid to mildly alkaline. Permeability is moderately slow, and the available water capacity is high. The root zone is deep. This soil is somewhat difficult to till because the surface layer consists mostly of subsoil material. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Eden, Faywood, Nicholson, and Shelbyville soils. Also included are a few areas of soils that are not eroded.

Most of this Lowell soil is used for pasture and hay. A few areas are in cultivated crops.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. Erosion has removed most of the original surface layer. Response of crops to applications of lime and fertilizer is fair. If this soil is cultivated, the hazard of erosion is very severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system will help to control further erosion.

This soil is suited to hay and pasture, and moderate yields can be obtained by using good management practices. Plants are somewhat difficult to establish since most of the original surface layer has been removed by erosion. The yields and desired plants need to be maintained through renovation, the application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control.

This soil has moderately high potential productivity for woodland. The preferred trees are Virginia pine, black oak, white ash, and northern red oak. Equipment limitations, seedling mortality, and plant competition are management concerns.

This soil is suited to some urban uses. Moderately slow permeability, the clayey texture, steepness of slope, and depth to bedrock are limitations for most sanitary facilities. Depth to bedrock, moderate shrink-swell potential, and steepness of slope are limitations for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Lowell soil is in capability subclass IVe and in woodland suitability group 3c.

MaB—Markland silt loam, rarely flooded, 2 to 6 percent slopes. This deep, moderately well drained and well drained, gently sloping soil is on slightly convex stream terraces along the Salt and Rolling Fork Rivers in the southwestern and central parts of Bullitt County. Slopes are about 75 to 200 feet in length, and the mapped areas are about 3 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil to a depth of 33 inches is brown silty clay. To a depth of 42 inches, it is dark yellowish brown clay and has many olive gray mottles. The underlying material to a depth of 64 inches is dark yellowish brown silty clay and has common olive gray mottles.

This soil is medium in natural fertility and low in organic matter content. Except where the surface layer has been limed, this soil is neutral to strongly acid in the surface layer, slightly acid to strongly acid in the upper part of the subsoil, and acid to mildly alkaline in the lower part of the subsoil. The underlying material is mildly alkaline or moderately alkaline. Permeability is slow, and the available water capacity is high. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep. A seasonal high water table is at a depth of 36 to 72 inches. This soil has high shrink-swell potential. It is subject to rare flooding.

Included with this soil in mapping are small areas of McGray soils.

Most of this Markland soil is used for hay and pasture. Some areas are in cultivated crops. A few areas are in the Fort Knox Military Reservation.

This soil is suited to most cultivated crops, and moderate yields can be obtained if properly managed. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain yields.

This soil is suited to most pasture and hay crops. If properly managed, it produces moderate yields. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are eastern white pine, black oak, yellow-poplar, and white ash. Plant competition is a management concern.

This soil is poorly suited to most urban uses. Slow permeability, the clayey texture, high shrink-swell potential, and the hazard of flooding are the main limitations.

This Markland soil is in capability subclass IIe and in woodland suitability group 2c.

MdD3—Markland silty clay, occasionally flooded, 10 to 30 percent slopes, severely eroded. This deep, moderately well drained and well drained, sloping to steep soil is on complex side slopes below broad slack water flats along the Salt and Rolling Fork Rivers in southwestern and central parts of Bullitt County. Slopes are about 50 to 200 feet in length, and the mapped areas are about 5 to 200 acres. Erosion has removed most of the original surface layer and, in places, some of the subsoil. Some areas have rills, and shallow gullies and have eroded into the underlying material.

Typically, the surface layer is dark grayish brown and brown silty clay about 5 inches thick. The subsoil to a depth of 28 inches is brown silty clay. To a depth of 37 inches, it is dark yellowish brown clay and has many olive gray mottles. The underlying material to a depth of 59 inches is dark yellowish brown silty clay and has common olive gray mottles.

This soil is low in natural fertility and low in organic matter content. Except where the surface layer has been limed, this soil is neutral to strongly acid in the surface layer, slightly acid to strongly acid in the upper part of the subsoil, and medium acid to mildly alkaline in the lower part of the subsoil. The underlying material is mildly alkaline or moderately alkaline. Permeability is slow, and the available water capacity is moderate. This soil is difficult to till because the surface layer consists mostly of subsoil material. The root zone is deep. A seasonal high water table is at a depth of 36 to 72 inches. This soil has high shrink-swell potential. It is subject to brief periods of occasional flooding usually from late in winter to early in spring.

Included with this soil in mapping are small areas of McGary, Newark, and Nolin soils.

This Markland soil is used mostly for pasture and hay. Some of the acreage is in the Fort Knox Military Reservation.

This soil is poorly suited to cultivated crops. Steepness of slope and the severely eroded surface layer are the main limitations.

This soil is suited to some pasture and hay crops but requires good management practices. The desired plants need to be maintained through renovation, the application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control. Some hay crops can be damaged by flooding. The steep slopes limit the use of farm machinery.

This soil has moderately high potential productivity for woodland. Preferred trees are eastern white pine, black oak, white oak, and white ash. The hazard of erosion, equipment limitations, seedling mortality, and plant competition are management concerns.

This soil is poorly suited to most urban uses. Steepness of slope, slow permeability, the clayey texture, high shrink-swell potential, and flooding are the main limitations.

This Markland soil is in capability subclass VIe and in woodland suitability group 3c.

Mc—McGary silt loam, rarely flooded. This deep, somewhat poorly drained, nearly level soil is on broad, slack water stream terraces along the Salt and Rolling Fork Rivers in the southwestern and central parts of

Bullitt County. The mapped areas are about 5 to more than 3,000 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil to a depth of 15 inches is yellowish brown silty clay loam. To a depth of 40 inches, it is grayish brown and dark yellowish brown silty clay. The underlying material to a depth of 72 inches is gray stratified silty clay loam and silty clay and has many yellowish brown mottles.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from neutral to strongly acid in the upper part of the subsoil and from medium acid to moderately alkaline in the lower part of the subsoil. The underlying material is moderately alkaline. Permeability is slow to very slow, and the available water capacity is high. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep. A seasonal high water table is at a depth of 12 to 36 inches. This soil is subject to rare flooding. It has high shrink-swell potential.

Included with this soil in mapping are small areas of Lawrence, Newark, and Markland soils. Some areas of soils that have slopes of 2 to 4 percent are also included.

This McGary soil is used mostly for pasture and hay, but some areas are in cultivated crops (fig. 24). Some of the acreage is in the Fort Knox Military Reservation. It is predominantly in woodland and brush. Some areas are in residential and urban developments including a large part of the city of Shepherdsville.

The seasonal high water table and clayey texture are the major limitations of this soil for cultivated crops. Planting and harvesting are sometimes delayed by wetness, and yields are reduced. When a surface drainage system is used, this soil is suited to some cultivated crops and produces moderate yields. Open ditch drainage is generally the most widely used system. Conservation tillage, return of crop residue to the soil, and the use of cover crops help to maintain desirable soil structure and organic matter content.

This soil is suited to pasture and hay crops that tolerate wetness. The seasonal high water table and clayey texture restrict use for deep rooted legumes. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, adequate drainage, proper stocking rates, and weed control are needed.

This soil has high potential productivity for woodland. Preferred trees are eastern white pine, black oak, white oak, baldcypress, white ash, pin oak, sweetgum, and American sycamore. Plant competition is a management concern.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is poorly suited to most urban uses. Wetness, very slow permeability, the clayey texture, and the hazard of flooding are limitations for most sanitary facilities. Wetness, flooding, and high shrink-swell potential are limitations for most building site development. The high shrink-swell potential and low strength are limitations for local roads and streets and for use of the soil as roadfill material.

This McGary soil is in capability subclass IIIw and in woodland suitability group 2w.

Mv—McGary Variant silt loam, rarely flooded. This deep, somewhat poorly drained, nearly level soil is on stream terraces along the Salt River. The mapped areas range from about 10 to 150 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsurface layer is grayish brown silt loam to a depth of 12 inches. The subsoil to a depth of 26 inches is light yellowish brown silt loam and grayish brown silty clay loam. To a depth of 48 inches, it is olive gray silty clay and has dark yellowish brown mottles. The underlying material to a depth of 96 inches is dark gray clay and strong brown silty clay and has mottles in shades of brown and gray.

This soil is high in natural fertility and moderate in organic matter content. It is slightly acid or neutral in the surface layer, slightly acid to strongly acid in the upper part of the subsoil, slightly acid to mildly alkaline in the lower part of the subsoil, and neutral to moderately alkaline in the underlying material. Permeability is moderate in the upper part of the subsoil and slow and very slow in the lower part of the subsoil and underlying material. The available water capacity is high. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep, but the clayey subsoil restricts root penetration for some plants. This soil is subject to rare flooding. A seasonal high water table is at a depth of about 12 to 36 inches.

Included with this soil in mapping are small areas of Newark, Lawrence, and Otwell soils. Also included are some areas of soils that are subject to ponding and soils that are not subject to flooding.

Most of this McGary Variant soil is used for row crops.

A seasonal high water table is the major limitation for row crops. Planting and harvesting are sometimes delayed because of wetness. Tile drainage systems are commonly used. When drained, this soil is well suited to corn and soybeans and can be cropped intensively. Good tilth is maintained by returning crop residue to the soil.

This soil is well suited to pasture and hay crops that tolerate some wetness. The desired plants need to be maintained through renovation. Application of lime and fertilizer, adequate drainage, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. Preferred trees are pin oak, white ash, sweetgum, American sycamore, and eastern white pine.

Figure 24.—A farmstead and small lake in an area of McGary silt loam, rarely flooded.

Plant competition and equipment limitations are management concerns.

This soil is poorly suited to most urban uses. Wetness and the hazard of flooding are the main limitations.

This McGary Variant soil is in capability subclass IIw and in woodland suitability group 3w.

Mo—Montgomery silty clay loam. This deep, very poorly drained, nearly level soil is on broad, slack water stream terraces near the Salt River, mainly in the central part of Bullitt County. The mapped areas are about 3 to 60 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is very dark grayish brown silty clay loam about 9 inches thick. The subsurface layer, to a depth of 15 inches, is very dark grayish brown silty clay. The subsoil, to a depth of 40 inches, is dark grayish brown silty clay and has common dark yellowish brown mottles. The underlying material to a depth of 62 inches is grayish brown silty clay and has many strong brown and dark yellowish brown mottles.

This soil is high in natural fertility and high in organic matter content. It ranges from slightly acid to mildly alkaline in the subsoil and is mildly alkaline or moderately alkaline in the underlying material. Permeability is slow to very slow, and the available water capacity is high. This soil is somewhat difficult to till because of the silty clay loam surface layer. The root zone is deep. A seasonal high water table is at or near the surface. This soil has high shrink-swell potential.

Included with this soil in mapping are small areas of McGary and Newark soils. Also included is a soil similar to the Montgomery soil except that it contains less clay, and some areas of soils subject to ponding or flooding.

Most of this Montgomery soil is used for pasture and hay. A few areas are in cultivated crops.

The seasonal high water table, clayey texture, and very poor drainage are the major limitations for cultivated crops. Planting and harvesting are sometimes delayed by wetness, and yields are reduced. When a surface drainage system is used, this soil is suited to some cultivated crops and produces moderate yields. Open ditch drainage is generally the most widely used surface drainage system. In many areas, the use of open ditch drainage is restricted because there is not an adequate outlet. Conservation tillage, return of crop residue to the soil, and the use of cover crops help to maintain desirable soil structure and organic matter content.

This soil is suited to pasture and hay crops that tolerate wetness. The seasonal high water table restricts use for deep-rooted legumes. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, adequate drainage, proper stocking rates, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are American sycamore, baldcypress, willow oak, swamp white oak, and sweetgum. Equipment limitations, seedling mortality, and plant competition are management concerns.

This soil is poorly suited to urban uses. Wetness, very slow permeability, and high shrink-swell potential are the main limitations.

This Montgomery soil is in capability subclass IIIw and in woodland suitability group 2w.

Ne—Newark silt loam, frequently flooded. This deep, somewhat poorly drained, nearly level soil is on flood plains throughout the survey area. The mapped areas are about 3 to 400 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is silt loam. It is brown and has common grayish brown mottles to a depth of 19 inches and is grayish brown and has common dark yellowish brown mottles to a depth of 34 inches. The underlying material to a depth of 60 inches is grayish brown silt loam.

This soil is high in natural fertility and moderate in organic matter content. It ranges from medium acid to mildly alkaline throughout. Permeability is moderate, and the available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. A seasonal high water table is at a depth of 6 to 18 inches. The root zone is deep. This soil is subject to brief periods of frequent flooding usually from late in winter to early in spring (fig. 25).

Included with this soil in mapping are small areas of Boonesboro, Lawrence, Nolin, Otwell, and Sensabaugh soils. Also included are some areas of poorly and very poorly drained soils and a few areas of soils that have slopes of 2 to 4 percent.

Most of this Newark soil is used for cultivated crops, hay, and pasture. A few small areas are in woodland.

A seasonal high water table is the major limitation for cultivated crops. Planting and harvesting are sometimes delayed by wetness. Tile drainage systems are commonly used. When drained, this soil is well suited to corn and soybeans and can be cropped intensively. Conservation tillage, return of crop residue to the soil, and use of cover crops help to maintain desirable soil structure and organic matter content. Small grain cover crops are sometimes damaged by winter flooding.

This soil is well suited to pasture and hay crops that tolerate some wetness, although some hay crops can be damaged by flooding. The desired plants need to be maintained through frequent renovation. Application of lime and fertilizer, adequate drainage, proper stocking rates, rotation grazing, and weed control are needed.

This soil has very high potential productivity for woodland. The preferred trees are eastern cottonwood, sweetgum, American sycamore, eastern white pine, and cherrybark oak. Plant competition and equipment limitations are management concerns.

This soil is poorly suited to most urban uses. The hazard of flooding is the main limitation.

This Newark soil is in capability subclass IIw and in woodland suitability group 1w.

NhA—Nicholson silt loam, 0 to 2 percent slopes. This deep, moderately well drained, nearly level soil is on ridgetops mainly in the central part of Bullitt County. The mapped areas are about 5 to 50 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of 61 inches. It is yellowish brown silt loam and dark yellowish brown silty clay loam to a depth of 24 inches. A very firm, compact, and brittle fragipan extends to a depth of 42 inches. It is brown silt loam in the upper part and has light brownish gray mottles. It is yellowish brown silty clay loam in the lower part and has light brownish gray and strong brown mottles. The lower part of the subsoil, to a depth of 61 inches, is strong brown silty clay and has grayish brown and olive gray mottles. The underlying

Figure 25.—Flooding of pastureland in an area of Newark silt loam, frequently flooded.

material to a depth of 72 inches is strong brown clay and has light brownish gray and yellowish brown mottles.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from very strongly acid to medium acid through the fragipan and from strongly acid to mildly alkaline below the fragipan. Permeability is slow. The available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are small areas of Crider and Lawrence soils. Also included is a moderately well drained soil that does not have a fragipan.

Most of this Nicholson soil is used for cultivated crops, hay, and pasture.

This soil is well suited to most cultivated crops. The seasonal high water table can limit production of tobacco during wet growing seasons. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is slight. Return of crop residue to the soil, use of cover crops, and inclusion of grasses and

legumes in the cropping system help to maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. The fragipan restricts rooting depth and can limit production of deep-rooted legumes. The desired plants need to be maintained through renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, eastern white pine, black oak, white oak, white ash, northern red oak, and sweetgum. Plant competition is a management concern.

This soil is suited to some urban uses. Slow permeability and wetness are limitations for most sanitary facilities and building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Nicholson soil is in capability subclass IIw and in woodland suitability group 2o.

NhB—Nicholson silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on slightly convex ridgetops throughout the survey area. Slopes range from about 75 to 250 feet in length, and the mapped areas are about 3 to 200 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of 61 inches. It is yellowish brown silt loam and dark yellowish brown silty clay loam to a depth of 24 inches. A very firm, compact, and brittle fragipan extends to a depth of 42 inches. It is brown silt loam in the upper part and has light brownish gray mottles. It is yellowish brown silty clay loam in the lower part and has light brownish gray and strong brown mottles. The lower part of the subsoil, to a depth of 61 inches, is strong brown silty clay and has grayish brown and olive gray mottles. The underlying material to a depth of 72 inches is strong brown clay and has light brownish gray and yellowish brown mottles.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from very strongly acid to medium acid through the fragipan and from strongly acid to mildly alkaline below the fragipan. Permeability is slow. The available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are small areas of Crider, Faywood, Lowell, and Shelbyville soils. Also included is a moderately well drained soil that does not have a fragipan.

Most of the Nicholson soil is used for cultivated crops, hay, and pasture.

This soil is well suited to most cultivated crops. The seasonal high water table can limit production of tobacco during wet growing seasons. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and to maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. The fragipan restricts rooting depth and can limit production of deep-rooted legumes. The desired plants need to be maintained through renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, eastern white pine, black oak, white oak, white ash, northern red oak, and sweetgum. Plant competition is a management concern.

This soil is suited to some urban uses. Slow permeability and wetness are limitations for most sanitary facilities. Wetness is a limitation for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Nicholson soil is in capability subclass IIe and in woodland suitability group 2o.

NhC—Nicholson silt loam, 6 to 12 percent slopes. This deep, moderately well drained, sloping soil is on convex ridgetops and shoulder slopes throughout the survey area. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 60 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of 61 inches. It is yellowish brown silt loam and dark yellowish brown silty clay loam to a depth of 24 inches. A very firm, compact, and brittle fragipan extends to a depth of 42 inches. It is brown silt loam in the upper part and has light brownish gray mottles. It is yellowish brown silty clay loam in the lower part and has light brownish gray and strong brown mottles. The lower part of the subsoil, to a depth of 61 inches, is strong brown silty clay and has grayish brown and olive gray mottles. The underlying material to a depth of 72 inches is strong brown clay and has light brownish gray and yellowish brown mottles.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from very strongly acid to medium acid through the fragipan and from strongly acid to mildly alkaline below the fragipan. Permeability is slow. The available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 18 to 30 inches.

Included with this soil in mapping are small areas of Crider, Eden, Faywood, and Lowell soils. Also included is

a moderately well drained soil that does not have a fragipan.

Most of this Nicholson soil is used for hay and pasture. Some areas are used for cultivated crops.

This soil is suited to most cultivated crops. The seasonal high water table can limit production of tobacco during wet growing seasons. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and to maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. The fragipan restricts rooting depth and can limit production of deep-rooted legumes. The desired plants need to be maintained through renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, eastern white pine, black oak, white oak, white ash, northern red oak, and sweetgum. Plant competition is a management concern.

This soil is suited to some urban uses. Slow permeability, wetness, and steepness of slope are limitations for most sanitary facilities. Wetness is a limitation for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Nicholson soil is in capability subclass IIIe and in woodland suitability group 2o.

No—Nolin silt loam, frequently flooded. This deep, well drained, nearly level soil is on flood plains throughout the survey area. The mapped areas are about 5 to 600 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil to a depth of 47 inches is brown silt loam, and to a depth of 52 inches it is yellowish brown silt loam. The underlying material to a depth of 78 inches is brown silt loam.

This soil is high in natural fertility and moderate in organic matter content. It ranges from medium acid to moderately alkaline throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content. It is subject to brief periods of frequent flooding usually from late in winter to early in spring (fig. 26).

Included with this soil in mapping are small areas of Boonesboro, Elk, Newark, Otwell, Sensabaugh, and Woolper soils. Also included are soils along the major stream banks that have slopes of 2 to 12 percent and that are subject to frequent erosion and deposition by fluctuating streams.

Most of this Nolin soil is used for cultivated crops, hay, and pasture.

If this soil is properly fertilized and organic matter content is maintained, it is productive and can be cropped intensively. Small grain cover crops are sometimes damaged by winter flooding (fig. 27). Conservation tillage, return of crop residue to the soil, and use of cover crops help to maintain desirable soil structure and organic matter content.

This soil is well suited to pasture and hay. Some hay crops can be damaged by flooding. Maintenance of the desired plants through renovation, weed control, proper stocking rates, and application of lime and fertilizer is needed.

This soil has very high potential productivity for woodland. The preferred trees are sweetgum, yellow-poplar, eastern white pine, eastern cottonwood, white ash, cherrybark oak, and black walnut. Equipment limitations and plant competition are management concerns.

This soil is poorly suited to most urban uses. The hazard of flooding is the main limitation.

This Nolin soil is in capability class IIw and in woodland suitability group 1w.

OtA—Otwell silt loam, 0 to 2 percent slopes. This deep, moderately well drained, nearly level soil is on stream terraces throughout the survey area. The mapped areas are about 2 to 20 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 62 inches. It is strong brown and yellowish brown silt loam to a depth of 26 inches; it has pale brown mottles in the lower part. A very firm, compact, and brittle fragipan extends to a depth of 42 inches. It is light yellowish brown silt loam in the upper part and has strong brown and light brownish gray mottles. It is yellowish brown silty clay loam in the lower part and has light brownish gray and strong brown mottles. The lower part of the subsoil to a depth of 62 inches is strong brown, stratified silty clay loam and silty clay and has light brownish gray mottles.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to very strongly acid in the surface layer and is strongly acid or very strongly acid in the upper part of the subsoil and fragipan. It is slightly acid to strongly acid in the lower part of the subsoil. Permeability is very slow, and the available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 24 to 36 inches.

Included with this soil in mapping are small areas of Elk, Lawrence, and Newark soils. Some areas of soils that have slopes of 2 to 4 percent and a few areas of

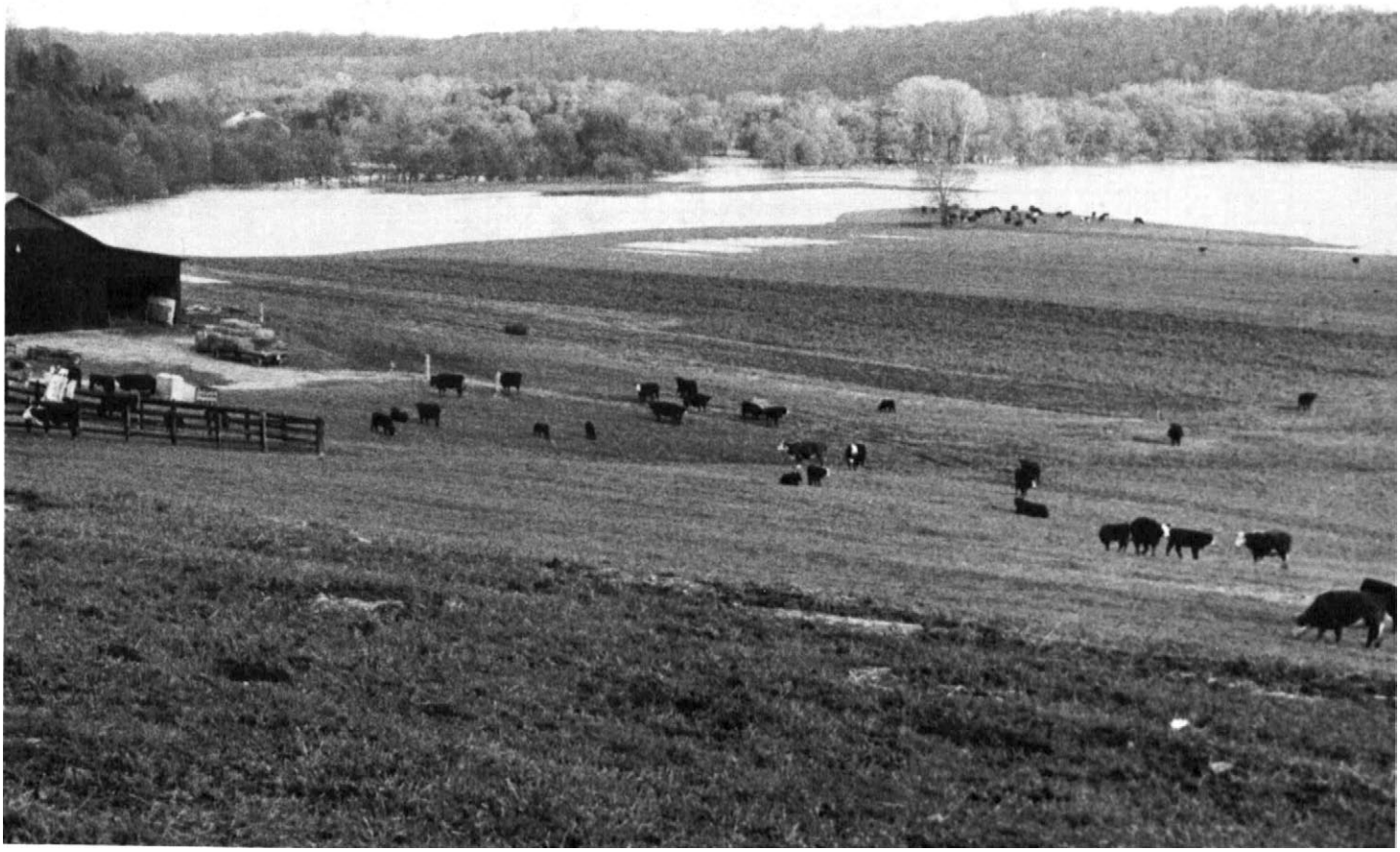


Figure 26.—Flooding in an area of Nolin silt loam, frequently flooded.

soils subject to occasional or rare flooding are also included.

Most of this Otwell soil is used for cultivated crops, hay, and pasture.

This soil is suited to most cultivated crops. The seasonal high water table can limit production of tobacco during wet growing seasons. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is slight. This soil can be cropped intensively if properly managed. Return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. The fragipan restricts rooting depth and can limit production of deep rooted legumes. The desired plants need to be maintained through renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are eastern white pine, black oak, white oak, shortleaf pine, and southern red oak. Plant competition is a management concern.

This soil is suited to some urban uses. Wetness and very slow permeability are limitations for most sanitary facilities. Wetness is a limitation for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Otwell soil is in capability subclass IIw and in woodland suitability group 3o.

OtB—Otwell silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on stream terraces throughout the survey area. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 75 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 62

Figure 27.—Flooding of cropland in an area of Nolin silt loam, frequently flooded.

inches. It is strong brown and yellowish brown silt loam to a depth of 26 inches; it has pale brown mottles in the lower part. A very firm, compact, and brittle fragipan extends to a depth of 42 inches. It is light yellowish brown silt loam in the upper part and has strong brown and light brownish gray mottles. It is yellowish brown silty clay loam in the lower part and has light brownish gray and strong brown mottles. The lower part of the subsoil to a depth of 62 inches is strong brown stratified silty clay loam and silty clay and has light brownish gray mottles.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to very strongly acid in the surface layer and is strongly acid or very strongly acid in the upper part of the subsoil and fragipan. It is slightly acid to strongly acid in the lower part of the subsoil. Permeability is very slow, and the available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 24 to 36 inches.

Included with this soil in mapping are small areas of Elk, Lawrence, and Newark soils. A few areas of soils subject to occasional or rare flooding are also included.

Most of this Otwell soil is used for cultivated crops. The seasonal high water table can limit production of tobacco during wet growing seasons. Crops respond well to applications of lime and fertilizer. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, and use of cover crops help to control erosion and to maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. The fragipan restricts rooting depth and can limit production of deep-rooted legumes. The desired plants need to be maintained through renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are eastern white pine, black oak, white oak, shortleaf pine, and southern red oak. Plant competition is a management concern.

This soil is suited to some urban uses. Wetness and very slow permeability are limitations for most sanitary facilities. Wetness is a limitation for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Otwell soil is in capability subclass IIe and in woodland suitability group 3o.

OtC—Otwell silt loam, 6 to 12 percent slopes. This deep, moderately well drained, sloping soil is on stream terraces throughout the survey area. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 125 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 62 inches. It is strong brown and yellowish brown silt loam to a depth of 26 inches; it has pale brown mottles in the lower part. A very firm, compact, and brittle fragipan extends to a depth of 42 inches. It is light yellowish brown silt loam in the upper part and has strong brown and light brownish gray mottles. It is yellowish brown silty clay loam in the lower part and has light brownish gray and strong brown mottles. The lower part of the subsoil to a depth of 62 inches is strong brown stratified silty clay loam and silty clay and has light brownish gray mottles.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to very strongly acid in the surface layer and strongly acid or very strongly acid in the upper part of the subsoil and fragipan. It is slightly acid to strongly acid in the lower part of the subsoil. Permeability is very slow, and the available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 24 to 36 inches.

Included with this soil in mapping are small areas of Elk, Lawrence, and Newark soils. A few areas of soils subject to occasional or rare flooding are also included.

Most of this Otwell soil is used for hay and pasture. Some areas are in cultivated crops.

This soil is suited to most cultivated crops. The seasonal high water table can limit production of tobacco during wet growing seasons. Crops respond well to lime and fertilizer. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, and use of cover crops help to control erosion and to maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay crops. The fragipan restricts rooting depth and can limit production of deep-rooted legumes. The desired plants need to be maintained through renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are eastern white pine, black oak, white oak, shortleaf pine, and southern red oak. Plant competition is a management concern.

This soil is suited to some urban uses. Wetness, steepness of slope, and very slow permeability are limitations for most sanitary facilities. Wetness is a limitation for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Otwell soil is in capability subclass IIIe and in woodland suitability group 3o.

OwB—Otwell silt loam, occasionally flooded, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on low stream terraces throughout the survey area. Slopes are about 75 to 300 feet in length, and the mapped areas are about 2 to 25 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 62 inches. It is strong brown and yellowish brown silt loam to a depth of 26 inches; it has pale brown mottles in the lower part. A very firm, compact, and brittle fragipan extends to a depth of 42 inches. It is light yellowish brown silt loam in the upper part and has strong brown and light brownish gray mottles. It is yellowish brown silty clay loam in the lower part and has light brownish gray and strong brown mottles. The lower part of the subsoil to a depth of 62 inches is strong brown stratified silty clay loam and silty clay and has light brownish gray mottles.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from neutral to very

strongly acid in the surface layer and is strongly acid or very strongly acid in the upper part of the subsoil and fragipan. It is slightly acid to strongly acid in the lower part of the subsoil. Permeability is very slow, and the available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 24 to 36 inches. This soil is subject to brief periods of occasional flooding usually from late in winter to early in spring.

Included with this soil in mapping are small areas of Elk, Lawrence, and Newark soils. A few areas of soils on slightly higher elevations than this Otwell soil and not subject to flooding and small areas of soils that have slopes of 0 to 2 percent are also included.

Most of this Otwell soil is used for cultivated crops, hay, and pasture.

This soil is suited to most cultivated crops. The seasonal high water table can limit production of tobacco during wet growing seasons. Small grain cover crops are sometimes damaged by flooding. Crops respond well to lime and fertilizer. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, and use of cover crops help to control erosion and to maintain desirable soil structure and organic matter content.

This soil is well suited to most pasture and hay. Some hay crops can be damaged by flooding. The fragipan restricts rooting depth and can limit production of deep-rooted legumes. The desired plants need to be maintained through renovation. Application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are eastern white pine, black oak, white oak, shortleaf pine, and southern red oak. Plant competition is a management concern.

This soil is suited to some urban uses. Flooding, wetness, and very slow permeability are limitations for sanitary facilities. The hazard of flooding and wetness are limitations for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Otwell soil is in capability subclass IIe and in woodland suitability group 3o.

Pt—Pits. This map unit consists of open excavations from which the soil has been removed and limestone or shale exposed so that it can be mined, conditioned, and stored for agricultural and industrial uses. The mapped areas are irregular in shape and are about 6 to 125 acres.

These open excavations do not support plants. The walls are vertical, and the flat bottoms are exposed bedrock. The excavations are as much as 100 feet deep and are usually several hundred feet in width.

Two of the larger areas in Bullitt County and a small area in Spencer County are limestone quarries. The limestone bedrock is removed and used for road material and agricultural lime. These areas in Bullitt County are in the same position on the landscape as Crider and Caneyville soils. The area in Spencer County is in the same position on the landscape as Faywood and Cynthiana soils.

One area in Bullitt County is in the greenish gray shale and black acid shale areas. These shales are removed and refined into material for making light-color concrete blocks. A small black shale area in Bullitt County provides shale for landfill cover and road material. These areas are in similar positions on the landscape as Carpenter, Lenberg, and Trappist soils.

These areas are poorly suited to agricultural or urban uses. Some selected spots, where overburden is stored, are suited to limited use as woodland.

Pits is in capability subclass VIIIs. It is not assigned to a woodland suitability group.

Sg—Sensabaugh gravelly loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains of the smaller streams in the Knobs area of Bullitt County. The mapped areas are about 5 to 180 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is brown gravelly loam about 8 inches thick. The subsoil, to a depth of 34 inches, is dark yellowish brown gravelly loam. The underlying material to a depth of 60 inches is very gravelly fine sandy loam.

This soil is medium in natural fertility and moderate in organic matter content. It ranges from medium acid to mildly alkaline throughout. Permeability is moderate and moderately rapid. The available water capacity is moderate. The root zone is deep. This soil is somewhat difficult to till because of the gravel in the surface layer. This soil is subject to very brief periods of occasional flooding usually from late in winter to early in spring.

Included with this soil in mapping are small areas of Elk, Newark, Nolin, and Otwell soils. A few areas of a soil similar to the Sensabaugh soil but underlain by soft greenish gray shale at a depth of 3 to 5 feet, areas of soils near streams and subject to frequent flooding, and areas that have slopes of more than 2 percent are also included.

Most of this Sensabaugh soil is used for cultivated crops, hay, and pasture. Some areas are in woodland.

This soil is suited to most cultivated crops. Small grain cover crops can be damaged by winter flooding. Conservation tillage, return of crop residue to the soil, and use of cover crops help to maintain desirable soil structure and organic matter content.

This soil is well suited to pasture and hay. Some hay crops can be damaged by flooding. The desired plants can be maintained through renovation, weed control,

proper stocking rates, and application of lime and fertilizer.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, black walnut, white oak, eastern white pine, shortleaf pine, and white ash. Plant competition is a management concern.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is poorly suited to urban uses. The hazard of flooding is the main limitation.

This Sensabaugh soil is in capability subclass IIs and in woodland suitability group 2o.

ShB—Shelbyville silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on convex ridgetops mostly in the western and central parts of Spencer County. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 100 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil to a depth of 37 inches is brown and dark yellowish brown silty clay loam. To a depth of 62 inches it is brown silty clay and has common yellowish brown and light yellowish brown mottles. The underlying material to a depth of 92 inches is light yellowish brown clay and has common strong brown and pale brown mottles.

This soil is high in natural fertility and moderate in organic matter content. It ranges from neutral to strongly acid in the upper part of the subsoil and from strongly acid to mildly alkaline in the lower part. Permeability is moderate and moderately slow. The available water capacity is high. The root zone is deep. This soil has good tilth and can be worked throughout a wide range of moisture content.

Included with this soil in mapping are small areas of Lowell and Nicholson soils. Also included is a soil similar to the Shelbyville soil but having a lighter colored surface layer, areas of soils that have slopes of 0 to 2 percent, and a few areas of eroded soils.

Most of this Shelbyville soil is used for cultivated crops, hay, and pasture.

This soil is well suited to cultivated crops. High yields can be obtained if properly managed. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, the use of cover crops, return of crop residue to the soil, and inclusion of grasses and legumes in the cropping system help to control erosion and maintain high yields.

This soil is well suited to pasture and hay. When properly managed, it produces high yields. The desired plants and yields can be maintained through renovation, the application of lime and fertilizer, proper stocking rates, rotation grazing, and weed control.

This soil has high potential productivity for woodland. The preferred trees are eastern white pine, black oak, shortleaf pine, yellow-poplar, black walnut, white ash, white oak, and northern red oak.

This soil is suited to most urban uses. The moderately slow permeability and the clayey texture in the lower part of the subsoil are limitations for some sanitary facilities. Shrinking and swelling is a limitation for some building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Shelbyville soil is in capability subclass IIe and in woodland suitability group 2o.

TrC—Trappist silt loam, 6 to 12 percent slopes, eroded. This moderately deep, well drained, sloping soil is on narrow, convex ridgetops and shoulder slopes in the Knobs area of Bullitt County. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 200 acres. About 25 to 75 percent of the original surface layer has been removed by erosion.

Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil, to a depth of 23 inches, is yellowish red silty clay. The underlying material, to a depth of 35 inches, is reddish brown very shaly silty clay and has many dark red and light olive gray mottles. Hard, black acid shale is at a depth of 35 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from strongly acid to extremely acid throughout. Permeability is moderately slow, and the available water capacity is moderate. This soil has good tilth except in areas where erosion has exposed the subsoil material. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Carpenter, Hagerstown, and Zanesville soils. Also included are a few areas of soils that have slopes of 2 to 6 percent.

This Trappist soil is used mostly for hay and pasture. A few areas are in cultivated crops or woodland.

Although this soil is suited to occasional cultivation, it is better suited to pasture and hay. Application of lime and fertilizer is important because of the acidity of this soil. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, inclusion of grasses and legumes in the cropping system, and use of cover crops help to prevent further erosion and maintain good tilth.

This soil is suited to most pasture and hay crops. Deep-rooted legumes can be difficult to establish and maintain because of the moderate depth of the root zone and the acidity of the subsoil and underlying material. The desired plants need to be maintained through frequent renovation. Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. Preferred trees are black oak, chestnut oak,

white oak, Virginia pine, and eastern white pine. Equipment limitations and plant competition are management concerns.

This soil is suited to some urban uses. Depth to bedrock, the clayey texture, and moderately slow permeability are limitations for most sanitary facilities. Depth to bedrock and moderate shrink-swell potential are limitations for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Trappist soil is in capability subclass IIIe and in woodland suitability group 3c.

TrD—Trappist silt loam, 12 to 30 percent slopes, eroded. This moderately deep, well drained, moderately steep and steep soil is on complex ridgetops, shoulder slopes, and hillsides in the Knobs area of Bullitt County. Slopes are about 50 to 300 feet in length, and the mapped areas are about 5 to more than 600 acres. Erosion has removed about 25 to 75 percent of the original surface layer.

Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil, to a depth of 23 inches, is yellowish red silty clay. The underlying material, to a depth of 35 inches, is reddish brown very shaly silty clay and has many dark red and light olive gray mottles. Hard, black acid shale is at a depth of 35 inches.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil ranges from strongly acid to extremely acid throughout. Permeability is moderately slow, and the available water capacity is moderate. This soil has good tilth except in areas where erosion has exposed the subsoil material. The root zone is moderately deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Carpenter, Lenberg, and Zanesville soils. Also included are a loamy soil that is less than 20 inches deep to black acid shale, small areas of a soil similar to Trappist soil but more than 40 inches deep to bedrock, and areas of soils that are not eroded.

Most of this Trappist soil is used as pasture and woodland.

This soil is poorly suited to cultivated crops. Past erosion and the very severe hazard of erosion are the main limitations.

This soil is suited to pasture and hay but requires good management to prevent further erosion. Deep-rooted legumes may be difficult to establish and maintain because of the moderate depth to bedrock and the acidity of the subsoil and underlying material. Plants that provide adequate ground cover and that do not require frequent renovation can help to prevent further erosion. Applications of lime and fertilizer, brush control, and rotation grazing are needed. The steep areas of this soil restrict the use of farm machinery.

This soil has moderately high potential productivity for woodland. The preferred trees are black oak, chestnut oak, white oak, Virginia pine, and eastern white pine. The hazard of erosion, equipment limitations, and plant competition are management concerns.

This soil is well suited to use as woodland wildlife habitat.

This soil is poorly suited to most urban uses. Steepness of slope and depth to bedrock are the main limitations.

This Trappist soil is in capability subclass VIe and in woodland suitability group 3c.

WoB—Woolper silty clay loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on concave foot slopes throughout Spencer County and in the eastern part of Bullitt County. Slopes are about 50 to 200 feet in length, and the mapped areas are about 3 to 35 acres.

Typically, the surface layer is dark brown silty clay loam about 10 inches thick. The subsoil is silty clay to a depth of 52 inches. It is dark brown in the upper part and yellowish brown and dark yellowish brown in the lower part. The underlying material to a depth of 80 inches is dark yellowish brown silty clay.

This soil is high in natural fertility and organic matter content. It ranges from mildly alkaline to slightly acid throughout. Permeability is moderately slow, and the available water capacity is high. This soil is somewhat difficult to till because of the silty clay loam surface layer. The root zone is deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Boonesboro, Elk, Lowell, and Nolin soils. Also included is a soil similar to Woolper soil but moderately well drained.

Most of the Woolper soil is used for pasture, hay, and cultivated crops.

This soil is well suited to cultivated crops. It produces high yields if properly managed. Diversion channels are commonly used to divert runoff from adjacent hillsides. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, inclusion of grasses and legumes in the cropping system, and use of cover crops help to control erosion and to maintain high yields.

This soil is well suited to pasture and hay and produces high yields if properly managed. The desired plants need to be maintained through renovation. Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, white ash, black oak, and white oak. Equipment limitations, seeding mortality and plant competition are management concerns.

This soil is suited to some urban uses. The clayey texture and moderately slow permeability are limitations for most sanitary facilities. The clayey texture and moderate shrink-swell potential are limitations for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Woolper soil is in capability class IIe and in woodland suitability group 2c.

WoC—Woolper silty clay loam, 6 to 12 percent slopes. This deep, well drained, sloping soil is on concave foot slopes throughout Spencer county and in the eastern part of Bullitt County. Slopes are about 75 to 300 feet in length, and the mapped areas are about 3 to 40 acres.

Typically, the surface layer is dark brown silty clay loam about 10 inches thick. The subsoil is silty clay to a depth of 52 inches. It is dark brown in the upper part and yellowish brown and dark yellowish brown in the lower part. The underlying material to a depth of 80 inches is dark yellowish brown silty clay.

This soil is high in natural fertility and organic matter content. It ranges from mildly alkaline to slightly acid throughout. Permeability is moderately slow, and the available water capacity is high. This soil is somewhat difficult to till because of the silty clay loam surface layer. The root zone is deep. This soil has moderate shrink-swell potential.

Included with this soil in mapping are small areas of Boonesboro, Elk, Faywood, Lowell, and Nolin soils. Also included is a soil similar to Woolper soil but moderately well drained.

Most of this Woolper soil is used for pasture and hay. Some areas are in cultivated crops.

This soil is suited to cultivated crops. It produces high yields if properly managed. Diversion channels are commonly used to divert runoff from adjacent hillsides. If this soil is cultivated, the hazard of erosion is very severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, inclusion of grasses and legumes in the cropping system, and use of cover crops help to control erosion and to maintain high yields.

This soil is well suited to pasture and hay and produces high yields if properly managed. The desired plants need to be maintained through renovation. Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has high potential productivity for woodland. The preferred trees are yellow-poplar, white ash, black oak, and white oak. Equipment limitations, seeding mortality, and plant competition are management concerns.

This soil is suited to some urban uses. The clayey texture, steepness of slope, and moderately slow permeability are limitations for most sanitary facilities. The clayey texture, moderate shrink-swell potential, and steepness of slope are limitations for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Woolper soil is in capability subclass IIIe and in woodland suitability group 2c.

ZaB—Zanesville silt loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on convex ridgetops in the western part of Bullitt County. Slopes are about 50 to 300 feet in length, and the mapped areas are about 3 to 100 acres.

Typically, the surface layer is brown silt loam about 2 inches thick. The subsurface layer, to a depth of 6 inches, is yellowish brown silt loam. The subsoil to a depth of 31 inches is yellowish brown and strong brown silt loam. It has common light brownish gray and brown mottles in the lower part. A very firm, compact, and brittle fragipan extends to a depth of 40 inches. It is yellowish brown silt loam and has common light olive gray and strong brown mottles. The subsoil to a depth of 53 inches is yellowish brown silty clay and has many olive gray mottles. The underlying material to a depth of 63 inches is yellowish brown silty clay.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil is very strongly acid or strongly acid throughout. Permeability is moderate above the fragipan and moderately slow to slow through the fragipan. The available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 24 to 36 inches.

Included with this soil is mapping are small areas of Carpenter, Lenberg, and Trappist soils. Also included are soils that are similar to the Zanesville soil, but one is well drained and does not have a fragipan and the other is underlain by black, acid shale bedrock.

Most of this Zanesville soil is used for pasture, hay, and woodland. Some areas are in cultivated crops. A large acreage is in Bernheim Forest.

This soil is suited to most cultivated crops. If this soil is cultivated, the hazard of erosion is moderate unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and to maintain good tilth.

This soil is suited to most pasture and hay crops. The fragipan restricts rooting depth and can limit production of deep-rooted legumes. The desired plants need to be maintained through frequent renovation. Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are eastern white pine,

shortleaf pine, black oak, and white oak. Plant competition is a management concern.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is suited to some urban uses. Slow and moderately slow permeability and wetness are limitations for most sanitary facilities. Wetness is a limitation for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Zanesville soil is in capability subclass IIe and in woodland suitability group 3o.

ZaC—Zanesville silt loam, 6 to 12 percent slopes. This deep, moderately well drained, sloping soil is on convex ridgetops and shoulder slopes in the western part of Bullitt County. Slopes are about 50 to 300 feet in length, and the mapped areas are about 3 to 80 acres.

Typically, the surface layer is brown silt loam about 2 inches thick. The subsurface layer, to a depth of 6 inches, is yellowish brown silt loam. The subsoil, to a depth of 31 inches, is yellowish brown and strong brown silt loam; it has common light brownish gray and brown mottles in the lower part. A very firm, compact, and brittle fragipan extends to a depth of 40 inches. It is yellowish brown silt loam and has common light gray and strong brown mottles. The subsoil, to a depth of 53 inches, is yellowish brown silty clay and has many olive gray mottles. The underlying material to a depth of 63 inches is yellowish brown silty clay.

This soil is medium in natural fertility and moderate in organic matter content. Except where the surface layer has been limed, this soil is very strongly acid or strongly acid throughout. Permeability is moderate above the fragipan and moderately slow to slow through the fragipan. The available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is moderately deep. A seasonal high water table is at a depth of 24 to 36 inches.

Included with this soil in mapping are small areas of Carpenter, Lenberg, and Trappist soils. Also included are soils that are similar to the Zanesville soil, but one is well drained and does not have a fragipan and the other is underlain by black, acid shale bedrock.

Most of this Zanesville soil is used for pasture, hay, and woodland. A few areas are in cultivated crops. A large acreage is in Bernheim Forest.

This soil is suited to most cultivated crops. If this soil is cultivated, the hazard of erosion is severe unless erosion control measures are used. Conservation tillage, return of crop residue to the soil, use of cover crops, and inclusion of grasses and legumes in the cropping system help to control erosion and to maintain good tilth.

This soil is suited to most pasture and hay crops. The fragipan restricts rooting depth and can limit production of deep-rooted legumes. The desired plants need to be maintained through frequent renovation. Applications of lime and fertilizer, proper stocking rates, rotation grazing, and weed control are needed.

This soil has moderately high potential productivity for woodland. The preferred trees are eastern white pine, shortleaf pine, black oak, and white oak. Plant competition is a management concern.

This soil is well suited to use as habitat for openland and woodland wildlife.

This soil is suited to some urban uses. Moderately slow permeability, wetness, and steepness of slope are limitations for most sanitary facilities. Wetness and steepness of slope are limitations for most building site development. Low strength is a limitation for local roads and streets and for use of the soil as roadfill material.

This Zanesville soil is in capability subclass IIIe and in woodland suitability group 3o.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Bullitt and Spencer Counties are listed.

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. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 6 percent.

About 68,960 acres, or 36 percent, of Bullitt County and about 23,595 acres, or 19 percent, of Spencer County meet the soil requirements of prime farmland. Areas are scattered throughout the survey area, but most are in general soil map units 1, 3, 5, and 7 in Bullitt County and 1, 3, and 4 in Spencer County.

The following map units, or soils, make up prime farmland in Bullitt and Spencer Counties. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 5. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Soils that have limitations, such as a high water table, flooding, or inadequate rainfall, may qualify as prime farmland if these limitations are overcome by such measures as drainage, flood control or irrigation. In the following list, the measures needed to overcome the limitations of a map unit, if any, are shown in parentheses after the map unit name. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

- BeB Beasley silt loam, 2 to 6 percent slopes
- Bo Boonesboro silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
- CaB Caneyville silt loam, 2 to 6 percent slopes
- CrB Crider silt loam, 2 to 6 percent slopes
- EkA Elk silt loam, 0 to 2 percent slopes
- EkB Elk silt loam, 2 to 6 percent slopes
- ElA Elk silt loam, occasionally flooded, 0 to 2 percent slopes
- ElB Elk silt loam, occasionally flooded, 2 to 6 percent slopes
- La Lawrence silt loam, rarely flooded (where drained)
- Le Lawrence silt loam (where drained)
- LoB Lowell silt loam, 2 to 6 percent slopes
- MaB Markland silt loam, rarely flooded, 2 to 6 percent slopes
- Mc McGary silt loam, rarely flooded (where drained)
- Mv McGary Variant silt loam, rarely flooded (where drained)
- Mo Montgomery silty clay loam (where drained)
- Ne Newark silt loam, frequently flooded (where drained and protected from flooding or not frequently flooded during the growing season)
- NhA Nicholson silt loam, 0 to 2 percent slopes
- NhB Nicholson silt loam, 2 to 6 percent slopes

No Nolin silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
OtA Otwell silt loam, 0 to 2 percent slopes
OtB Otwell silt loam, 2 to 6 percent slopes
OwB Otwell silt loam, occasionally flooded, 2 to 6 percent slopes
Sg Sensabaugh gravelly loam, occasionally flooded
ShB Shelbyville silt loam, 2 to 6 percent slopes
WoB Woolper silty clay loam, 2 to 6 percent slopes
ZaB Zanesville silt loam, 2 to 6 percent slopes

Use and Management of the Soils

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

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

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

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

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

Henry Amos, conservation agronomist, and Carl W. Hail, assistant state soil scientist, Soil Conservation Service, helped to prepare this section.

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

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

More than 162,000 acres in the survey was used for crops and pasture in 1967 *(13)*. Of this total, more than 82,000 acres were used for permanent pasture; 23,000 acres for row crops, mainly corn and tobacco; 3,300 acres for close grown crops, mainly wheat; 25,000 acres for rotation hay and pasture; and 12,500 acres for hay. The remainder of the acreage was mostly idle cropland, openland formerly cropped, and land in conservation use only. According to more recent reports, the acres of crops and pasture have not changed significantly in recent years, except for a substantial increase in row crops, mainly soybeans, in Spencer County. Urban expansion and the construction of the Taylorsville Dam have caused a decrease or shift in location of crops and pasture acreage in some areas and, in places, have resulted in crops on less desirable marginal land.

Cropland

The soils of Bullitt and Spencer Counties have some potential for increased crop production. According to the 1970 Kentucky Soil and Water Conservation Needs Inventory, about 15,200 acres of potentially good cropland was used as pasture, about 5,200 acres for woodland, and about 3,600 acres was idle or formerly cropped openland. A significant acreage of the better cropland has been removed from production since 1970 by urban expansion in Bullitt County and the Taylorsville Lake Project in Spencer County. This has caused a shift in crop production to some of the marginal, sloping soils. Crop production could be increased by applying the latest production techniques to all cropland in the area.

It was estimated that in 1967 there were about 7,400 acres of urban and built-up land in Bullitt and Spencer Counties. Since then these areas have increased dramatically, especially in Bullitt County, and in many areas, they have replaced cropland. This survey can help to make land use decisions that can influence the future

of farming in the survey area (see the section "General Soil Map Units").

Soil erosion is the major problem on most of the cropland and pasture in the survey area. If the slope is more than 2 percent, erosion is a hazard. Except for some of the nearly level flood plains and stream terraces, nearly all of the cropland and pasture in Bullitt and Spencer Counties is gently sloping to steep.

Loss of the surface layer through erosion is damaging for three reasons. First, productivity is reduced as organic matter and nutrients are lost, and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on the soils that have a clayey subsoil, such as Lowell and Beasley soils. Second, erosion further limits the depth of the root zone in soils that have a limiting layer in or below the subsoil or are shallow or moderately deep to bedrock. The Lawrence, Nicholson, and Otwell soils have a fragipan, and the Caneyville, Eden, and Faywood soils are moderately deep to bedrock. Third, erosion results in the pollution of ponds, lakes, and streams by sediment. This pollution impairs the quality of water for municipal and recreational use and for livestock, fish, and wildlife use.

Erosion control practices reduce damage from runoff and increase infiltration. A cropping system that keeps plant cover or crop residue on the soil for extended periods can hold soil losses to amounts that will not reduce the productive capacity of the soils.

The trend in Bullitt and Spencer Counties is erosion control through cultural practices, such as conservation tillage, crop rotations, and use of cover crops, instead of structural practices, such as terraces and diversions. Information on design and application of erosion control practices for each kind of soil in the survey area is available in the local offices of the Soil Conservation Service.

Soil drainage is the major management need on about 19 percent of the acreage used for crops and pasture in the survey area. Unless artificially drained, the somewhat poorly drained and very poorly drained soils are so wet that production of crops is restricted. The somewhat poorly drained and very poorly drained soils are the Lawrence, McGary, McGary Variant, Montgomery, and Newark soils. These soils make up about 31,000 acres of the survey area. On McGary and Montgomery soils, crop selection is restricted even with drainage. In most places, open ditch drainage is needed to remove excess water. Tile drainage has been used successfully on the McGary Variant and Newark soils. On the moderately well drained Nicholson and Otwell soils, artificial drainage is generally not needed, but crops that will tolerate occasional wetness need to be selected.

Pasture

A successful livestock program is dependent on a forage program that will supply large quantities of home-grown feeds of adequate quality. Such a program can furnish up to 78 percent of the feed for beef cattle and 66 percent for diary cattle *(8)*.

The soils in Bullitt and Spencer Counties vary widely in their capabilities and properties because of differences in depth to bedrock or limiting layers, internal drainage, ability to supply moisture, and many other properties. Grasses and legumes and grass-legumes combinations also vary in their ability to persist and produce on different soils. It is important to match the plant or mixture of plants to the different soils so that the greatest returns can be realized along with the maximum soil and water conservation.

The best use of nearly level to gently sloping soils that are deep and well drained is to plant the highest producing crops, such as corn silage, alfalfa, or a mixture of alfalfa-orchard grass or alfalfa-timothy. Steeper land should be maintained in sod-forming grasses, such as tall fescue or bluegrass, to minimize soil erosion. Alfalfa should be used with cool-season grasses where the soils are at least 2 feet deep to bedrock and are well drained. On soils less than 2 feet deep to bedrock or on soils that have drainage problems, clover-grass mixtures or pure grass stands can be used. Legumes can be established in grass-dominant sods through renovation.

Plants need to be adapted not only to the soil but also to the intended use. The plants selected need to provide maximum quality and versatility in the forage program. Legumes generally produce higher quality feed than grasses. The higher quality feed results in higher animal performance. Legumes should be used to the maximum extent possible. Taller growing legumes, such as alfalfa and red clover, are more versatile than a legume, such as white clover, which is used primarily for grazing. Grasses, such as orchardgrass, timothy, and tall fescue, are better adapted for hay and silage.

Tall fescue is an important cool-season grass suited to a wide range of soil conditions. It is used for both hay and pasture. Growth that occurs from August to November is commonly permitted to accumulate in the field and is "stockpiled" for deferred grazing late in fall and in winter. Nitrogen fertilizer is important for maximum production during the stockpiling period. Desired production levels determine the rate of application.

Warm-season grasses planted from early in April to late in May would alleviate the "summer slump" of cool-season grass pastures, such as tall fescue and Kentucky bluegrass. They produce well in warm weather, and their greatest growth is from mid-June to September. This is the time when cool-season grasses taper off. Some of the warm-season grasses are switchgrass, big bluestem, Indiangrass, and Caucasian bluestem.

One of the ways to increase yields of pasture and hay fields with a good stand of grass is by renovation. Renovation is the improvement of pasture and hay fields by partial destruction of the sod, plus liming, fertilizing, and seeding to reestablish desirable forage plants. Adding legumes to these fields provides high quality

feed. Legumes increase summer production and take nitrogen from the air. Alfalfa is the most efficient nitrogen-fixing legume in Kentucky. Other legumes in order of their nitrogen-fixing ability are red clover, Ladino clover, Korean lespedeza, and vetch.

For additional information on pasture and hay management, contact the local office of the Soil Conservation Service or the Kentucky Cooperative Extension Service.

Yields Per Acre

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

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

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

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. 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 rangeland, for woodland, and for engineering purposes.

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

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless a 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.

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

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

Woodland Management and Productivity

Charles A. Foster, forester, Soil Conservation Service, helped to prepare this section.

Bullitt and Spencer Counties are in the Western Forest region of Kentucky, a transitional area of intermediate moisture that has oak species dominating forest communities with increasing frequency. Commercial forest lands occupy 103,800 acres, or 54 percent of the land area, in Bullitt County and 28,200 acres, or 24 percent, in Spencer County *(10)*. The dominant forest types include oak-hickory on approximately 55 percent of the forest land, maple-beech-birch on 16 percent, oak-pine and loblolly-shortleaf pine on 12 percent each, elm-ash on 4 percent, and oak-gum on 1 percent.

Woodland tracts in the soil survey area are small private holdings of approximately 24 acres and are essentially unmanaged. Most land has the capability of growing 50 cubic feet or more of wood per acre per year, but actual growth is 33 cubic feet. The obstacles to management of private forest lands are that 30 percent of the landowners own woodland simply because it happens to be a part of the farm or tract, many stands are not well stocked with desirable high quality trees, and many tracts are owned less than 10 years.

Tree growth, stocking, and quality can be improved with proper management. This involves removal of low quality trees in fully stocked and understocked stands of all sizes and regeneration of sawtimber stands. Soil surveys are a useful management tool to identify Kentucky's most productive forest lands, soil limitations for woodland management, and preferred trees to favor or plant.

The woodland industry in Bullitt and Spencer Counties consists primarily of one commercial sawmill, five custom sawmills, and one pallet mill. Products produced are rough lumber, pallets, dimension stock, cross ties, firewood, and posts. Several mills in adjacent counties also buy logs and standing trees from the area.

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

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

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

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

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

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

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

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

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

Recreation

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

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

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

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle 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, 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

William H. Casey, biologist, Soil Conservation Service, helped to prepare this section.

The wildlife population of Spencer and Bullitt Counties is composed of an estimated 37 species of mammals, 43 species of terrestrial reptiles and amphibians, and 107 species of birds that nest here. Many of the more than 200 other kinds of birds that visit Kentucky can be found in these counties at sometime during the year.

The wildlife most important at present are those that furnish recreation in the form of hunting or economic gain in the form of trapping. In Spencer and Bullitt Counties, these are the gray squirrel, fox squirrel, white-tailed deer, raccoon, mink, muskrat, cottontail rabbit, bobwhite quail, and morning dove. Birdwatching for nongame species is also a popular activity for many outdoor enthusiasts.

Although there is much overlap in the habitat requirements of these animals, the gray squirrel, fox squirrel, and white-tailed deer are usually classified as woodland wildlife. The rabbit, quail, and dove are generally considered to be openland species, and those wildlife such as mink and muskrat, that spend most of their time in or about water are considered wetland wildlife.

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 *(3)*.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are

suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bluegrass, orchardgrass, clover, and alfalfa.

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

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

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

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

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

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

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

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

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, 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. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations.

For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

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

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

surface layer affect trafficability after vegetation is established.

Sanitary Facilities

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

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that 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 60 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

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

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

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

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

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

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

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

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

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

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit

revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and 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 the restrictive features that affect each soil for 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 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, boulders, or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

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

Soil Properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

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

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

Engineering Index Properties

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

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

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

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

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

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

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

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

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

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

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

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These 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 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

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

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency is expressed as *none, rare, common, occasional*, or *frequent. None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), and *long* (more than 7 days). Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

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

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

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

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

The results of physical analysis of two typical pedons in the survey area are given in table 18 and the results of chemical analysis in table 19. The data are for soils sampled at carefully selected sites. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." Soil samples were analyzed by the Kentucky Agricultural Experiment Station.

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 oven-dry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(15)*.

Coarse materials—(2-75 mm fraction) weight estimates of the percentages of all materials less than 75 mm (3B1).

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all materials less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).

Organic carbon—dichromate, ferric sulfate titration (6A1a).

Reaction (pH)—1:1 water dilution (8C1a).

Reaction (pH)—potassium chloride (8C1c).

Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (602), sodium (6P2), potassium (6Q2).

Extractable acidity—barium chloride-triethanolamine I (6H1a).

Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1a).

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).

Available phosphorus—procedure (656) Ky. Agric. Exp. Stn.

Field Sampling-site selection (1A1).

Field Sampling-Soil Sampling (1A2).

Laboratory Preparation-Standard (air dry) Material (1B1).

Particles less than specified size more than 2mm (2A2).

Particles less than 2mm (2A1).

Particles greater than 2mm By Field or Laboratory Weighing (3B1a).

Extractable Bases (5B1a).

Exchangeable Acidity (H+ Al) Method of Yuan Procedure 67-3.52, Part 2, Methods of Analysis, ASA, 1965.

Calcium Carbonate Equivalent. Procedure (236b) USDA Handbook 60, USDA Salinity Laboratory 1954 (6N7).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(14)*. 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 on laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

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

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

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

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

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (12)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (14)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Beasley Series

The Beasley series consists of deep, well drained soils that have moderately slow permeability. They formed in clayey residuum weathered from soft limestone, calcareous siltstone, sandstone, and shale. Beasley soils are on ridgetops, shoulder slopes, and hillsides. Slopes range from about 2 to 60 percent but are dominantly 6 to 12 percent.

Beasley soils are associated on the landscape with Caneyville, Crider, Faywood, and Nicholson soils and Rock outcrop. Caneyville and Faywood soils are moderately deep to limestone bedrock. Crider soils are

loamy in the upper part of the subsoil. Nicholson soils are moderately well drained and have a fragipan. Limestone Rock outcrop is mapped in a complex with Beasley soils.

A typical pedon of Beasley silt loam, 6 to 12 percent slopes, eroded; in Bullitt County, about 0.85 mile southeast of Mount Washington, 220 yards northeast of U.S. Highway 31E:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; few small black concretions; neutral; abrupt smooth boundary.

B2t—5 to 21 inches; strong brown (7.5YR 5/6) silty clay; moderate medium subangular blocky structure; firm, sticky, and plastic; few fine and medium roots; nearly continuous clay films on faces of peds; medium acid; gradual wavy boundary.

B3t—21 to 26 inches; strong brown (7.5YR 5/6) silty clay; common medium distinct mottles of yellowish brown (10YR 5/6); moderate medium subangular blocky structure; firm, sticky, and plastic; few fine roots; nearly continuous clay films on faces of peds; medium acid; gradual wavy boundary.

C—26 to 46 inches; yellowish brown (10YR 5/6) clay; common medium distinct mottles of pale brown (10YR 6/3); massive; very firm, sticky, and plastic; common small black concretions; moderately alkaline, calcareous; clear smooth boundary.

Cr—46 to 50 inches; soft calcareous siltstone and shale.

Thickness of the solum ranges from 20 to 40 inches, and depth to soft calcareous bedrock is 40 inches or more. Coarse fragments of limestone, shale, or siltstone range from 0 to 10 percent in the solum and from 0 to 35 percent in the upper part of the C horizon. The soil ranges from very strongly acid to neutral in the upper part of the solum and from medium acid to moderately alkaline in the lower part. It ranges from neutral to moderately alkaline in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2, 3, or 4. It is silt loam or silty clay loam. In some pedons, an A1 horizon less than 6 inches thick has value of 3 and chroma of 2.

In some pedons, a B1 horizon, 3 to 8 inches thick, has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. It is silty clay loam.

The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. In some pedons, this horizon has few to many mottles in shades of red, brown, or yellow in the upper part and in shades of gray in the lower part. The B2 horizon is silty clay or clay.

The B3 horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 to 8. In some pedons, this horizon has few to many mottles in shades of red, brown, yellow, or gray. The B3 horizon is silty clay or clay.

The C horizon has matrix colors and mottles in shades of gray, olive, and brown. It is clay, silty clay, or their cherty or channery analogs.

Boonesboro Series

The Boonesboro series consists of moderately deep, well drained soils that have rapid permeability. The soils have a dark surface layer and formed in alluvial material that washed from soils on uplands of limestone, siltstone, and shale origin. Boonesboro soils are on flood plains in narrow valleys. Slopes range from 0 to 2 percent.

Boonesboro soils are associated on the landscape with the Newark, Nolin, and Woolper soils. All of the associated soils are deep to bedrock. Newark soils are somewhat poorly drained, and Newark and Nolin soils have ochric epipedons. Woolper soils are in a fine family and are on foot slopes.

A typical pedon of Boonesboro silt loam, frequently flooded; in Bullitt County, about 1 mile southeast of Mount Washington, 0.5 mile northeast of U.S. Highway 150, 150 feet northwest of Mulberry Run:

Ap—0 to 12 inches; dark brown (10YR 3/3) silt loam; moderate medium subangular blocky structure parting to moderate medium granular; friable; many fine and medium roots; mildly alkaline; clear smooth boundary.

B21t—12 to 22 inches; dark yellowish brown (10YR 4/4) gravelly silt loam; moderate medium subangular blocky structure; friable; few fine and medium roots; 15 percent limestone fragments 1/16 to 1/2 inch in diameter; mildly alkaline; clear smooth boundary.

B22—22 to 28 inches; dark yellowish brown (10YR 4/4) very gravelly loam; weak fine subangular blocky structure; friable; 50 percent coarse fragments 1/16 to 1 inch in diameter; mildly alkaline; gradual smooth boundary.

R—28 inches; limestone bedrock.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. The soil ranges from slightly acid to mildly alkaline throughout. Coarse fragments range from 0 to 20 percent in the A horizon and from 15 to 60 percent in the B horizon.

The A horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 or 3. It is silt loam.

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

In some pedons, a C horizon, 2 to 4 inches thick, has similar color and texture ranges as the B horizon.

Caneyville Series

The Caneyville series consists of moderately deep, well drained soils that have moderately slow permeability. They formed in clayey residuum weathered from limestone. Caneyville soils are on ridgetops, shoulder slopes, and hillsides mostly in the eastern part of Bullitt County. Some areas are karst. Slopes range from 2 to 40 percent but are dominantly 6 to 12 percent.

Caneyville soils are associated on the landscape with Beasley, Crider, Garmon, and Hagerstown soils. Beasley soils are deep to soft limestone and calcareous siltstone and shale. Crider soils are loamy in the upper part of the subsoil and are deep to bedrock. Garmon soils formed in loamy residuum from shaly limestone and calcareous siltstone and shale. Hagerstown soils are deep to bedrock.

A typical pedon of Caneyville silt loam, 6 to 12 percent slopes, eroded; in Bullitt County, about 3.5 miles southwest of Mount Washington, 370 yards west of the junction of Bogard Lane and Oak Ridge Drive, 150 feet west of a gravel road:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam, weak fine granular structure; very friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

B1—5 to 10 inches; yellowish red (5YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots; very strongly acid; gradual smooth boundary.

B21t—10 to 21 inches; yellowish red (5YR 4/6) silty clay; moderate medium angular blocky structure; firm, sticky, and plastic; few fine roots; nearly continuous clay films on faces of peds; strongly acid; clear wavy boundary.

B22t—21 to 33 inches; yellowish red (5YR 4/6) clay; common medium distinct mottles of pale brown (10YR 6/3) and light gray (10YR 7/2); moderate medium angular blocky structure; very firm, sticky, and plastic; nearly continuous clay films on faces of peds; common dark brown and black concretions; medium acid; abrupt smooth boundary.

R—33 inches; limestone bedrock.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Coarse fragments range from 0 to 10 percent in the solum. The soil ranges from very strongly acid to neutral in the upper part of the solum and from medium acid to mildly alkaline in the lower part.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. In some pedons, an A1 horizon less than 5 inches thick has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 or 3. The Ap horizon is silt loam.

The B1 horizon has hue of 10YR to 5YR, value of 5 or 6, and chroma of 4 to 6. It is silt loam or silty clay loam.

The B21t horizon has hue of 5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam, silty clay, or clay.

The B22t horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, chroma of 4 to 6, and has few to many mottles in shades of brown, red, or gray. It is silty clay or clay.

In some pedons, a B3 or C horizon has texture similar to the B22t horizon. Colors are in shades of red, brown, olive, or gray.

Carpenter Series

The Carpenter series consists of deep, well drained soils that have moderate permeability. They formed in colluvium over greenish gray shale. Carpenter soils are mostly in the Knobs area of Bullitt County and are on hillsides and narrow ridgetops. Slopes range from 20 to 40 percent.

The Carpenter soils are associated on the landscape with the Garmon, Lenberg, Trappist, and Zanesville soils. The Garmon soils are moderately deep to bedrock and formed in loamy residuum from shaly limestone and calcareous siltstone and shale. Lenberg soils are in a fine family and are moderately deep to soft greenish gray shale. The Trappist soils are in a clayey family and are moderately deep to hard black acid shale. The Zanesville soils are moderately well drained and have a fragipan.

A typical pedon of Carpenter flaggy silt loam, in an area of Lenberg-Carpenter complex, 20 to 40 percent slopes; in Bullitt County, about 1.7 miles east of Clermont, 0.6 mile north of Kentucky Highway 245, and 200 feet west of a gravel road:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) flaggy silt loam; weak fine granular structure; very friable; many fine and medium roots; 20 percent siltstone fragments 4 to 18 inches in length and 3 to 6 inches thick; strongly acid; clear wavy boundary.

A2—3 to 6 inches; yellowish brown (10YR 5/4) flaggy silt loam; weak fine and very fine subangular blocky structure parting to weak fine granular; very friable; many fine and medium roots; 15 percent siltstone fragments 1/2 inch to 2 inches across and 15 percent siltstone flagstones; very strongly acid; clear smooth boundary.

B1—6 to 10 inches; yellowish brown (10YR 5/6) flaggy silt loam; weak fine and medium subangular blocky structure; very friable; many fine and medium roots; 10 percent siltstone fragments 1/2 inch to 2 inches across and 10 percent siltstone flagstones; very strongly acid; clear wavy boundary.

B21t—10 to 15 inches; strong brown (7.5YR 5/6) gravelly silt loam; moderate fine and medium subangular blocky structure; friable; thin patchy clay films on faces of peds; 18 percent siltstone fragments 1/2 inch to 3 inches in diameter; very strongly acid; gradual wavy boundary.

B22t—15 to 25 inches; strong brown (7.5YR 5/6) gravelly silty clay loam; common medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; common fine, medium, and coarse roots; thin nearly continuous yellowish red (5YR 5/6) clay films on faces of peds; 20 percent siltstone fragments, 1/2 inch to 3 inches in diameter and 5 percent siltstone flagstones; very strongly acid; gradual wavy boundary.

B23t—25 to 35 inches; yellowish red (5YR 5/6) gravelly silty clay loam; common medium distinct olive gray (5Y 5/2) and light yellowish brown (2.5Y 6/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine and medium roots; thin nearly continuous clay films on faces of peds; 18 percent siltstone fragments 1/4 inch to 3 inches in diameter; very strongly acid; gradual wavy boundary.

IIB3—35 to 46 inches; dark yellowish brown (10YR 4/4); silty clay loam; many medium distinct yellowish red (5YR 5/6) and few medium distinct greenish gray (5GY 6/1) mottles; weak coarse prismatic structure; firm, sticky, and plastic; few fine roots; 10 percent siltstone fragments 1/4 inch to 2 inches in diameter; very strongly acid; gradual wavy boundary.

IIC—46 to 51 inches; dark yellowish brown (10YR 4/4) silty clay loam, common medium distinct greenish gray (5GY 6/1) mottles; relict shale structure; firm, sticky, and plastic; few fine roots along interstices; 15 percent brown and gray shale fragments, 1/4 inch to 2 inches across; very strongly acid; clear wavy boundary.

IICr—51 to 54 inches; greenish gray shale interbedded with layers of fractured siltstone rock 3 to 8 inches thick.

Thickness of the solum ranges from 40 to 60 inches, and depth to soft shale bedrock is 40 to 80 inches or more. Siltstone and shale fragments, mostly 1/4 inch to 15 inches across, range from 2 to 20 percent in the A horizon, from 5 to 35 percent in the B horizon, and from 5 to 20 percent in the IIB and IIC horizons. The soil ranges from very strongly acid to slightly acid in the upper part of the solum and from very strongly acid to medium acid in the lower part of the solum and in the C horizon.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is flaggy silt loam.

The A2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2, 3, or 4. It is flaggy silt loam. Cultivated soils have an Ap horizon that has similar color and texture ranges as the A2 horizon.

The B1 horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam, silty clay loam, or their gravelly, channery, or flaggy analogs.

The B2t horizon has hue of 5YR, 7.5YR, 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 4 to 8. It has few to many gray, brown, or red mottles in the lower part of the horizon. The B2t horizon is silty clay loam, clay loam, loam, or their gravelly, channery, or flaggy analogs.

The IIB3 and IIC horizons have hue of 7.5YR, 10YR, 2.5Y, or 5Y; value of 4 to 7; and chroma of 3 to 8. It has few to many gray, brown, or red mottles. The IIB3 and IIC horizons are silty clay loam, silty clay, clay, or their gravelly, channery, or shaly analogs.

Crider Series

The Crider series consists of deep, well drained soils that have moderate permeability. They formed in a loess mantle over clayey residuum weathered from limestone. Crider soils are on ridgetops and shoulder slopes, mostly in the eastern part of Bullitt County. Some areas are karst. Slopes range from 2 to 20 percent but are dominantly 2 to 6 percent.

Crider soils are associated on the landscape with Beasley, Caneyville, Hagerstown, and Nicholson soils. Beasley soils have a clayey subsoil. Caneyville soils are moderately deep to limestone bedrock and have a clayey subsoil. Hagerstown soils are clayey in the upper part of the subsoil. Nicholson soils have a fragipan and are moderately well drained.

A typical pedon of Crider silt loam, 2 to 6 percent slopes; in Bullitt County, about 7 miles northeast of Shepherdsville, 500 yards southwest of the junction of Kentucky Highway 44 and Bogard Lane, 250 yards west of Bogard Lane:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine roots; slightly acid; clear smooth boundary.

B21t—9 to 19 inches; brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films; dark brown iron and manganese concretions; slightly acid; gradual wavy boundary.

B22t—19 to 37 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin continuous clay films; common dark brown and black iron and manganese concretions; few light yellowish brown (10YR 6/4) silt coatings; medium acid; clear wavy boundary.

IIB23t—37 to 58 inches; yellowish red (5YR 4/6) silty clay loam; moderate coarse and medium subangular blocky structure; firm; thin continuous clay films; common dark brown iron and manganese concretions; few light yellowish brown silt coatings on faces of peds; strongly acid; abrupt smooth boundary.

IIB24t—58 to 84 inches; red (10YR 4/6) silty clay; common medium distinct mottles of pale brown (10YR 6/3); moderate coarse and medium subangular blocky structure; firm; nearly continuous

clay films; common dark brown iron and manganese concretions; few angular chert fragments 2 to 4 inches across; strongly acid.

Thickness of the solum is more than 60 inches. Depth to bedrock ranges from 60 to more than 100 inches. The soil ranges from neutral to strongly acid to a depth of about 40 inches and from medium acid to very strongly acid below a depth of 40 inches.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

In some pedons, a B1 horizon up to 10 inches thick has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam.

The B21t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is silt loam or silty clay loam.

The B22t horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is silt loam or silty clay loam.

The IIB2t horizon has hue of 5YR, 2.5YR, or 10R; value of 3 to 5; and chroma of 4 or 6. In some pedons, this horizon has mottles in shades of red, brown, yellow, or gray. It is silty clay loam in the upper part of the horizon and silty clay or clay in the lower part. Coarse fragments, mostly chert, range from 0 to 5 percent.

Cynthiana Series

The Cynthiana series consists of shallow, well drained soils that have moderately slow permeability. They formed in clayey residuum derived from limestone. These soils are on hillsides mostly in the central and eastern parts of the survey area. Slopes range from 12 to 30 percent.

Cynthiana soils are associated on the landscape with Faywood, Fairmount, and Lowell soils. Faywood soils are moderately deep to bedrock, and Lowell soils are deep to bedrock. Fairmount soils are shallow and have a mollic epipedon.

A typical pedon of Cynthiana silty clay loam, in an area of Faywood-Cynthiana complex, 12 to 30 percent slopes; in Spencer County, about 2.7 miles northwest of Taylorsville, 1 mile northwest of the junction of Kentucky Highway 1633 and Mike Brown Road, 200 feet south of Mike Brown Road:

Ap—0 to 5 inches; brown (10YR 4/3) silty clay loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

B21t—5 to 13 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm, sticky, and plastic; common fine roots; thin nearly continuous clay films on faces of peds; few dark brown concretions; 5 percent limestone fragments 1 to 4 inches across; mildly alkaline; gradual wavy boundary.

B22t—13 to 17 inches; light olive brown (2.5Y 5/4) clay; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium angular and subangular blocky structure; very firm, sticky, and plastic; nearly continuous clay films on faces of peds; 10 percent limestone fragments 1 to 4 inches across; mildly alkaline; clear smooth boundary.

R—17 inches; hard limestone bedrock.

Thickness of the solum and depth to bedrock are 10 to 20 inches. Reaction ranges from slightly acid to mildly alkaline. Limestone fragments range from 0 to 15 percent in the A horizon and from 5 to 20 percent in the B horizon.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3 or 4. It is silty clay loam.

The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 or 6. It is silty clay, clay, or their channery or flaggy analogs.

Eden Series

The Eden series consists of moderately deep, well drained soils that have slow permeability. They formed in clayey residuum derived from soft calcareous shale interbedded with thin layers of limestone and siltstone. Eden soils are on hillsides, shoulder slopes, and narrow ridgetops mostly in the eastern part of Spencer County. Slopes range from 6 to 30 percent but are dominantly 20 to 30 percent.

Eden soils are associated on the landscape with Faywood, Lowell, and Nicholson soils. The associated soils are underlain by hard limestone bedrock interbedded with thin layers of calcareous shale and siltstone. Faywood soils are less than 40 inches deep to a lithic contact, and Lowell soils are deep to bedrock. Nicholson soils are moderately well drained and have a fragipan.

A typical pedon of Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded; in Spencer County, about 3 miles east of Taylorsville, 1 mile southeast of the junction of Kentucky Highway 44 and Kelien Lane, 350 yards north of Beech Creek:

Ap—0 to 5 inches; brown (10YR 5/3) flaggy silty clay; weak fine subangular blocky structure; slightly firm; many fine roots; 5 percent siltstone fragments 1/4 to 1/2 inch across and 20 percent limestone flags; neutral; clear smooth boundary.

B2t—5 to 16 inches; light olive brown (2.5Y 5/4) silty clay; strong fine and medium angular blocky structure; firm, sticky, and plastic; common fine and medium roots; nearly continuous clay films on faces of peds; 10 percent weathered shale and siltstone fragments 1/4 inch to 3 inches across; slightly acid; clear smooth boundary.

B3—16 to 26 inches; olive brown (2.5Y 4/4) flaggy clay; few medium distinct mottles of pale brown (10YR 6/3) and yellowish brown (10YR 5/6); weak medium and coarse angular blocky structure; very firm, sticky, and plastic; common fine and medium roots; common thin clay films on faces of peds; 15 percent limestone flags and 10 percent siltstone and shale fragments, 1/2 inch to 3 inches across; neutral; clear smooth boundary.

Cr—26 to 59 inches; slightly weathered olive brown (2.5Y 4/4) and yellowish brown (10YR 5/6) interbedded siltstone and calcareous shale and thin strata of fractured limestone.

Thickness of the solum ranges from 14 to 40 inches. Depth to a paralithic contact ranges from 20 to 40 inches. Coarse fragments of limestone, siltstone, and shale range from 0 to 25 percent in the A horizon and from 10 to 35 percent in the B horizon. The soil ranges from strongly acid to moderately alkaline.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silty clay loam, silty clay, or their flaggy analogs.

A B1 horizon, 2 to 6 inches thick, is in some pedons. It is silty clay loam.

The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. In some pedons, it is mottled in shades of olive and brown. The B2t horizon is silty clay, clay, or their flaggy analogs.

The B3 horizon has similar color and texture ranges as the B2t horizon. In some pedons, it has mottles that have chroma of 2 in the lower part of the argillic horizon. The gray color is considered to be inherited from the parent material.

In some pedons, a C horizon has hue of 2.5Y, 5Y, or 5GY; value of 4 to 6; and chroma of 1 to 4. It is commonly mottled in shades of gray, olive, or brown. The C horizon is flaggy or very flaggy silty clay or clay. Coarse fragments of limestone, siltstone, and shale range from 25 to 75 percent. This horizon ranges from mildly alkaline to strongly alkaline.

Elk Series

The Elk series consists of deep, well drained soils that have moderate permeability. They formed in mixed alluvium on stream terraces. Slopes range from 0 to 12 percent.

Elk soils are associated on the landscape with the Lawrence, Newark, Nolin, and Otwell soils. Lawrence and Otwell soils have a fragipan. Lawrence soils are somewhat poorly drained, and Otwell soils are moderately well drained. Newark soils are somewhat poorly drained. Newark and Nolin soils are on flood plains and do not have an argillic horizon.

A typical pedon of Elk silt loam, 2 to 6 percent slopes; in Spencer County, about 1.1 miles north of Taylorsville, 0.8 mile east of Kentucky Highway 1633, 135 yards north of a private road:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable, common fine roots; neutral; clear smooth boundary.

B21t—10 to 23 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—23 to 42 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin nearly continuous clay films; medium acid; gradual wavy boundary.

B23t—42 to 50 inches; brown (7.5YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; thin patchy clay films on faces of peds; 2 percent limestone fragments 1/4 to 1/2 inch in diameter; common dark brown concretions; very strongly acid; gradual wavy boundary.

C—50 to 70 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; common dark brown concretions; strongly acid.

Thickness of the solum ranges from 40 to 60 inches, and depth to bedrock ranges from 5 to more than 20 feet. Coarse fragments range from none to 5 percent in the upper 40 inches of the solum and from none to 35 percent in the underlying layers. The soil ranges from slightly acid to very strongly acid throughout, except where the surface layer has been limed.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

In some pedons, a B1 horizon, 3 to 8 inches thick, has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is silt loam or silty clay loam.

The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. In some pedons, it has few to common gray mottles in the lower part of the argillic horizon. The B2t horizon is silt loam or silty clay loam.

The C horizon has color ranges similar to the B2t horizon. It is mostly silt loam or silty clay loam, but in some pedons, there are thin stratified layers of fine sandy loam, loam, clay loam, or silty clay.

Fairmount Series

The Fairmount series consists of shallow, well drained soils that have moderately slow and slow permeability. They formed in clayey residuum derived from limestone. These soils are on hillsides and bluffs principally along the larger streams. Slopes range from 30 to 60 percent.

Fairmount soils are associated on the landscape with Cynthiana, Faywood, and Woolper soils. Cynthiana and

Faywood soils have ochric epipedons. Faywood soils are moderately deep to bedrock. Woolper soils are deep to bedrock and are on foot slopes.

A typical pedon of Fairmount silty clay loam, from an area of Faywood-Fairmount-Woolper complex, 30 to 60 percent slopes; in Spencer County, about 2 miles west of Waterford, 1.2 miles south of the junction of Kentucky Highway 44 and Goose Creek Road, 140 yards southeast of Goose Creek Road, 150 feet southwest of a private road:

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak fine and medium granular structure; friable; common fine and medium roots; 5 percent limestone fragments 1 to 3 inches across; mildly alkaline; clear smooth boundary.
B21—7 to 13 inches; dark yellowish brown (10YR 4/4) silty clay; moderate medium subangular blocky structure; firm, sticky, and plastic; common medium and coarse roots; 10 percent limestone fragments 1 to 6 inches across; mildly alkaline; clear wavy boundary.
B22—13 to 16 inches; dark yellowish brown (10YR 4/4) flaggy clay; weak coarse subangular blocky structure; very firm, sticky, and plastic; few fine and medium roots; 25 percent limestone flags and channers 3 to 10 inches across; moderately alkaline; abrupt smooth boundary.
R—16 inches; hard limestone bedrock.

Thickness of the solum and depth to bedrock range from 10 to 20 inches. The soil ranges from neutral to moderately alkaline throughout. Limestone fragments range from 5 to 35 percent.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 2 or 3. It is silty clay loam.

The B2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silty clay loam, silty clay, clay, or their flaggy analogs. In some pedons, the horizon has few to common mottles in shades of brown, gray, or olive.

Faywood Series

The Faywood series consists of moderately deep, well drained soils that have moderately slow and slow permeability. They formed in clayey residuum derived from limestone interbedded with calcareous shale and siltstone. Faywood soils are on ridgetops, shoulder slopes, and hillsides. Slopes range from 6 to 60 percent but are dominantly 12 to 20 percent.

Faywood soils are associated on the landscape with the Beasley, Eden, Cynthiana, Fairmount, Lowell, and Nicholson soils. Beasley soils are deep to soft limestone, calcareous siltstone, and shale. Eden soils are underlain by interbedded soft calcareous shale, siltstone, and limestone and have a lithic contact at a depth of 20 to 40 inches. Cynthiana soils are shallow to bedrock and have common coarse fragments in the upper part of the solum. Fairmount soils are shallow to bedrock and have a mollic epipedon. Lowell soils are deep to bedrock. Nicholson soils are moderately well drained and have a fragipan.

A typical pedon of Faywood silt loam, 6 to 12 percent slopes, eroded; in Spencer County, about 1.1 mile northeast of Waterford, 0.5 mile east of Kentucky Highway 1060:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; slightly acid; clear smooth boundary.
B21t—5 to 16 inches; yellowish brown (10YR 5/6) silty clay; moderate medium subangular blocky structure; firm, sticky, and plastic; few fine roots; thin continuous clay films on faces of peds; strongly acid; gradual wavy boundary.
B22t—16 to 30 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; very firm, sticky, and plastic; few fine roots; thin continuous clay films on faces of peds; few small dark brown and black concretions; strongly acid; abrupt smooth boundary.
R—30 inches; hard limestone bedrock.

Thickness of the solum and depth to limestone bedrock range from 20 to 40 inches. Coarse fragments of limestone and shale range from 0 to 15 percent in the solum. The soil ranges from strongly acid to mildly alkaline.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is silt loam or silty clay loam. An A1 horizon, present in some pedons in wooded areas, has hue of 10YR, value of 3, and chroma of 2 or 3.

The B2t horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 or 5; and chroma of 4 through 8. In some pedons, this horizon has mottles that have chroma of 2 in the lower part of the argillic horizon. The B2t horizon is silty clay loam, silty clay, or clay.

In some pedons, a B3 or C horizon has similar color and texture ranges as the lower part of the B2t horizon.

Garmon Series

The Garmon series consists of moderately deep, well drained soils that have moderately rapid permeability. They formed in loamy residuum from shaly limestone and calcareous siltstone and shale. Garmon soils are on the steep to very steep, upper Knob hillsides of Bullitt County. Slopes range from 25 to 60 percent.

The Garmon soils are associated on the landscape with the Caneyville, Carpenter, and Lenberg soils. Caneyville soils are in a fine family and are underlain by hard limestone bedrock. Carpenter soils are deep and formed in loamy colluvium underlain by soft greenish

gray shale. Lenberg soils are in a fine family and are underlain by soft greenish gray shale.

A typical pedon of Garmon silt loam, 25 to 60 percent slopes; in Bullitt County, about 2.4 miles west of Brooks, 1 mile west of the junction of Kentucky Highway 1526 and Holsclaw Hill Road, 275 yards east of Knob Creek:

O1—1 inch to 0; deciduous leaf litter.
A1—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; very friable; many medium and coarse roots; 10 percent siltstone fragments 1/4 inch to 2 inches across; medium acid; clear wavy boundary.
A2—2 to 5 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many medium and coarse roots; 5 percent siltstone fragments 1/4 inch to 2 inches in length; strongly acid; clear wavy boundary.
B21—5 to 13 inches; yellowish brown (10YR 5/4) silt loam; weak fine and medium subangular blocky structure; friable; common medium and coarse roots; 10 percent siltstone fragments 1/4 inch to 2 inches in length; strongly acid; clear smooth boundary.
B22—13 to 21 inches; yellowish brown (10YR 5/6) channery silty clay loam; moderate medium subangular blocky structure; friable; common medium and coarse roots; 15 percent siltstone and shale fragments 1/2 inch to 3 inches in length; medium acid; clear smooth boundary.
B3—21 to 29 inches; light yellowish brown (10YR 6/4) very channery loam; weak fine and medium subangular blocky structure; friable; 40 percent siltstone fragments 1/4 inch to 4 inches in length; medium acid; clear smooth boundary.
R—29 inches; siltstone bedrock.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Siltstone, limestone, and shale fragments 1/2 inch to 10 inches in length range from about 2 to 40 percent throughout the soil profile and average about 10 to 25 percent in the B horizon. The soil ranges from very strongly acid to neutral in the upper part of the solum and from medium acid to neutral in the lower part.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. It is silt loam.

The A2 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. It is silt loam. An Ap horizon that has similar color and texture ranges as the A2 horizon is in some areas.

The B2 horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 to 6; and chroma of 4 or 6. It is silt loam, loam, silty clay loam, or their channery, flaggy, or shaly analogs.

A B3 horizon or C horizon that has similar color and texture ranges as the B2 horizon is in some pedons.

Hagerstown Series

The Hagerstown series consists of deep, well drained soils that have moderate permeability. They formed in clayey residuum from limestone. Hagerstown soils are mostly in the western part of Bullitt County and are on ridgetops and shoulder slopes. Slopes range from 6 to 12 percent.

The Hagerstown soils are associated on the landscape with Caneyville, Crider, and Nicholson soils. Caneyville soils are moderately deep to bedrock. Crider soils are loamy in the upper part of the subsoil. Nicholson soils are moderately well drained and have a fragipan.

A typical pedon of Hagerstown silt loam, 6 to 12 percent slopes, eroded; in Bullitt County, about 1.7 miles west of Clermont, 0.3 mile northeast of the junction of Interstate Highway 65 and Kentucky Highway 245, 150 yards east of Interstate Highway 65, in the Bullitt County Fairgrounds:

Ap—0 to 5 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure parting to weak fine granular; very friable; many fine roots; slightly acid; clear smooth boundary.
B1—5 to 16 inches; reddish brown (5YR 4/4) silt loam; moderate medium, fine, and very fine subangular blocky structure; friable; common fine roots; thin patchy clay films on faces of peds; slightly acid; gradual smooth boundary.
B21t—16 to 34 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky, and plastic; few fine roots; thin nearly continuous clay films on faces of peds; slightly acid; gradual smooth boundary.
B22t—34 to 48 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky, and plastic; thin patchy clay films on faces of peds; few small black concretions; medium acid; gradual smooth boundary.
B23t—48 to 53 inches; yellowish red (5YR 4/6) clay; weak medium subangular blocky structure; very firm, sticky, and plastic; thin patchy clay films on faces of peds; few angular chert fragments 1/4 inch across; neutral; clear smooth boundary.
R—53 inches; hard limestone bedrock.

Thickness of the solum ranges from 40 to 60 inches, and depth to hard limestone bedrock ranges from 40 to more than 80 inches. The upper part of the solum is relatively free of coarse fragments, but the lower part of the solum ranges from none to 10 percent angular chert fragments. The soil ranges from very strongly acid to slightly acid in the upper part of the solum, except where the surface layer has been limed. It ranges from strongly acid to neutral in the lower part.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

The B1 horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6. It is silt loam or silty clay loam.

The B2t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 4 or 6. Some subhorizons have hue of 7.5YR. The B2t horizon is dominantly silty clay or clay, but some subhorizons are silty clay loam.

A B3 horizon that has similar color and texture ranges as the B2t horizon is in some pedons.

A C horizon that has hue of 10YR, 7.5YR, 5YR, or 2.5YR; value of 3 to 6; and chroma of 4 through 8 is in some pedons. It is mottled in shades of gray and is silty clay or clay.

Lawrence Series

The Lawrence series consists of deep, somewhat poorly drained soils that have a slowly permeable fragipan. They formed mostly in mixed alluvium on stream terraces. Slopes range from 0 to 2 percent.

Lawrence soils are associated on the landscape with the Elk, Newark, Nolin, Montgomery, McGary, McGary Variant, and Otwell soils. The Elk soils are well drained. The Newark and Nolin soils are on flood plains and do not have a fragipan or argillic horizon. Montgomery and McGary soils are clayey in the upper part of the solum and do not have a fragipan. McGary Variant soils are clayey in the lower part of the solum and do not have a fragipan. Otwell soils are moderately well drained.

A typical pedon of Lawrence silt loam; in Bullitt County, 0.5 mile southwest of Belmont, 0.4 mile south of Kentucky Highway 251, 120 feet west of a railroad:

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

B2t—8 to 20 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct mottles of light brownish gray (2.5Y 6/2); moderate medium subangular blocky structure; friable; common fine roots; thin nearly continuous light yellowish brown (10YR 6/4) clay films on faces of peds; strongly acid, clear wavy boundary.

Bx1—20 to 30 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct mottles of light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6); moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm, compact, and brittle; few fine roots along prism faces; few fine tubular pores; thin continuous clay films along prism faces; few gray silt coatings on faces of peds; few small dark brown concretions; very strongly acid; gradual wavy boundary.

Bx2—30 to 48 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct mottles of strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6); moderate very coarse prismatic structure parting to moderate medium angular blocky; very firm, compact, and brittle; few fine tubular pores; thin continuous clay films along prism faces; few gray silt coatings on faces of peds; common dark brown concretionary material; very strongly acid; gradual wavy boundary.

B3—48 to 54 inches; mottled light brownish gray (2.5Y 6/2), yellowish brown (10YR 5/4), and strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular structure; slightly firm; thin nearly continuous gray clay films; common dark brown concretions; strongly acid; clear wavy boundary.

C—54 to 64 inches; mottled light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) silty clay loam; few thin stratifications of silt loam; massive; firm, sticky, and plastic; few dark brown concretions; medium acid.

Thickness of the solum ranges from 40 to 80 inches. Depth to bedrock ranges from 5 to more than 10 feet. Except where the surface layer has been limed, the soil above the fragipan is slightly acid to very strongly acid. Reaction is strongly acid or very strongly acid in the fragipan and very strongly acid to neutral in the B3 and C horizons.

The Ap horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

A B1 horizon, 3 to 6 inches thick, is in some pedons. It has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 3 to 6. The B1 horizon is silt loam or silty clay loam.

The B2t horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 3 to 6. It has few to many mottles that have chroma of 2 or less. The B2t horizon is silt loam or silty clay loam.

The Bx horizon has hue of 2.5Y, 10YR, or 7.5YR; value of 5 to 7; and chroma of 0 to 8. In many pedons, it is equally mottled in shades of gray and brown. The Bx horizon is silt loam or silty clay loam. It has a weak or moderate, very coarse, prismatic structure.

The B3 and C horizons have colors similar to those of the Bx horizon. They are silty clay loam or silty clay and have thin stratifications of silt loam.

Lenberg Series

The Lenberg series consists of moderately deep, well drained soils that have moderately slow permeability. They formed in residuum from greenish gray shale. Lenberg soils are mostly in the Knobs area of Bullitt County and are on hillsides and narrow ridgetops. Slopes range from 20 to 40 percent.

The Lenberg soils are associated on the landscape with Carpenter, Garmon, Trappist, and Zanesville soils. Carpenter soils formed in loamy colluvium and are deep to greenish gray shale. The Garmon soils formed in loamy residuum from shaly limestone and calcareous

siltstone and shale. The Trappist soils are underlain by hard, black acid shale. Zanesville soils are moderately well drained and have a fragipan.

A typical pedon of Lenberg silt loam, in an area of Lenberg-Carpenter complex, 20 to 40 percent slopes; in Bullitt County, about 2.5 miles northwest of Shepherdsville, 130 yards southwest of Pryor Valley Road:

O1—1 inch to 0; leaf litter.
A1—0 to 4 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure parting to weak fine granular; very friable; common fine and medium roots; few fine pores; dark grayish brown coatings in the upper part; very strongly acid; abrupt smooth boundary.
B212t—4 to 9 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure parting to moderate fine angular blocky; firm; common fine and medium roots; few fine pores; nearly continuous clay films; 1 percent siltstone fragments 1/2 inch to 2 inches across; extremely acid; clear smooth boundary.
B22t—9 to 17 inches; strong brown (7.5YR 5/6) silty clay; common medium distinct olive gray (5Y 5/2) mottles; moderate medium angular blocky structure; firm; common fine and medium roots; few fine pores; nearly continuous yellowish brown (10YR 5/6) clay films; 10 percent siltstone and shale fragments; 5 percent large brown concretions 3 to 6 inches across; extremely acid; clear smooth boundary.
B23t—17 to 22 inches; mottled yellowish red (5YR 5/6) and light olive gray (5Y 6/2) silty clay; moderate fine and medium angular blocky structure; very firm; few fine roots; few fine pores; nearly continuous yellowish brown (10YR 5/6) and light olive gray (5Y 6/2) clay films; very strongly acid; gradual smooth boundary.
B3—22 to 36 inches; mottled brown (7.5YR 4/4) and light olive gray (5Y 6/2) silty clay; moderate medium and coarse angular blocky structure; some ped interiors have relict platy shale structure; very firm; few fine roots; few fine pores; nearly continuous clay films; very strongly acid; clear smooth boundary.
Cr—36 to 48 inches; olive (5YR 5/3) soft shale.

Thickness of the solum and depth to soft greenish gray shale range from 20 to 40 inches. Siltstone and shale fragments, mostly 1/4 inch to 6 inches across, range from none to 25 percent throughout the solum. The soil ranges from strongly acid to very strongly acid throughout, except where the surface layer has been limed.

The A1 or Ap horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 6. It is silt loam.

The B2t horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 4 or 6. Mottles are in shades of brown, red, or yellow. Below the upper 10 inches of the argillic horizon in some pedons, mottles are in shades of gray. Gray colors in the lower part of the B horizon are from weathered shale. The B2t horizon is clay, silty clay, silty clay loam, or their gravelly or channery analogs.

The B3 horizon has color range similar to that of the B2t horizon, or it is mottled in shades of brown, yellow, or gray. Texture is silty clay or clay or their gravelly or channery analogs.

In some pedons, a C horizon has matrix colors and mottles in shades of red, brown, yellow, olive, or gray. It is silty clay or clay or their channery or gravelly analogs.

Lowell Series

The Lowell series consists of deep, well drained soils that have moderately slow permeability. They formed in clayey residuum derived from limestone interbedded with calcareous siltstone and shale. Lowell soils are on ridgetops and shoulder slopes mostly in Spencer County. Slopes range from 2 to 12 percent but are dominantly 6 to 12 percent.

Lowell soils are associated on the landscape with the Eden, Cynthiana, Faywood, Nicholson, and Shelbyville soils. Eden soils are moderately deep to calcareous shale interbedded with limestone and siltstone. Cynthiana soils are shallow to bedrock, and Faywood soils are moderately deep to bedrock. Nicholson soils are moderately well drained and have a fragipan. Shelbyville soils are loamy in the upper part of the subsoil.

A typical pedon of Lowell silt loam, 6 to 12 percent slopes, eroded; in Spencer county, about 2.4 miles east of Little Mount, 240 yards north of Kentucky Highway 1795:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.
B21t—5 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; thin patchy clay films on faces of peds; medium acid; clear wavy boundary.
B22t—16 to 31 inches; yellowish brown (10YR 5/6) silty clay; few medium distinct mottles of yellowish red (5YR 5/6) and light brownish gray (10YR 6/2); moderate medium subangular blocky structure; firm; common fine roots; nearly continuous clay films on faces of peds; few very small black concretions; strongly acid; clear wavy boundary.
B23t—31 to 40 inches; yellowish brown (10YR 5/6) clay; moderate medium and coarse subangular blocky structure; very firm, sticky, and plastic; few fine roots; nearly continuous clay films on faces of peds; common black concretionary material; slightly acid; clear smooth boundary.

B3—40 to 54 inches; yellowish brown (10YR 5/4) clay; weak coarse subangular blocky structure; very firm, sticky, and plastic; few fine roots; nearly continuous clay films on faces of peds; common black concretionary stains and a few small black concretions; few soft siltstone fragments 1/8 to 1/2 inch across; neutral; clear wavy boundary.
C—54 to 63 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct mottles of strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2); massive; very firm, sticky, and plastic; few small black concretions; few soft siltstone fragments 1/8 to 1/2 inch across; mildly alkaline; abrupt smooth boundary.
R—63 inches; interbedded limestone, shale, and siltstone.

Thickness of the solum ranges from 30 to 60 inches. Depth to bedrock ranges from 40 to 80 inches or more. Coarse fragments of limestone and siltstone range from 0 to 5 percent in the upper part of the solum, from 0 to 10 percent in the lower part of the solum, and from 1 to 10 percent in the C horizon. The soil ranges from slightly acid to very strongly acid in the upper part of the solum, unless the surface layer has been limed. The lower part of the solum ranges from strongly acid to mildly alkaline. The C horizon or the layer immediately above bedrock ranges from medium acid to mildly alkaline.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 4. It is silt loam or silty clay loam.

In some pedons, a B1 horizon, 3 to 6 inches thick, has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silty clay loam or silty clay.

The B2t horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 or 5; and chroma of 4 to 6. In some pedons, it has few to many mottles that have chroma of 2 in the lower part of the argillic horizon. Mottles in shades of red and brown are in some pedons. The B2t horizon is silty clay loam, silty clay, or clay in the upper part of the horizon and silty clay or clay in the lower part.

The B3 horizon has hue of 10YR, 2.5Y, or 5Y; value of 5; and chroma of 3 to 6. In some pedons, it is mottled in shades of brown, gray, yellow, and olive. The B3 horizon is silty clay or clay.

The C horizon has similar color and texture ranges as the B3 horizon.

Markland Series

The Markland series consists of deep, moderately well drained to well drained soils that have slow permeability. They formed in clayey slack water deposits. Markland soils are on short side slopes below broad slack water stream terraces in Bullitt County. Slopes range from 2 to 30 percent but are dominantly 10 to 30 percent.

Markland soils are associated on the landscape with McGary and Nolin soils. McGary soils are somewhat poorly drained. Nolin soils are on flood plains and are well drained and loamy throughout.

A typical pedon of Markland silt loam, rarely flooded, 2 to 6 percent slopes; in Bullitt County, about 2.7 miles southwest of Shepherdsville, 435 yards east of Beech Grove Road, 120 yards west of Long Lick Creek:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine and medium roots; neutral; abrupt smooth boundary.
B21t—6 to 17 inches; brown (7.5YR 5/4) silty clay; moderate medium subangular blocky structure; firm, sticky, and plastic; few fine roots; thin patchy strong brown (7.5YR 5/6) clay films on faces of peds; slightly acid; gradual wavy boundary.
B22t—17 to 33 inches; brown (7.5YR 4/4) silty clay; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm, sticky, and plastic; few fine roots; nearly continuous yellowish brown (10YR 5/6) clay films on faces of peds; strongly acid; gradual wavy boundary.
B3—33 to 42 inches; dark yellowish brown (10YR 4/4) clay; many coarse prominent olive gray (5Y 5/2) mottles; weak coarse angular blocky structure; very firm, sticky, and plastic; few fine roots; nearly continuous light olive brown (2.5Y 5/4) clay films on faces of peds; common black concretionary material; calcareous, mildly alkaline; clear wavy boundary.
C—42 to 64 inches; dark yellowish brown (10YR 4/4) silty clay; common medium distinct olive gray (5Y 5/2) mottles; massive parting to angular blocky structure; firm, sticky, and plastic; common nodules and streaks of secondary lime; calcareous, moderately alkaline.

Thickness of the solum ranges from 24 to 44 inches. Depth to bedrock ranges from 5 to more than 20 feet. The soil ranges from neutral to strongly acid in the Ap horizon and from slightly acid to strongly acid in the B2t horizon. It is medium acid to mildly alkaline in the B3 horizon and mildly alkaline to moderately alkaline in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 4. It is silt loam or silty clay.

In some pedons, a B1 horizon, 2 to 5 inches thick, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

The B2t horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 or 4. Chroma of 2 or less is common below the upper 10 inches of the argillic horizon. The B2t horizon is silty clay or clay.

The B3 horizon and C horizon have hue of 10YR and 2.5Y, value of 4 to 6, chroma of 2 or 4, and few to many mottles in shades of gray, brown, or olive. It is silty clay

or clay and in some pedons there are stratified layers of silty clay loam, silty clay, or clay.

McGary Series

The McGary series consists of deep, somewhat poorly drained soils that have slow or very slow permeability. They formed in clayey slack water deposits. McGary soils are on broad stream terraces mostly along the Salt and Rolling Fork Rivers in Bullitt County. Slopes range from 0 to 2 percent.

McGary soils are associated on the landscape with Lawrence, Markland, Montgomery, Newark, and Nolin soils. Lawrence soils are loamy in the upper part of the subsoil and have a fragipan. Markland soils are well drained to moderately well drained. Montgomery soils have a dark surface layer and are very poorly drained. Newark and Nolin soils are on flood plains, are loamy, and do not have an argillic horizon. Nolin soils are well drained.

A typical pedon of McGary silt loam, rarely flooded; in Bullitt County, about 800 yards northeast of the junction of Kentucky Highways 61 and 44, in Shepherdsville, 75 feet east of a railroad:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine and medium granular structure; very friable; many fine and medium roots; neutral; abrupt smooth boundary.

B21t—8 to 15 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak moderate prismatic structure parting to moderate medium subangular and angular blocky; firm, sticky, and plastic; common fine and medium roots; continuous light brownish gray (10YR 6/2) clay films on faces of peds; strongly acid; clear wavy boundary.

B22tg—15 to 22 inches; grayish brown (10YR 5/2) silty clay; common medium distinct mottles of dark yellowish brown (10YR 4/4); moderate medium prismatic structure parting to moderate and strong medium angular blocky; firm, sticky, and plastic; few fine roots; continuous gray (10YR 5/1) clay film on faces of peds; strongly acid; gradual wavy boundary.

B23t—22 to 32 inches; dark yellowish brown (10YR 4/4) silty clay; many medium distinct grayish brown (10YR 5/2) mottles; moderate fine and medium prismatic structure parting to moderate medium angular blocky; very firm, sticky, and plastic; few fine roots; continuous gray (10YR 5/1) clay film on faces of peds; medium acid; clear wavy boundary.

B3g—32 to 40 inches; grayish brown (10YR 5/2) silty clay; many medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to weak coarse subangular blocky; very firm, sticky, and plastic; few fine roots; discontinuous gray (10YR 5/1) clay films on faces of peds; common dark brown and black concretions; neutral; clear wavy boundary.

Cg—40 to 72 inches; gray (10YR 5/1) stratified silty clay loam and silty clay; many coarse distinct yellowish brown (10YR 5/4) mottles; massive parting to angular blocky structure; firm, sticky, and plastic; common nodules of secondary lime; calcareous, moderately alkaline.

Thickness of the solum ranges from 24 to 48 inches. Depth to bedrock is more than 5 feet. Depth to carbonates ranges from 20 to 40 inches. The soil ranges from strongly acid to neutral in the upper part of the B horizon and from medium acid to mildly alkaline in the lower part. It is moderately alkaline in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is silt loam.

In some pedons, a B1 horizon, 2 to 5 inches thick, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam. A subhorizon that has matrix chroma of 3 or 4 is between the Ap horizon and a depth of 30 inches is in some pedons.

The B2t horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is commonly mottled in shades of brown, yellow, olive, or gray. The B2t horizon is silty clay loam, silty clay, or clay.

The B3g horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is commonly mottled in shades of brown, yellow, olive, or gray.

The Cg horizon is dominantly gray and is mottled in shades of brown, yellow, or olive. It is stratified layers of silty clay, clay, and silty clay loam.

McGary Variant

The McGary Variant consists of deep, somewhat poorly drained soils that have slow permeability in the lower part of the subsoil. They formed in recent alluvium underlain by clayey slack water deposits. These soils are on broad, flat stream terraces near old oxbows along the Salt River. Slopes range from 0 to 2 percent.

McGary Variant soils are associated on the landscape with Lawrence and Newark soils. Lawrence soils have a fragipan. Newark soils are on flood plains, do not have an argillic horizon, and are loamy throughout.

A typical pedon of McGary Variant silt loam, rarely flooded; in Spencer County, about 3 miles southwest of Waterford, 0.8 mile west of the confluence of Goose Creek and the Salt River, 300 yards southwest of Dutchman Creek Road:

Ap1—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; slightly acid; clear smooth boundary.

Ap2—6 to 12 inches; grayish brown (2.5Y 5/2) silt loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky

structure; very friable; common fine roots; slightly acid; clear smooth boundary.

B21t—12 to 21 inches; light yellowish brown (2.5Y 6/4) silt loam; many medium faint grayish brown (2.5Y 5/2) and common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common fine roots; few fine and medium pores; few thin patchy clay films on faces of peds; few small pebbles 1/8 to 1/4 inch in diameter; strongly acid; gradual smooth boundary.

B22tg—21 to 26 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and common medium faint light yellowish brown (2.5Y 6/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; common fine and medium pores; thin, nearly continuous clay films on faces of peds; medium acid; clear smooth boundary.

IIB23tg—26 to 48 inches; olive gray (5Y 4/2) silty clay; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; firm, sticky, and plastic; few fine roots; many fine and medium pores; few thin patchy clay films on faces of peds; neutral; gradual smooth boundary.

IIC1g—48 to 78 inches; dark gray (N 4/0) clay; common medium distinct strong brown (7.5YR 5/6) and dark yellowish brown (10YR 4/4) mottles; massive; firm, sticky, and plastic; neutral; clear wavy boundary.

IIC2—78 to 96 inches; strong brown (7.5YR 5/6) silty clay; common medium distinct gray (N 5/0) mottles; massive; firm, sticky, and plastic; neutral.

The fine silty deposit of alluvium underlain by clayey materials ranges from 19 to 32 inches in thickness. Thickness of the solum ranges from 40 to more than 60 inches. Coarse fragments, mostly pebbles, range from none to 5 percent in the solum. Depth to bedrock ranges from 5 to more than 20 feet. The soil ranges from slightly acid to neutral in the A horizon, from slightly acid to strongly acid in the upper part of the B horizon, from slightly acid to mildly alkaline in the lower part of the B horizon, and from neutral to moderately alkaline in the C horizon.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 3. Mottles in shades of brown or gray are in some pedons. The Ap horizon is silt loam.

In some pedons, a B1 horizon, 3 to 8 inches thick, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4.

The B21t horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 3 to 6. It has common to many mottles in shades of gray and brown. The B21t horizon is silt loam or silty clay loam.

The B22tg horizon has hue of 2.5Y or 10YR, value of 3 to 6, and chroma of 2 to 4. It has mottles in shades of brown, olive, or gray. In some pedons, the B22tg horizon is equally mottled in shades of gray and brown. The B22tg horizon is silt loam or silty clay loam.

The IIB23tg horizon has hue of 5Y, 2.5Y, or 10YR, value of 4 to 6, and chroma of 1 or 2. It has few to many mottles in shades of brown, gray, olive, or red. The IIB23tg horizon is silty clay loam or silty clay.

A IIB3 horizon present in some pedons, has color ranges similar to those of the IIB23tg horizon. It is silty clay or clay.

The IIC horizon has hue of 5Y, 2.5Y, or 7.5YR; value of 4 to 6; and chroma of 0 to 6; or it is neutral and has value of 4 to 6. The IIC horizon has few to many mottles in shades of gray, olive, brown, or red. It is dominantly silty clay or clay, but in some pedons, there are stratified layers of silty clay loam or silt loam.

Montgomery Series

The Montgomery series consists of deep, very poorly drained soils that have slow or very slow permeability. They have a mollic epipedon and formed in clayey slack water deposits. Montgomery soils are on broad stream terraces mostly along the Salt and Rolling Fork Rivers in Bullitt County. Slopes range from 0 to 2 percent.

Montgomery soils are associated on the landscape with Lawrence, McGary, and Newark soils. Lawrence soils are loamy in the upper part of the solum and have a fragipan. McGary soils have an ochric epipedon and are somewhat poorly drained. Newark soils are on flood plains and are loamy and somewhat poorly drained.

A typical pedon of Montgomery silty clay loam; in Bullitt County, about 0.75 mile northeast of the junction of Kentucky Highways 61 and 44, 150 feet east of a railroad, in Shepherdsville:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak medium granular structure; many fine and medium roots; friable; neutral; clear smooth boundary.

A12—9 to 15 inches; very dark grayish brown (10YR 3/2) silty clay; few fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular and angular blocky structure; firm, sticky, and plastic; many fine and medium roots; common very dark grayish brown (10YR 3/2) pressure faces; mildly alkaline; clear wavy boundary.

B2g—15 to 27 inches; dark grayish brown (2.5Y 4/2) silty clay; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; very firm, sticky, and plastic; common fine roots; common dark grayish brown (10YR 4/2) pressure faces; mildly alkaline; gradual wavy boundary.

B3g—27 to 40 inches; dark grayish brown (2.5Y 4/2) silty clay; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium

prismatic structure parting to weak coarse angular blocky; very firm, sticky, and plastic; few fine roots; common dark grayish brown (2.5Y 4/2) pressure faces; 2 percent limestone gravel 1/4 to 1/2 inch in diameter; few dark brown concretions; mildly alkaline; clear wavy boundary.

Cg—40 to 62 inches; grayish brown (2.5Y 5/2) silty clay; many medium distinct strong brown (7.5YR 5/6) and dark yellowish brown (10YR 4/4) mottles; massive; very firm, sticky, and plastic; common dark brown concretions; common calcium carbonate concretions; moderately alkaline.

Thickness of the solum ranges from 30 to 48 inches. Depth to bedrock is more than 5 feet. The soil ranges from slightly acid to mildly alkaline in the solum.

The Ap and A12 horizons have hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is silty clay loam.

The B2g horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of 1 or 2. It has mottles in shades of gray or brown. The B2g horizon is silty clay or silty clay loam. The B3g horizon has color and texture ranges similar to the B2g horizon.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or less. Mottles in shades of gray or brown range from few to many. In some pedons, there are stratified layers of clay, silty clay, or silty clay loam.

Newark Series

The Newark series consists of deep, somewhat poorly drained soils that have moderate permeability. They formed in mixed alluvium on flood plains of major streams and their tributaries. Slopes range from 0 to 2 percent.

Newark soils are associated on the landscape with the Boonesboro, Elk, Lawrence, McGary, McGary Variant, Montgomery, Nolin, Otwell, and Sensabaugh soils. Boonesboro soils are well drained and are moderately deep to bedrock. Elk soils are well drained and are on stream terraces. Lawrence and Otwell soils have a fragipan and are on stream terraces. The Otwell soils are moderately well drained. McGary and Montgomery soils are in a fine family and are on slack water stream terraces. The Montgomery soils have a mollic epipedon and are very poorly drained. McGary Variant soils are clayey in the lower part of the solum. Nolin soils are well drained. Sensabaugh soils are well drained and are gravelly throughout.

A typical pedon of Newark silt loam, frequently flooded; in Bullitt County, about 2.4 miles south of Mount Washington, 0.5 mile southwest of the junction of U.S. Highway 31E and Strainger Lane, 230 yards south of Greenwell Ford Road:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint grayish brown mottles; weak fine granular structure; very friable; many fine roots; mildly alkaline; clear smooth boundary.

B21—9 to 19 inches; brown (10YR 5/3) silt loam; common medium distinct grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure parting to moderate medium granular; friable; few fine roots; mildly alkaline; gradual wavy boundary.

B22g—19 to 34 inches; grayish brown (2.5Y 5/2) silt loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few fine roots; mildly alkaline; gradual wavy boundary.

Cg—34 to 60 inches; grayish brown (2.5Y 5/2) silt loam; few distinct yellowish brown (10YR 5/6) mottles; massive; friable; mildly alkaline.

Thickness of the solum ranges from 22 to 44 inches. Depth to bedrock is more than 5 feet. Coarse fragments range from none to 5 percent to a depth of 30 inches and up to 15 percent in the underlying material. The soil ranges from medium acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

The B21 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It has mottles in shades of gray or brown. The B21 horizon is silt loam or silty clay loam.

The B22g horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2; or it is neutral and has value of 4 to 6. It has mottles in shades of gray or brown. The B22g horizon is silt loam or silty clay loam.

The Cg horizon has similar color and texture ranges as the B22g horizon except that it may be equally mottled in shades of brown and gray. In some pedons, there are stratified thin layers of loam, fine sandy loam, silty clay loam, or silty clay.

Nicholson Series

The Nicholson series consists of deep, moderately well drained soils that have a slowly permeable fragipan. They formed in a mantle of silty loess underlain by clayey residuum from limestone, siltstone, and shale. Nicholson soils are on ridgetops and shoulder slopes. Slopes range from 2 to 12 percent but are dominantly 2 to 6 percent.

Nicholson soils are associated on the landscape with the Beasley, Crider, Lowell, and Shelbyville soils. Beasley and Lowell soils are in a fine family, are well drained, and do not have a fragipan. Crider and Shelbyville soils are well drained and do not have a fragipan.

A typical pedon of Nicholson silt loam, 2 to 6 percent slopes; in Spencer County, 4.1 miles northeast of Taylorsville, 140 yards northeast of the junction of John Henry Road and Yoder-Tipton Road, 60 feet northwest of the stone wall of a cemetery:

Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; slightly acid; clear smooth boundary.
B21t—7 to 18 inches; yellowish brown (10YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; few fine pores; thin, nearly continuous clay films on faces of peds; few dark brown concretionary stains on faces of peds; slightly acid; gradual wavy boundary.
B22t—18 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine pores; thin nearly continuous clay films on faces of peds; few dark concretionary stains on faces of peds; medium acid; gradual wavy boundary.
Bx1—24 to 32 inches; brown (7.5YR 4/4) silt loam; many medium and coarse prominent light brownish gray (2.5Y 6/2) mottles; very coarse prismatic structure parting to moderate medium subangular blocky; very firm, compact, and brittle; few fine roots along prism faces; nearly continuous clay films and silt coatings on prism faces; few dark brown and black oxide concretions; strongly acid; gradual wavy boundary.
Bx2—32 to 42 inches; dark yellowish brown (10YR 4/4) silty clay loam; many medium and coarse prominent light brownish gray (2.5Y 6/2) and common medium distinct strong brown (7.5YR 5/6) mottles; very coarse prismatic structure; very firm, compact, and brittle; few fine roots along prism faces; many dark brown and black oxide concretions; common clay films and silt coatings on prism faces; strongly acid; clear wavy boundary.
IIB3—42 to 61 inches; strong brown (7.5YR 5/6) silty clay; common medium prominent grayish brown (2.5Y 5/2) and light olive gray (5Y 6/2) mottles; weak coarse subangular blocky structure; firm, sticky, and plastic; common dark brown and black concretions; strongly acid; gradual wavy boundary.
IIC—61 to 72 inches; strong brown (7.5YR 5/6) clay; common medium prominent light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/4) mottles; massive; very firm, sticky, and plastic; many dark brown and black oxide concretions; medium acid.

Thickness of the solum ranges from 40 to 80 inches, and depth to bedrock is more than 60 inches. The upper part of the solum through the fragipan is generally free of coarse fragments, but the lower part of the solum ranges from none to 15 percent. The soil ranges from very strongly acid to medium acid through the fragipan and from strongly acid to mildly alkaline below the fragipan.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

In some pedons, a B1 horizon has hue of 10YR, or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silty loam or silty clay loam.

The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. In some pedons, few or common mottles have chroma of 2 in the lower part of the argillic horizon. The B2t horizon is silt loam or silty clay loam.

The Bx horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 3 to 5; chroma of 4 to 8. It has few to many mottles that have chroma of 2 or less. It is silt loam or silty clay loam.

The IIB3 horizon has hue of 2.5YR, 5YR, 7.5YR, 10YR, or 2.5Y; value of 4 or 5; and chroma of 4 or 6. It has few to common mottles that have chroma of 2 or less. The IIB3 horizon is silty clay or clay.

The IIC horizon has similar color and texture ranges as the IIB3 horizon.

Nolin Series

The Nolin series consists of deep, well drained soils that have moderate permeability. They formed in mixed alluvium on flood plains of major streams and their tributaries. Slopes range from 0 to 2 percent.

Nolin soils are associated on the landscape with the Boonesboro, Elk, Lawrence, Newark, Otwell, and Sensabaugh soils. Boonesboro soils are moderately deep to bedrock, have a mollic epipedon, and have more coarse fragments in the subsoil than the Nolin soils. Elk, Lawrence, and Otwell soils are on stream terraces. Elk soils are well drained. Lawrence and Otwell soils have a fragipan. Lawrence and Newark soils are somewhat poorly drained, and Otwell soils are moderately well drained. Sensabaugh soils are gravelly throughout.

A typical pedon of Nolin silt loam, frequently flooded; in Bullitt County, about 0.6 mile southeast of the junction of Kentucky Highways 44 and 61, 300 yards south of Shepherdsville Middle School, 100 feet north of Salt River:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure parting to weak fine granular; very friable; few fine roots; mildly alkaline; clear wavy boundary.
B21—9 to 23 inches; brown (10YR 4/3) silt loam; weak fine subangular structure parting to weak fine granular; friable; few fine roots; mildly alkaline; clear smooth boundary.
B22—23 to 47 inches; brown (10YR 4/3) silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; mildly alkaline; gradual wavy boundary.
B23—47 to 52 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; few fine pores; mildly alkaline; gradual wavy boundary.

22C—52 to 78 inches; brown (10YR 4/3) silt loam; massive; friable; few dark brown concretions; mildly alkaline.

Thickness of the solum is more than 40 inches. Depth to bedrock ranges from about 5 feet to more than 20 feet. Gravel in the solum ranges from 0 to 5 percent. The soil ranges from medium acid to moderately alkaline.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is silt loam.

The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. In some pedons, mottles that have chroma of 2 or less are at depths below 24 inches. The B2 horizon is silt loam or silty clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. The content of gravel ranges from 0 to 35 percent. The C horizon is silt loam or silty clay loam. In some pedons, there are stratified layers of silt loam, silty clay loam, loam, fine sandy loam, or their gravelly analogs.

Otwell Series

The Otwell series consists of deep, moderately well drained soils that have a very slowly permeable fragipan. They formed in mixed alluvium on stream terraces and foot slopes. Slopes range from 0 to 12 percent but are dominantly 2 to 6 percent.

Otwell soils are associated on the landscape with the Elk, Lawrence, Newark, and Nolin soils. Elk and Nolin soils are well drained, and Lawrence and Newark soils are somewhat poorly drained. Newark and Nolin soils are on flood plains and do not have an argillic horizon.

A typical pedon of Otwell silt loam, 2 to 6 percent slopes; in Bullitt County, 1.3 miles northeast of Belmont, 0.7 mile northeast of the junction of Kentucky Highways 251 and 61, 240 yards east of Interstate Highway 65, 75 feet north of a gravel road:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; many fine and medium pores; neutral; abrupt smooth boundary.

B21t—8 to 15 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common fine and medium pores; thin patchy clay films on faces of peds; 2 percent rounded and angular hard siltstone pebbles 1/4 to 1/2 inch in diameter; neutral; clear wavy boundary.

B22t—15 to 26 inches; yellowish brown (10YR 5/6) silt loam; few medium faint pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; common fine and medium pores; thin nearly continuous clay films on faces of peds; medium acid; clear wavy boundary.

Bx1—26 to 34 inches; light yellowish brown (2.5Y 6/4) silt loam; common medium distinct strong brown (7.5YR 5/6) and light brownish gray (10YR 6/2) mottles; very coarse prismatic structure parting to weak medium platy and moderate medium subangular blocky; very firm, compact, and brittle; few fine roots along prism faces; few fine and medium pores; continuous clay film and silt coating on prism faces; common black oxide concretions; few siltstone fragments 1/4 to 1 inch in diameter; strongly acid; gradual wavy boundary.

Bx2—34 to 42 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) mottles; very coarse prismatic structure; very firm, compact, and brittle; nearly continuous clay films and silt coatings on prism faces; common dark brown and black oxide concretions; strongly acid; gradual wavy boundary.

B3—42 to 62 inches; strong brown (7.5YR 5/6) stratified silty clay loam and silty clay; many medium distinct light brownish gray (2.5Y 6/2) mottles; massive; firm, sticky, and plastic; few siltstone fragments 1/4 to 1 inch in diameter; strongly acid.

Thickness of the solum ranges from 40 inches to more than 80 inches. Depth to bedrock ranges from 5 feet to more than 10 feet. Coarse fragments range from none to 5 percent in the solum. The soil ranges from neutral to very strongly acid in the surface layer and from strongly acid to very strongly acid in the upper part of the solum and in the fragipan. It ranges from slightly acid to strongly acid in the lower part of the solum.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

In some pedons, a B1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is silt loam or silty clay loam.

The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. In some pedons, it has chroma of 2 or less in the lower part of the argillic horizon and above the fragipan. The B2t horizon is silt loam or silty clay loam.

The Bx horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 7; and chroma of 2 to 6. It has few to many mottles in shades of brown, yellow, gray, or olive. The Bx horizon is silt loam or silty clay loam.

The B3 horizon has colors similar to the Bx horizon. It is commonly stratified layers of silt loam, silty clay loam, or silty clay.

In some pedons, a C horizon has colors similar to those of the Bx horizon and textures similar to those of the B3 horizon.

Sensabaugh Series

The Sensabaugh series consists of deep, well drained soils that have moderate and moderately rapid permeability. They formed in mixed alluvium on flood

plains of the narrow valleys in the Knobs area of Bullitt County. Slopes range from 0 to 2 percent.

Sensabaugh soils are associated on the landscape with the Newark and Nolin soils. Newark soils are somewhat poorly drained, and Nolin soils are well drained. They contain few coarse fragments in the solum.

A typical pedon of Sensabaugh gravelly loam, occasionally flooded; in Bullitt County, about 1.25 miles east of Barrallton, 0.7 mile east of the junction of Kentucky Highway 1526 and Brushy Fork Road, 30 feet north of Brushy Fork Road:

Ap—0 to 8 inches; brown (10YR 4/3) gravelly loam; weak fine granular structure; very friable; many fine and medium roots; about 20 percent siltstone fragments 1/4 inch to 2 inches in diameter; neutral; clear smooth boundary.

B21—8 to 15 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 20 percent siltstone fragments 1/4 inch to 2 inches in diameter; neutral; gradual wavy boundary.

B22—15 to 34 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 30 percent siltstone fragments 1/2 inch to 3 inches in diameter; neutral; gradual wavy boundary.

C—34 to 60 inches; dark yellowish brown (10YR 4/4) very gravelly fine sandy loam; structureless; friable; few fine roots; about 50 percent siltstone and shale fragments 1/4 inch to 3 inches in diameter; neutral.

Thickness of the solum ranges from 24 to 55 inches. Depth to bedrock is more than 5 feet. Siltstone and shale fragments, mostly 1/4 inch to 5 inches in diameter, range from 15 to 25 percent in the Ap horizon, from 15 to 35 percent in the B horizon, and from 15 to 60 percent in the C horizon. The soil ranges from medium acid to mildly alkaline throughout.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4. It is gravelly loam.

The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. In some pedons, it has mottles in shades of gray or brown below a depth of 24 inches. The B horizon is gravelly loam or gravelly silt loam.

The C horizon has color ranges similar to those of the B horizon. It is the gravelly or very gravelly analogs of loam, silt loam, fine sandy loam, clay loam, or silty clay loam.

Shelbyville Series

The Shelbyville series consists of deep, well drained soils that have moderate permeability. They formed in a silty loess mantle underlain by residuum derived from limestone interbedded with siltstone and shale. Shelbyville soils are on ridgetops in Spencer County. Slopes range from 2 to 6 percent.

The Shelbyville soils are associated on the landscape with the Lowell and Nicholson soils. Lowell soils are clayey in the upper part of the subsoil. Nicholson soils are moderately well drained and have a fragipan.

A typical pedon of Shelbyville silt loam, 2 to 6 percent slopes; in Spencer County about 1.7 miles north of Little Mount, 0.3 mile northeast of the junction of Kentucky Highway 44 and Steve Allen Road, 300 yards north of Steve Allen Road:

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; neutral; clear smooth boundary.

B21t—9 to 29 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few dark brown and black concretions; medium acid; gradual wavy boundary.

B22t—29 to 37 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few small dark brown and black concretions; medium acid; clear wavy boundary.

IIB23t—37 to 62 inches; brown (7.5YR 4/4) silty clay; common medium distinct mottles of yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4); moderate medium subangular blocky structure; firm, sticky, and plastic; thin nearly continuous clay films on faces of peds; many small dark brown and black concretions; medium acid; gradual wavy boundary.

IIC—62 to 92 inches; light yellowish brown (2.5Y 6/4) clay; common medium distinct mottles of strong brown (7.5YR 5/6) and pale brown (10YR 6/3); massive; very firm, sticky, and plastic; common dark brown and black concretions; neutral.

Thickness of the solum is more than 50 inches, and depth to bedrock is more than 60 inches. The loess mantle is 24 to 40 inches thick. Coarse fragments are not in the upper part of the solum but range from 0 to 15 percent in the lower part and in the C horizon. The soil ranges from neutral to strongly acid in the upper part of the solum, except where the surface layer has been limed, and from strongly acid to mildly alkaline in the lower part of the solum. The C horizon ranges from medium acid to mildly alkaline.

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

In some pedons, a B1 horizon, 2 to 6 inches thick, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. It is silt loam or silty clay loam.

The B21t and B22t horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. They are silt loam or silty clay loam.

The IIB23t horizon has hue of 7.5YR, 10YR, or 2.5Y; value of 4 or 5; and chroma of 4 to 8. In some pedons, it is mottled in shades of gray, brown, or olive. The IIB23t horizon is silty clay or clay.

The IIC horizon has similar color and texture ranges as the IIB23t horizon.

Trappist Series

The Trappist series consists of moderately deep, well drained soils that have slow permeability. They formed in clayey residuum from black acid shale. These soils are primarily on lower hillsides in the Knobs area of Bullitt County. Slopes range from 6 to 30 percent but are dominantly 12 to 30 percent.

Trappist soils are associated on the landscape with the Lenberg, Carpenter, and Zanesville soils. Lenberg soils are underlain by soft greenish gray shale. Carpenter soils are deep and formed in loamy colluvium underlain by greenish gray shale. Zanesville soils are moderately well drained and have a fragipan.

A typical pedon of Trappist silt loam, 12 to 30 percent slopes, eroded; in Bullitt County, about 2.8 miles northeast of Lebanon Junction, 2 miles southeast of the junction of Kentucky Highways 733 and 61, 170 yards southwest of Kentucky Highway 733:

Ap—0 to 4 inches; brown (7.5YR 4/4) silt loam; weak fine and medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

B21t—4 to 14 inches; yellowish red (5YR 4/6) silty clay; moderate medium subangular blocky structure; firm, sticky, and plastic; few fine roots; nearly continuous clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—14 to 23 inches; yellowish red (5YR 4/6) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky, and plastic; few fine roots; thin patchy clay films on faces of peds; 5 percent black shale fragments 1/4 to 1 inch in length; extremely acid; clear wavy boundary.

C—23 to 35 inches; reddish brown (5YR 4/4) very shaly silty clay; many medium prominent dark red (2.5YR 3/6) and light olive gray (5Y 6/2) mottles; relict shale structure; firm, sticky, and plastic; 40 percent black shale fragments 1/2 to 1 inch in length; very strongly acid; abrupt smooth boundary.

R—35 inches; black shale.

Thickness of the solum and depth to hard black shale ranges from 20 to 40 inches. Coarse fragments mostly of shale and some of siltstone range from 0 to 35 percent in the solum and from 25 to 75 percent in the C horizon. The soil ranges from strongly acid to extremely acid throughout, except where the surface layer has been limed.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam.

In some pedons, an A1 horizon, 1 to 3 inches thick, has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. In some pedons, an A2 horizon, 3 to 7 inches thick, has hue of 10YR, 7.5YR, or 2.5Y; value of 4 or 5; and chroma of 3 or 4.

In some pedons, a B1 horizon, 2 to 5 inches thick, has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is silt loam, silty clay loam, silty clay, or their shaly analogs.

The B2t horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 or 5; and chroma of 4 or 6. It is silty clay loam, silty clay, clay, or their shaly analogs. In some pedons, the B2t horizon is mottled in shades of red or brown.

In some pedons, a B3 horizon has color and texture ranges similar to those of the B2t horizon. Mottles are in shades of red, brown, or gray.

The C horizon has hue of 10YR, 5YR, or 2.5YR; value of 4 or 5; and chroma of 3 to 6. It has few to many mottles in shades of gray, red, and brown. The C horizon is shaly silty clay, very shaly silty clay, or clay.

Woolper Series

The Woolper series consists of deep, well drained soils that have moderately slow permeability. They have a mollic epipedon and formed in clayey, colluvial material derived from limestone. Woolper soils are on foot slopes, mostly in the eastern part of the survey area, where slopes range from 2 to 12 percent, and on hillside benches where slopes range from 30 to 60 percent.

Woolper soils are associated on the landscape with the Boonesboro, Faywood, and Fairmount soils. Boonesboro and Faywood soils are moderately deep to bedrock. Boonesboro soils are on flood plains. They are loamy and have common to many coarse fragments in the subsoil. The Faywood soils have an ochric epipedon. Fairmount soils are shallow to bedrock and formed in clayey residuum.

A typical pedon of Woolper silty clay loam, 2 to 6 percent slopes; in Bullitt County, about 1.3 miles northeast of Solitude, 1 mile northeast of the junction of Kentucky Highway 480 and Clarks Lane, 150 feet south of Rummage Road:

Ap—0 to 10 inches; dark brown (10YR 3/3) silty clay loam; weak fine and medium granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

B21t—10 to 17 inches; dark brown (10YR 3/3) silty clay; moderate medium subangular blocky structure; firm; common fine roots; thick nearly continuous clay films on faces of peds; slightly acid; clear wavy boundary.

B22—17 to 37 inches; yellowish brown (10YR 5/4) silty clay; moderate medium subangular blocky structure; very firm, sticky, and plastic; few fine roots; thick nearly continuous clay films on faces of peds; slightly acid; gradual wavy boundary.
B23t—37 to 52 inches; dark yellowish brown (10YR 4/4) silty clay; weak coarse subangular blocky sturcture; very firm, sticky, and plastic; few fine roots; thin patchy clay films on faces of peds; slightly acid; gradual wavy boundary.
C—52 to 80 inches; dark yellowish brown (10YR 4/4) silty clay; common medium distinct light yellowish brown (10YR 6/4) mottles; massive; firm, sticky, and plastic; common dark concretions; slightly acid.

Thickness of the solum ranges from 40 to 60 inches. Depth to bedrock ranges from 60 inches to more than 100 inches. Coarse fragments range from none to 10 percent throughout. In some pedons, limestone flagstones are on the surface or scattered throughout the soil profile. The soil ranges from mildly alkaline to slightly acid throughout. Thickness of the mollic epipedon ranges from 10 to about 24 inches.

The Ap horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 2 or 3. It is silty clay loam.

The B21t horizon has similar color ranges as the Ap horizon. In some pedons, it has value of 4 or 5 and chroma of 3 to 6. The B21t horizon is silty clay loam, silty clay, or clay.

The B22t and B23t horizons have hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5; and chroma of 3 to 6. They are silty clay or clay. In some pedons, they have few to common mottles in shades of gray in the lower part of the argillic horizon.

The C horizon has color and texture ranges similar to those of the B22t and B23t horizons, except mottles are in shades of brown, gray, or olive.

Zanesville Series

The Zanesville series consists of deep, moderately well drained soils formed in a loess mantle underlain by clayey residuum derived from siltstone and shale. They have moderate permeability above the fragipan and moderately slow to slow permeability in the fragipan. Zanesville soils are on ridgetops in the western part of Bullitt County. Slopes range from 2 to 12 percent.

Zanesville soils are associated on the landscape with the Carpenter, Lenberg, and Trappist soils. The Carpenter, Lenberg, and Trappist soils are well drained. Carpenter soils formed in colluvial material underlain by greenish gray shales. Lenberg soils are in a fine family and are moderately deep to soft greenish gray shale. The Trappist soils are clayey and are moderately deep to hard, black acid shale.

A typical pedon of Zanesville silt loam, 6 to 12 percent slopes; in Bullitt County, about 4 miles southeast of Clermont; 1.8 miles southeast of Ridgetop fire tower in Bernheim Forest, 1 mile northeast of the confluence of Harrison Fork and Wilson Creek, 570 yards south of a gravel fire trail:

AO—1 inch to 0; decayed forest litter.
A1—0 to 2 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; common fine and medium roots; strongly acid; abrupt smooth boundary.
A2—2 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; common fine and medium roots; strongly acid; clear smooth boundary.
B1—6 to 11 inches; yellowish brown (10YR 5/6) silt loam; weak fine and medium subangular blocky structure; friable; few medium and large roots; very strongly acid; clear wavy boundary.
B21t—11 to 22 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine and medium roots; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.
B22t—22 to 31 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct light brownish gray (10YR 6/2) and brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; thin patchy clay films on faces of peds; very strongly acid; clear wavy boundary.
Bx—31 to 40 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct light olive gray (5Y 6/2) and strong brown (7.5YR 5/8) mottles; moderate very coarse prismatic structure parting to weak fine subangular blocky; very firm, brittle, and compact; 2 percent siltstone fragments 1/4 to 1 inch in diameter; strongly acid; clear wavy boundary.
IIB3—40 to 53 inches; yellowish brown (10YR 5/6) silty clay; many medium distinct light olive gray (5Y 6/2) mottles; weak coarse subangular blocky structure; firm, sticky, and plastic; 5 percent siltstone fragments 1/4 to 1/2 inch in diameter; strongly acid; gradual wavy boundary.
IIC—53 to 63 inches; yellowish brown (10YR 5/6) silty clay; few medium distinct light olive gray (5Y 6/2) mottles; massive; firm, sticky, and plastic; 5 percent siltstone fragments 1/4 to 1/2 inch in diameter; very strongly acid.

Thickness of the solum ranges from 35 to 70 inches. Depth to bedrock is 40 to 80 inches. Coarse fragments range from 5 to 10 percent in the IIB and IIC horizons. The soil ranges from strongly acid to very strongly acid throughout, except where the surface layer has been limed.

The A1 horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 to 3. It is silt loam.

The A2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. In cultivated areas, an Ap horizon has similar color and texture ranges as the A2 horizon.

The B1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is silt loam or silty clay loam.

The Bt horizon has hue of 7.5YR, 10YR, or 5YR; value of 4 or 5; and chroma of 4 or 6. Mottles that have chroma of 2 are common in the lower part of the argillic horizon in some pedons. The Bt horizon is silt loam or silty clay loam.

The Bx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It has few to many mottles in shades of brown or gray. The Bx horizon is silt loam or silty clay loam.

The IIB3 and IIC horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. They have few to many mottles in shades of brown or gray. They are silty clay or clay.

In this survey area, Zanesville soils are a taxadjunct to the Zanesville series because they contain more clay in the IIB and IIC horizons than is defined for the Zanesville series. The use, management, and behavior of these soils are not affected by this difference.

Factors of Soil Formation

The characteristics of a soil at any given point depend on the physical and chemical composition of parent material and on climate, relief, plant and animal life, and time. Soils form by the interaction of these five factors. The relative importance of each factor differs from one soil to another. In some areas, one factor may dominate the formation of soil characteristics, and in other areas, another factor may dominate. In Bullitt and Spencer Counties, climate and plant and animal life are not likely to vary greatly, but there are differences in relief and parent material. Because the interrelationships between the five factors are so complex, the effect of any one factor is difficult to determine.

The following is a brief discussion of some of the ways in which the five factors have influenced soil formation in Bullitt and Spencer Counties.

Parent Material

Parent material is the soft, unconsolidated mass in which soils form. It influences the mineral and chemical composition of the soil and, to a large extent, the rate at which soil formation takes place. In Bullitt and Spencer Counties, the soils formed in parent material derived from the weathering or decomposition of rocks and minerals of the Ordivician, Silurian, Devonian, and Mississipian Systems. This parent material occurs in the form of residuum, alluvium, and loess.

Many of the soils on the uplands of Bullitt and Spencer Counties formed in residuum weathered from hard limestone. These soils include Caneyville, Faywood, Hagerstown, and Lowell soils. Beasley soils formed in residuum of soft calcareous bedrock. Eden soils formed in residuum of calcareous shale that has thin layers of limestone and siltstone. Lenberg and Trappist soils formed in residuum of acid shale. All of these residual soils are clayey in the lower part of the subsoil and in the substratum.

Some soils, such as Nicholson soils, formed in a thin mantle of loess over limestone residuum. The upper part of the solum, which formed in loess, is silty, and the lower part, which formed in residuum, is clayey.

Elk, Lawrence, and Otwell soils formed in old alluvium on stream terraces. Boonesboro, Newark, and Nolin soils formed in more recent alluvium on flood plains. These soils have less clay in the subsoil and substratum than the soils that formed in residuum. McGary and Markland soils formed in lacustrine deposits and have a clayey subsoil.

Climate

The climate of Bullitt and Spencer Counties is humid and temperate. The average annual precipitation is 55 inches. The soils are never completely dry, and they are subject to leaching throughout most of the year. The average summer air temperature is 75 degrees F, and the average winter air temperature is 35 degrees F.

The soils in Bullitt and Spencer Counties that best show the influence of climate have a leached, acid Bt horizon that is finer textured than the surface layer. The well drained Lowell soils are an example. For more detailed information on climate, see the section "General Nature of the Survey Area."

Relief

Relief, or the position, shape, and slope of the landscape, influences the formation of soils mainly through its effect on drainage and erosion. Relief also influences the formation of soils through variations in exposure to sun, wind, air, drainage, and plant cover.

On moderately steep and steep soils, such as Eden and Fairmount soils, a considerable amount of water is lost through runoff, and less water is able to enter the soil. As a result, erosion removes the soil more rapidly, and deep soils generally do not develop.

On gently sloping and sloping soils, such as Lowell soils, enough water moves downward to cause leaching and a pronounced accumulation of clay in the subsoil. These soils are likely to be deep and have well defined profiles.

On nearly level soils, such as Newark soils, most of the water drains through the soil. This creates a wetness problem if the soil is positioned on a landscape that does not allow surface water to drain off easily.

Plant and Animal Life

Plants affect soil formation mostly by adding organic matter to the soil. Earthworms, ants, and burrowing animals mix the soil and add organic matter. They also make soils more open and porous. Bacteria and fungi contribute mainly by helping to decompose organic matter and thus releasing plant nutrients. The organic

matter imparts a dark color to the soil material and affects soil structure.

The vegetation that grows on the soil during the period of soil formation influences the type of soil that forms. In Bullitt and Spencer Counties, the native vegetation was mostly hardwood forest. The soils which formed under hardwood forest are characterized by a thin, dark surface layer; a leached, lighter colored subsurface layer; and a brighter colored subsoil.

Man greatly altered the surface layer and changed the soil environment where he cleared the forest and plowed the soil. He has mixed the soil layers, moved soil from place to place, added fertilizer and lime, and introduced new plants. In places, accelerated erosion has removed most of the original surface layer and exposed the subsoil.

Time

A long period of time is required for distinct soil profiles to develop. The length of time required depends mainly on the nature of the parent material and the topography. With the exception of soils formed in recent alluvium, enough time has elapsed for the soils in Bullitt and Spencer Counties to express the interaction of the factors of soil formation.

Soils formed in recent alluvium have weak horizon development. The surface horizon may show a slight increase in the organic matter content, and the subsoil may have weak structure. Such soils are said to be immature; Nolin and Newark soils are examples. After a long period of time, if there is no further deposition of sediment, weathering occurs. Some of the finer material moves into the subsoil, and the structure and color of the subsoil may change. Elk soils are examples of this maturing process. A soil is said to be mature when it has been in place long enough to acquire distinct profile characteristics. Examples of mature soils in Bullitt and Spencer Counties are Crider and Lowell soils.

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Glossary

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

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

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

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

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

	Inches
Very low	less than 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

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

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

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

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

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

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

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

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

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

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

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

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

Coarse textured soil. Sand or loamy sand.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

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

Conservation tillage. A form of noninversion tillage that retains protective amounts of residue mulch on the surface throughout the year. These include no

tillage, strip tillage, stubble mulching, and other types of noninversion tillage.

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

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

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

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

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

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another

within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

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

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

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.
C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.
R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet

and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments that are 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

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 adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). The soil mass is susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material 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.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--GEOLOGIC SYSTEMS, FORMATIONS, AND MEMBERS

System	Formation	Member	Predominant Series
Quaternary--------	---	---	McGary, Markland, Nolin, Lawrence, Newark.
Mississippian-----	St. Louis Limestone, Salem Limestone, Harrodsburg Limestone.	---	Crider, Caneyville.
	Borden----------	Muldraugh, Holtsclaw Siltstone.	Garmon.
		Nancy, Kenwood Siltstone, New Providence Shale.	Lenberg, Carpenter.
Devonian----------	New Albany Shale-----	---	Trappist.
Silurian----------	Louisville Limestone	---	Crider.
	Waldron Shale--------	---	Beasley.
	Laurel Dolomite------	---	Caneyville, Crider.
	Osgood, Brassfield	---	Beasley.
Ordivician--------	Drakes----------	Saluda Dolomite, Bardstown.	Beasley.
		Rowland----------	Faywood, Lowell.
	Grant Lake Limestone, Calloway Creek Limestone.	---	Faywood, Lowell.
	Clays Ferry----------	---	Eden.

TABLE 2.--TEMPERATURE AND PRECIPITATION

[Data were recorded in the period 1970-80 at Bernheim Forest, Kentucky]

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	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
January----	41.7	21.1	31.4	70	-10	42	3.80	1.99	5.37	8	10.6
February---	47.0	24.1	35.6	76	-5	28	3.72	1.39	5.65	6	3.7
March------	60.1	35.4	47.8	84	7	123	4.99	3.05	6.73	10	2.1
April------	70.7	42.5	56.6	87	25	206	5.58	2.41	8.28	8	.0
May--------	78.6	51.4	65.0	91	30	465	4.66	2.67	6.42	8	.0
June-------	86.1	59.7	72.4	94	44	672	5.42	3.05	7.52	7	.0
July-------	88.7	63.1	75.9	98	49	803	5.36	2.01	8.14	7	.0
August-----	87.7	62.7	75.2	96	48	781	4.64	2.14	6.78	7	.0
September--	82.6	57.2	69.9	96	36	597	4.57	1.73	6.94	7	.0
October----	71.1	43.9	57.5	88	23	265	3.67	2.09	5.07	6	.0
November---	58.2	36.1	47.2	81	13	73	4.35	1.80	6.50	7	.8
December---	49.3	28.8	39.1	70	2	11	4.76	2.22	6.95	7	1.3
Yearly:											
Average--	68.4	43.8	56.1	---	---	---	---	---	---	---	---
Extreme--	---	---	---	98	-11	---	---	---	---	---	---
Total----	---	---	---	---	---	4,066	55.52	44.34	66.12	88	18.5

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 °F).

TABLE 3.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1970-80 at Bernheim Forest, Kentucky]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 27	May 8	May 19
2 years in 10 later than--	April 18	April 30	May 13
5 years in 10 later than--	March 31	April 15	May 3
First freezing temperature in fall:			
1 year in 10 earlier than--	October 15	October 5	September 25
2 years in 10 earlier than--	October 21	October 11	September 30
5 years in 10 earlier than--	November 2	October 22	October 10

TABLE 4.--GROWING SEASON

[Data were recorded in the period 1970-80 at Bernheim Forest, Kentucky]

Probability	Length of growing season if Daily minimum temperature is ---		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	176	157	139
8 years in 10	186	168	146
5 years in 10	215	189	160
2 years in 10	240	210	173
1 year in 10	254	221	180

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Bullitt County	Spencer County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
BeB	Beasley silt loam, 2 to 6 percent slopes	845	205	1,050	0.3
BeC	Beasley silt loam, 6 to 12 percent slopes, eroded	4,565	1,920	6,485	2.0
BeD	Beasley silt loam, 12 to 20 percent slopes, eroded	450	55	505	0.2
BfC3	Beasley silty clay loam, 6 to 12 percent slopes, severely eroded	2,135	150	2,285	0.7
BfD3	Beasley silty clay loam, 12 to 20 percent slopes, severely eroded	2,450	1,095	3,545	1.1
Bo	Boonesboro silt loam, frequently flooded	400	1,220	1,620	0.5
CaB	Caneyville silt loam, 2 to 6 percent slopes	1,775	0	1,775	0.6
CaC	Caneyville silt loam, 6 to 12 percent slopes, eroded	9,785	0	9,785	3.1
CbD	Caneyville-Beasley-Rock outcrop complex, 12 to 30 percent slopes	4,320	0	4,320	1.4
CnD	Caneyville-Rock outcrop complex, 6 to 20 percent slopes	4,430	0	4,430	1.4
CnE	Caneyville-Rock outcrop complex, 20 to 40 percent slopes	6,235	0	6,235	2.0
CrB	Crider silt loam, 2 to 6 percent slopes	15,590	35	15,625	5.0
CrC	Crider silt loam, 6 to 12 percent slopes, eroded	7,070	0	7,070	2.3
CrD	Crider silt loam, 12 to 20 percent slopes, eroded	1,395	0	1,395	0.4
EcC	Eden silty clay loam, 6 to 20 percent slopes, eroded	0	1,945	1,945	0.6
EdE3	Eden flaggy silty clay, 20 to 30 percent slopes, severely eroded	0	24,135	24,135	7.7
EkA	Elk silt loam, 0 to 2 percent slopes	20	325	345	0.1
EkB	Elk silt loam, 2 to 6 percent slopes	455	1,365	1,820	0.6
EkC	Elk silt loam, 6 to 12 percent slopes	1,460	645	2,105	0.7
ElA	Elk silt loam, occasionally flooded, 0 to 2 percent slopes	70	155	225	0.1
ElB	Elk silt loam, occasionally flooded, 2 to 6 percent slopes	330	455	785	0.3
ElC	Elk silt loam, occasionally flooded, 6 to 12 percent slopes	210	100	310	0.1
FaC	Faywood silt loam, 6 to 12 percent slopes, eroded	40	4,205	4,245	1.4
FdD	Faywood silty clay loam, 12 to 20 percent slopes, eroded	195	15,045	15,240	4.9
FkF	Faywood-Beasley-Rock outcrop complex, 25 to 60 percent slopes	1,795	0	1,795	0.6
FlE	Faywood-Cynthiana complex, 12 to 30 percent slopes	2,960	16,285	19,245	6.2
FnF	Faywood-Fairmount-Woolper complex, 30 to 60 percent slopes	1,845	8,120	9,965	3.2
GmF	Garmon silt loam, 25 to 60 percent slopes	20,900	0	20,900	6.7
HaC	Hagerstown silt loam, 6 to 12 percent slopes, eroded	1,300	0	1,300	0.4
La	Lawrence silt loam, rarely flooded	2,515	400	2,915	0.9
Le	Lawrence silt loam	2,785	215	3,000	1.0
LfE	Lenberg-Carpenter complex, 20 to 40 percent slopes	24,705	0	24,705	7.9
LoB	Lowell silt loam, 2 to 6 percent slopes	0	3,920	3,920	1.3
LoC	Lowell silt loam, 6 to 12 percent slopes, eroded	75	20,735	20,810	6.7
LsC3	Lowell silty clay loam, 6 to 12 percent slopes, severely eroded	0	600	600	0.2
MaB	Markland silt loam, rarely flooded, 2 to 6 percent slopes	525	5	530	0.2
MbD3	Markland silty clay, occasionally flooded, 10 to 30 percent slopes, severely eroded	7,295	0	7,295	2.3
Mc	McGary silt loam, rarely flooded	16,025	5	16,030	5.1
Mv	McGary Variant silt loam, rarely flooded	0	485	485	0.2
Mo	Montgomery silty clay loam	465	155	620	0.2
Ne	Newark silt loam, frequently flooded	5,900	2,025	7,925	2.5
NhA	Nicholson silt loam, 0 to 2 percent slopes	230	0	230	0.1
NhB	Nicholson silt loam, 2 to 6 percent slopes	3,510	3,450	6,960	2.2
NhC	Nicholson silt loam, 6 to 12 percent slopes	755	415	1,170	0.4
No	Nolin silt loam, frequently flooded	9,421	5,485	14,906	4.8
OtA	Otwell silt loam, 0 to 2 percent slopes	55	155	210	0.1
OtB	Otwell silt loam, 2 to 6 percent slopes	2,785	665	3,450	1.1
OtC	Otwell silt loam, 6 to 12 percent slopes	2,980	210	3,190	1.0
OwB	Otwell silt loam, occasionally flooded, 2 to 6 percent slopes	255	190	445	0.1
Pt	Pits	270	10	280	0.1
Sg	Sensabaugh gravelly loam, occasionally flooded	4,095	0	4,095	1.3
ShB	Shelbyville silt loam, 2 to 6 percent slopes	0	2,130	2,130	0.7
TrC	Trappist silt loam, 6 to 12 percent slopes, eroded	1,500	0	1,500	0.5
TrD	Trappist silt loam, 12 to 30 percent slopes, eroded	8,950	0	8,950	2.9
WoB	Woolper silty clay loam, 2 to 6 percent slopes	530	550	1,080	0.3

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Bullitt County	Spencer County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
WoC	Woolper silty clay loam, 6 to 12 percent slopes	545	480	1,025	0.3
ZaB	Zanesville silt loam, 2 to 6 percent slopes	985	0	985	0.3
ZaC	Zanesville silt loam, 6 to 12 percent slopes	2,120	0	2,120	0.7
	Total Land Area	192,301	119,745	312,046	100.0
	Water (Taylorsville Lake-Impounded In 1983)	0	2,930	2,930	0.0
	Total	192,301	122,675	314,976	100.0

TABLE 6.--LAND CAPABILITY CLASSES 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	Soybeans	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Bu	Lbs	Tons	AUM*
BeB---------- Beasley	IIe	105	35	35	2,800	4.0	8.0
BeC---------- Beasley	IIIe	90	30	30	2,400	3.5	7.0
BeD---------- Beasley	IVe	70	---	25	2,050	3.0	6.0
BfC3---------- Beasley	IVe	---	---	---	---	2.5	5.0
BfD3---------- Beasley	VIe	---	---	---	---	---	---
Bo---------- Boonesboro	IIs	100	40	30	2,600	3.0	6.0
CaB---------- Caneyville	IIe	100	30	30	2,500	4.0	8.0
CaC---------- Caneyville	IVe	80	25	25	2,200	3.5	7.0
CbD**:							
Caneyville-----	VIe	---	---	---	---	---	---
Beasley-------	VIe	---	---	---	---	---	---
Rock outcrop--	VIIIs	---	---	---	---	---	---
CnD**:							
Caneyville-----	VIs	---	---	---	---	---	---
Rock outcrop--	VIIIs	---	---	---	---	---	---
CnE**:							
Caneyville-----	VIIs	---	---	---	---	---	---
Rock outcrop--	VIIIs	---	---	---	---	---	---
CrB---------- Crider	IIe	130	45	45	3,200	4.5	9.0
CrC---------- Crider	IIIe	105	35	40	2,900	4.0	8.0
CrD---------- Crider	IVe	85	30	35	2,600	3.5	7.0
EcC---------- Eden	IVe	80	25	30	2,100	3.0	6.0
EdE3---------- Eden	VIe	---	---	---	---	---	3.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Bu	Lbs	Tons	AUM*
EkA---------- Elk	I	135	45	50	3,200	4.5	9.0
EkB---------- Elk	IIe	130	45	50	3,200	4.5	9.0
EkC---------- Elk	IIIe	115	35	40	2,800	4.0	8.0
ElA---------- Elk	IIw	135	45	40	3,200	4.0	8.0
ElB---------- Elk	IIe	130	45	40	3,200	4.0	8.0
ElC---------- Elk	IIIe	115	35	30	2,800	3.5	7.0
FaC---------- Faywood	IIIe	80	25	25	2,200	3.0	6.5
FdD---------- Faywood	IVe	---	---	---	---	3.0	6.0
FkF**:							
Faywood--------	VIIe	---	---	---	---	---	---
Beasley-------	VIIe	---	---	---	---	---	---
Rock outcrop--	VIIIs	---	---	---	---	---	---
FlE---------- Faywood-Cynthiana	VIe	---	---	---	---	---	---
FnF:							
Faywood--------	VIIe	---	---	---	---	---	---
Fairmount-----	VIIe	---	---	---	---	---	---
Woolper-------	VIIe	---	---	---	---	---	---
GmF---------- Garmon	VIIe	---	---	---	---	---	---
HaC---------- Hagerstown	IIIe	105	35	40	2,500	4.0	8.0
La, Le---------- Lawrence	IIIw	90	30	---	1,700	30	5.5
LfE:							
Lenberg--------	VIe	---	---	---	---	---	4.0
Carpenter-----	VIe	---	---	---	---	---	4.0
LoB---------- Lowell	IIe	115	40	40	2,800	4.0	8.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Bu	Lbs	Tons	AUM*
LoC---------- Lowell	IIIe	100	35	35	2,500	3.5	7.5
LsC3---------- Lowell	IVe	85	25	30	2,000	2.5	5.5
MaB---------- Markland	IIe	95	35	35	2,300	3.0	6.5
MbD3---------- Markland	VIe	---	---	---	---	---	4.0
Mc---------- McGary	IIIw	75	25	---	---	2.5	5.5
Mv---------- McGary Variant	IIw	100	40	35	---	4.0	7.0
Mo---------- Montgomery	IIIw	115	40	35	---	4.0	7.0
Ne---------- Newark	IIw	115	40	40	2,500	4.5	8.5
NhA---------- Nicholson	IIw	110	40	40	2,500	3.5	7.5
NhB---------- Nicholson	IIe	115	35	40	2,800	3.5	8.0
NhC---------- Nicholson	IIIe	100	30	30	2,500	3.0	7.0
No---------- Nolin	IIw	120	40	35	2,500	3.5	8.0
OtA---------- Otwell	IIw	105	35	40	2,500	3.5	7.5
OtB---------- Otwell	IIe	110	35	40	2,800	3.5	8.0
OtC---------- Otwell	IIIe	95	30	30	2,500	3.0	7.0
OwB---------- Otwell	IIe	110	35	35	2,800	3.0	6.5
Pt**---------- Pits	VIIIs	---	---	---	---	---	---
Sg---------- Sensabaugh	IIs	95	35	40	2,600	3.0	6.5
ShB---------- Shelbyville	IIe	130	40	50	3,200	4.5	9.0
TrC---------- Trappist	IIIe	80	25	25	2,300	3.5	6.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Bu	Lbs	Tons	AUM*
TrD---------- Trappist	VIe	---	---	---	---	3.0	5.5
WoB---------- Woolper	IIe	115	40	45	2,900	4.0	8.0
WoC---------- Woolper	IIIe	110	35	40	2,600	3.5	7.5
ZaB---------- Zanesville	IIe	115	35	35	2,700	3.5	7.0
ZaC---------- Zanesville	IIIe	90	30	30	2,300	3.0	6.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Dashes indicate no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I:					
Bullitt County	20	---	---	---	---
Spencer County	325	---	---	---	---
II:					
Bullitt County	47,756	27,585	15,676	4,495	---
Spencer County	22,495	12,970	8,305	1,220	---
III:					
Bullitt County	44,410	22,620	21,790	---	---
Spencer County	29,485	28,710	775	---	---
IV:					
Bullitt County	13,960	13,960	---	---	---
Spencer County	17,795	17,795	---	---	---
V:					
Bullitt County	---	---	---	---	---
Spencer County	---	---	---	---	---
VI:					
Bullitt County	53,533	49,989	---	3,544	---
Spencer County	41,515	41,515	---	---	---
VII:					
Bullitt County	28,947	24,271	---	4,676	---
Spencer County	8,120	8,120	---	---	---
VIII:					
Bullitt County	3,675	---	---	3,675	---
Spencer County	10	---	---	10	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
BeB, BeC---------- Beasley	3c	Slight	Moderate	Slight	Moderate	Black locust--------	---	White oak, black oak, white ash, chestnut oak.
						White oak----------	67	
						Scarlet oak---------	---	
						Eastern redcedar----	41	
						Chestnut oak--------	---	
						Yellow-poplar-------	---	
						White ash----------	63	
						Virginia pine-------	70	
BeD---------- Beasley	3c	Moderate	Moderate	Slight	Moderate	White oak----------	67	White oak, black oak, white ash, chestnut oak.
						Scarlet oak---------	---	
						Eastern redcedar----	41	
						Chestnut oak--------	---	
						White ash----------	63	
						Black locust--------	---	
BfC3---------- Beasley	4c	Slight	Moderate	Moderate	Slight	White oak----------	60	White oak, Virginia pine, eastern redcedar, black oak, chestnut oak.
						Virginia pine-------	60	
						Eastern redcedar----	---	
						Chinkapin oak-------	---	
						Black locust--------	---	
BfD3---------- Beasley	4c	Moderate	Moderate	Moderate	Slight	White oak----------	60	White oak, Virginia pine, eastern redcedar, black oak, chestnut oak.
						Eastern redcedar----	35	
						Chinkapin oak-------	---	
						Virginia pine-------	---	
Bo---------- Boonesboro	1o	Slight	Slight	Slight	Severe	Northern red oak----	85	Black walnut, eastern cottonwood, sweetgum, yellow-poplar, white, ash, eastern white, pine, shortleaf pine, black oak, white oak.
						White oak----------	---	
						Black oak----------	---	
						Yellow-poplar-------	---	
CaB, CaC---------- Caneyville	3c	Slight	Moderate	Slight	Moderate	Northern red oak----	71	Black oak, Virginia, pine, white oak, eastern white pine, white ash, northern red oak.
						Yellow-poplar-------	90	
						Eastern redcedar----	45	
						White oak----------	62	
						Black oak----------	69	
						Scarlet oak---------	---	
						Chinkapin oak-------	---	
CbD*:								
Caneyville--------- (North)	3c	Moderate	Moderate	Slight	Moderate	Yellow-poplar-------	90	Eastern white pine, white oak, white ash, yellow-poplar.
						Black oak----------	71	
						White oak----------	64	
						Eastern redcedar----	40	
Beasley----------	3c	Moderate	Moderate	Slight	Moderate	White oak----------	67	White oak, black oak, white ash, chestnut oak.
						Scarlet oak---------	---	
						Eastern redcedar----	41	
						Chestnut oak--------	---	
						White ash----------	63	
						Virginia pine-------	70	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
CbD*: Rock outcrop.								
CbD*: Caneyville (South)	4c	Moderate	Moderate	Moderate	Slight	Scarlet oak Eastern redcedar Chinkapin oak Black oak White oak	53 36 --- 65 52	Eastern redcedar, Virginia pine.
Beasley	3c	Moderate	Moderate	Slight	Moderate	White oak Scarlet oak Eastern redcedar Chestnut oak Virginia pine White ash	67 --- 41 --- 70 63	White oak, black oak, Virginia pine, white ash, chestnut oak.
Rock outcrop.								
CnD*, CnE: Caneyville (North)	3x	Moderate	Moderate	Moderate	Moderate	Black oak Yellow-poplar Eastern redcedar White oak Sugar maple Hickory White ash	71 90 45 64 --- --- 72	White oak, yellow-poplar, eastern white pine, white ash.
Rock outcrop.								
CnD, CnE*: Caneyville (South)	4x	Moderate	Moderate	Moderate	Slight	Scarlet oak Eastern redcedar Black oak White oak Sugar maple Chinkapin oak	53 36 65 52 --- 51	Eastern redcedar, Virginia pine.
Rock outcrop.								
CrB, CrC Crider	1o	Slight	Slight	Slight	Severe	Black oak Northern red oak Yellow-poplar Virginia pine Sugar maple White oak	87 88 97 78 --- ---	Eastern white pine, yellow-poplar, black walnut, white ash, black oak, white oak, northern red oak.
CrD Crider	1r	Moderate	Moderate	Slight	Severe	Black oak Northern red oak Yellow-poplar Virginia pine Sugar maple White oak	87 88 97 78 --- ---	Eastern white pine, yellow-poplar, black walnut, white ash, black oak, white oak, northern red oak.
EcC Eden	3c	Slight	Moderate	Moderate	Moderate	White oak White ash Scarlet oak Eastern redcedar Sugar maple	--- 70 --- 40 ---	White oak, black oak, white ash, Virginia pine.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
EdE3---------- Eden	4c	Moderate	Moderate	Severe	Slight	Eastern redcedar----	35	Eastern redcedar, white oak, black oak.
						Black oak----------	65	
						Scarlet oak---------	---	
						Chinkapin oak-------	---	
						Sassafras----------	---	
EkA, EkB, EkC, ElA, ElB, ElC---------- Elk	2o	Slight	Slight	Slight	Severe	Northern red oak----	80	Eastern white pine, yellow-poplar, black walnut, eastern cottonwood, white ash, northern red oak, pin oak, black oak, white oak, sweetgum.
						Yellow-poplar-------	90	
						Red maple----------	---	
						Hackberry----------	---	
FaC---------- Faywood	3c	Slight	Moderate	Slight	Moderate	Northern red oak----	70	White oak, black oak, eastern white pine, white ash.
						Scarlet oak---------	72	
						White oak----------	60	
						Chinkapin oak-------	---	
						Sugar maple---------	---	
						Southern red oak----	---	
FdD---------- Faywood	3c	Moderate	Moderate	Slight	Moderate	Northern red oak----	70	White oak, black oak, eastern white pine, white ash.
						Scarlet oak---------	---	
						White oak----------	---	
						White ash----------	---	
						Chinkapin oak-------	---	
						Sugar maple---------	---	
						Southern red oak----	---	
						Virginia pine-------	70	
FkF*:								
Faywood----------	3c	Severe	Severe	Slight	Moderate	Northern red oak----	70	White oak, black oak, eastern white pine, white ash.
						Scarlet oak---------	---	
						White oak----------	---	
						Hickory------------	---	
						White ash----------	---	
						Chinkapin oak-------	---	
						Sugar maple---------	---	
						Southern red oak----	---	
						Virginia pine-------	70	
Beasley----------	3c	Severe	Severe	Slight	Moderate	White oak----------	67	White oak, black oak, Virginia pine, white ash, chestnut oak.
						Scarlet oak---------	---	
						Eastern redcedar----	41	
						Chinkapin oak-------	---	
						White ash----------	63	
						Black walnut--------	---	
						Virginia pine-------	---	
						Chestnut oak--------	---	
Rock outcrop.								

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
FlE*:								
Faywood	3c	Moderate	Moderate	Slight	Moderate	Northern red oak	70	White oak, black oak, eastern white pine, white ash.
						Scarlet oak	72	
						White oak	60	
						Hickory	---	
						White ash	---	
						Chinkapin oak	---	
						Sugar maple	---	
						Southern red oak	---	
Cynthiana	4d	Severe	Severe	Severe	Slight	Eastern redcedar	42	Eastern redcedar, Virginia pine.
						White ash	---	
						Black walnut	---	
FnF*:								
Faywood	3c	Severe	Severe	Slight	Moderate	Northern red oak	70	White oak, black oak, eastern white pine, white ash.
						Scarlet oak	---	
						White oak	---	
						Chinkapin oak	---	
						Sugar maple	---	
						Southern red oak	---	
						Virginia pine	70	
FnF*:								
Fairmount	4d	Severe	Severe	Moderate	Slight	Eastern redcedar	42	Black oak, white oak, Virginia pine, eastern redcedar.
						Scarlet oak	60	
						Northern red oak	66	
						Virginia pine	60	
Woolper	2c	Severe	Severe	Slight	Slight	Chinkapin oak	70	Yellow-poplar, black oak, white oak, white ash.
						White ash	---	
						Hickory	---	
						White oak	---	
GmF	3r	Severe	Severe	Slight	Slight	Northern red oak	71	Black oak, Virginia pine, white oak, chestnut oak, eastern white pine.
Garmon						Virginia pine	65	
						Eastern redcedar	38	
						Chestnut oak	62	
						White oak	67	
						Black oak	72	
HaC	1c	Slight	Moderate	Slight	Severe	Northern red oak	85	Northern red oak, white ash, black oak, white oak.
Hagerstown						Black oak	---	
						White oak	---	
La, Le	2w	Slight	Moderate	Slight	Moderate	Yellow-poplar	86	Yellow-poplar, white ash, American sycamore, black oak, white oak, sweetgum.
Lawrence						Sweetgum	87	
						White oak	74	
LfE*:								
Lenberg (North)	3c	Severe	Moderate	Slight	Moderate	Northern red oak	70	Eastern white pine, shortleaf pine, Virginia pine.
Lenburg (South)	4c	Severe	Moderate	Slight	Slight	White oak	59	Virginia pine, shortleaf pine, white oak.
						Scarlet oak	---	
						Chestnut oak	---	
						Virginia pine	60	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
LfE*: Carpenter	2r	Moderate	Moderate	Slight	Moderate	Hickory Chestnut oak Scarlet oak	--- 75 ---	Eastern white pine, yellow-poplar, black walnut, white oak, black oak, white ash, chestnut oak.
LoB, LoC Lowell	2c	Slight	Slight	Slight	Moderate	Black oak White ash Chinkapin oak Virginia pine	89 75 --- 80	Yellow-poplar, eastern white pine, white ash, black oak, northern red oak.
LsC3 Lowell	3c	Slight	Moderate	Moderate	Moderate	Black oak Virginia pine White ash	80 65 70	Virginia pine, black oak, white ash, northern red oak.
MaB Markland	2c	Slight	Slight	Slight	Moderate	White oak Northern red oak Black oak Black cherry	75 78 --- ---	Eastern white pine, black oak, white ash, yellow-poplar.
MbD3 Markland	3c	Moderate	Moderate	Moderate	Moderate	White oak Northern red oak Black oak Hickory	65 68 --- ---	Eastern white pine, black oak, white oak, white ash.
Mc McGary	2w	Slight	Slight	Slight	Moderate	Pin oak Sweetgum White oak White ash Red maple	85 90 75 --- ---	Eastern white pine, baldcypress, white ash, black oak, white oak, American sycamore, pin oak, sweetgum.
Mv McGary Variant	3w	Slight	Moderate	Slight	Moderate	Pin oak Shellbark hickory Sweetgum Red maple Hackberry White ash	80 --- --- --- --- ---	Pin oak, American sycamore, sweetgum, white ash, eastern white pine.
Mo Montgomery	2w	Slight	Severe	Severe	Moderate	Pin oak Sweetgum	88 90	American sycamore, willow oak, swamp white oak, sweetgum, baldcypress.
Ne Newark	1w	Slight	Moderate	Slight	Severe	Pin oak Eastern cottonwood Sweetgum	99 94 88	Eastern cottonwood, sweetgum, American sycamore, eastern white pine, cherrybark oak.
NhA, NhB, NhC Nicholson	2o	Slight	Slight	Slight	Moderate	Northern red oak Black oak White oak Yellow-poplar Sweetgum	80 76 72 --- ---	Black oak, white oak, yellow-poplar, white ash, sweetgum, eastern white pine, northern red oak.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	
No---------- Nolin	1w	Slight	Moderate	Slight	Severe	Red maple----------	---	Sweetgum, eastern white pine, eastern cottonwood, white ash, cherrybark oak, black walnut, yellow-poplar.
						Sweetgum----------	92	
						Cherrybark oak------	97	
						White ash----------	---	
						Yellow-poplar-------	---	
OtA, OtB, OtC, OwB-- Otwell	3o	Slight	Slight	Slight	Moderate	White oak----------	69	Eastern white pine, black oak, white oak, southern red oak, shortleaf pine.
						Black oak----------	---	
						Sugar maple---------	---	
						Black gum----------	---	
Sg---------- Sensabaugh	2o	Slight	Slight	Slight	Moderate	Yellow-poplar-------	100	Yellow-poplar, black walnut, white oak, eastern white pine, white ash, shortleaf pine.
						White oak----------	80	
						Shortleaf pine------	80	
						Virginia pine-------	75	
ShB---------- Shelbyville	2o	Slight	Slight	Slight	Moderate	Northern red oak----	80	Eastern white pine, shortleaf pine, black oak, yellow-poplar, black walnut, white ash, white oak, northern red oak.
						Black oak----------	---	
						White oak----------	---	
						Hickory------------	---	
TrC---------- Trappist	3c	Slight	Moderate	Slight	Moderate	White oak----------	58	Black oak, Virginia pine, white oak, eastern white pine, chestnut oak.
						Virginia pine-------	62	
						Black oak----------	58	
						Chestnut oak--------	58	
						American beech------	---	
TrD---------- Trappist	3c	Moderate	Moderate	Slight	Moderate	White oak----------	58	Black oak, Virginia pine, white oak, chestnut oak, eastern white pine.
						Virginia pine-------	62	
						Black oak----------	58	
						Chestnut oak--------	58	
						American beech------	---	
WoB, WoC---------- Woolper	2c	Slight	Moderate	Moderate	Severe	White oak----------	80	Yellow-poplar, white ash, black oak, white oak.
						Yellow-poplar-------	90	
						Chinkapin oak-------	70	
ZaB, ZaC---------- Zanesville	3o	Slight	Slight	Slight	Moderate	Black oak----------	72	Eastern white pine, shortleaf pine, black oak, white oak.
						Virginia pine-------	66	
						White oak----------	62	
						Black cherry--------	---	

*See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BeB Beasley	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight	Slight.
BeC Beasley	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
BeD Beasley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
BfC3 Beasley	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
BfD3 Beasley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Bo Boonesboro	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
CaB Caneyville	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, depth to rock, percs slowly.	Slight	Moderate: thin layer.
CaC Caneyville	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
CbD*: Caneyville	Severe: slope.	Severe: slope.	Severe: slope,	Severe: erodes easily.	Severe: slope,
Beasley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Rock outcrop.					
CnD*: Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: depth to rock, slope.
Rock outcrop.					
CnE*: Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
CrB Crider	Slight	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CrC---------- Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
CrD---------- Crider	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
EcC---------- Eden	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: large stones, slope, thin layer.
EdE3---------- Eden	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: large stones, slope, too clayey, small stones.	Severe: too clayey, slope.	Severe: large stones, slope, too clayey.
EkA---------- Elk	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
EkB---------- Elk	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
EkC---------- Elk	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
ElA---------- Elk	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
ElB---------- Elk	Severe: flooding.	Slight----------	Moderate: slope, flooding.	Slight----------	Moderate: flooding.
ElC---------- Elk	Severe: flooding.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope, flooding.
FaC---------- Faywood	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.
FdD---------- Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
FkF*: Faywood----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Beasley----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Rock outcrop.					
FlE*: Faywood----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily, slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
F1E*: Cynthiana	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: erodes easily, slope.	Severe: slope, thin layer.
FnF*: Faywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Fairmount	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: erodes easily, slope.	Severe: slope, thin layer.
Woolper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
GmF: Garmon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HaC: Hagerstown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
La: Lawrence	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Le: Lawrence	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
LfE*: Lenberg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope, slippage.
Carpenter	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Severe: slope, slippage.
LoB: Lowell	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
LoC, LsC3: Lowell	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MaB: Markland	Severe: flooding.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
MbD3: Markland	Severe: flooding, slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey, erodes easily.	Severe: slope, too clayey.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Mc---------- McGary	Severe: flooding, wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Mv---------- McGary Variant	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Mo---------- Montgomery	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ne---------- Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
NhA---------- Nicholson	Moderate: percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
NhB---------- Nicholson	Moderate: percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
NhC---------- Nicholson	Moderate: slope, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
No---------- Nolin	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
OtA, OtB---------- Otwell	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.
OtC---------- Otwell	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
OwB---------- Otwell	Severe: flooding, percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Moderate: flooding.
Pt*. Pits					
Sg---------- Sensabaugh	Severe: flooding.	Slight----------	Severe: small stones.	Slight----------	Moderate: small stones, large stones, flooding.
ShB---------- Shelbyville	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
TrC---------- Trappist	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TrD---------- Trappist	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
WoB---------- Woolper	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight----------	Slight.
WoC---------- Woolper	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
ZaB---------- Zanesville	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
ZaC---------- Zanesville	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	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
BeB---- Beasley	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BeC---- Beasley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BeD---- Beasley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BfC3---- Beasley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BfD3---- Beasley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Bo---- Boonesboro	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaB---- Caneyville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaC---- Caneyville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CbD*:										
Caneyville----	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Beasley----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
CnD*, CnE*:										
Caneyville----	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
CrB---- Crider	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrC---- Crider	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CrD---- Crider	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
EcC---- Eden	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EdE3---- Eden	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	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
EkA, EkB---------- Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EkC---------- Elk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ElA, ElB---------- Elk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ElC---------- Elk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FaC---------- Faywood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FdD---------- Faywood	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FkF*: Faywood----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Beasley----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
FlE*: Faywood----------	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cynthiana---------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
FnF*: Faywood----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Fairmount---------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Woolper----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GmF---------- Garmon	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
HaC---------- Hagerstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
La, Le---------- Lawrence	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
LfE*: Lenberg----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Carpenter---------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	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
LoB---- Lowell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LoC, LsC3---- Lowell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MaB---- Markland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MbD3---- Markland	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mc---- McGary	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Mv---- McGary Variant	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
Mo---- Montgomery	Fair	Poor	Poor	Poor	Poor	Good	Good	Very poor.	Poor	Good.
Ne---- Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
NhA---- Nicholson	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
NhB---- Nicholson	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NhC---- Nicholson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
No---- Nolin	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Fair	Very poor.
OtA, OtB---- Otwell	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	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.
Pt*. Pits										
Sg---- Sensabaugh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ShB---- Shelbyville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TrC---- Trappist	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TrD---- Trappist	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	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
WoB---------- Woolper	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WoC---------- Woolper	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ZaB---------- Zanesville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ZaC---------- Zanesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BeB---------- Beasley	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
BeC---------- Beasley	Moderate: slope, too clayey.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
BeD---------- Beasley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
BfC3---------- Beasley	Moderate: slope, too clayey.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
BfD3---------- Beasley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Bo---------- Boonesboro	Severe: depth to rock.	Severe: flooding.	Severe: flooding, depth to rock.	Severe: flooding.	Severe: flooding.	Severe: flooding.
CaB---------- 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: thin layer.
CaC---------- Caneyville	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
CbD*:						
Caneyville-------	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Beasley----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Rock outcrop.						
CnD*:						
Caneyville-------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CnE*: Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						
CrB---- Crider	Moderate: too clayey.	Slight----	Slight----	Moderate: slope.	Severe: low strength.	Slight.
CrC---- Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
CrD---- Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
EcC---- Eden	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope, thin layer.
EdE3---- Eden	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, too clayey.
EkA---- Elk	Slight----	Slight----	Slight----	Slight----	Severe: low strength.	Slight.
EkB---- Elk	Slight----	Slight----	Slight----	Moderate: slope.	Severe: low strength.	Slight.
EkC---- Elk	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
ElA, ElB---- Elk	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
ElC---- Elk	Moderate: slope, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Severe: low strength, flooding.	Moderate: slope, flooding.
FaC---- Faywood	Severe: depth to rock.	Moderate: slope, depth to rock, shrink-swell.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
FdD---- Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
FkF*: Faywood----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FkF*:						
Beasley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Rock outcrop.						
F1E*:						
Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Cynthiana	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: slope, thin layer.
FnF*:						
Faywood	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Fairmount	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, low strength, slope.	Severe: large stone, slope, thin layer.
Woolper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
GmF Garmon	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
HaC 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.
La Lawrence	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength.	Moderate: wetness.
Le Lawrence	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
LfE*:						
Lenberg	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope, slippage.
Carpenter	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.
LoB Lowell	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LoC, LsC3--------- Lowell	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.
MaB--------------- Markland	Moderate: too clayey, wetness.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: low strength, shrink-swell.	Slight.
MbD3-------------- Markland	Severe: slope.	Severe: flooding, shrink-swell, slope.	Severe: flooding, shrink-swell, slope.	Severe: flooding, shrink-swell, slope.	Severe: low strength, flooding, shrink-swell, slope.	Severe: slope, too clayey.
Mc---------------- McGary	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
Mv---------------- McGary Variant	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
Mo---------------- Montgomery	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, wetness, shrink-swell.	Severe: wetness.
Ne---------------- Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
NhA--------------- Nicholson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Moderate: wetness.
NhB--------------- Nicholson	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Moderate: wetness.
NhC--------------- Nicholson	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
No---------------- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
OtA--------------- Otwell	Moderate: too clayey, wetness.	Moderate: shrink-swell, wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength.	Slight.
OtB--------------- Otwell	Moderate: too clayey, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
OtC---------- Otwell	Moderate: too clayey, wetness, slope.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
OwB---------- Otwell	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Pt*. Pits						
Sg---------- Sensabaugh	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: small stones, large stones, flooding.
ShB---------- Shelbyville	Moderate: too clayey.	Slight---------	Moderate: shrink-swell.	Moderate: slope.	Severe: low strength.	Slight.
TrC---------- Trappist	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.	Moderate: slope, thin layer.
TrD---------- Trappist	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
WoB---------- Woolper	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
WoC---------- Woolper	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
ZaB---------- Zanesville	Moderate: depth to rock, wetness, too clayey.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Slight.
ZaC---------- Zanesville	Moderate: slope, wetness, depth to rock.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: Low strength.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "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]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BeB---------- Beasley	Severe: percs slowly.	Moderate: slope, depth to rock.	Severe: too clayey, depth to rock.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
BeC---------- Beasley	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope, depth to rock.	Poor: too clayey, hard to pack.
BeD---------- Beasley	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, hard to pack.
BfC3--------- Beasley	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope, depth to rock.	Poor: too clayey, hard to pack.
BfD3--------- Beasley	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, hard to pack.
Bo---------- Boonesboro	Severe: flooding, depth to rock, poor filter.	Severe: seepage, depth to rock, flooding.	Severe: flooding, depth to rock, seepage.	Severe: flooding, depth to rock, seepage.	Poor: area reclaim, thin layer.
CaB---------- 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.
CaC---------- 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.
CbD*: 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, slope.
Beasley----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, hard to pack.
Rock outcrop.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CnD*: Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey, slope.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, depth to rock, slope.
Rock outcrop.					
CnE*: 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, slope.
Rock outcrop.					
CrB---- Crider	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----	Fair: too clayey.
CrC---- Crider	Moderate: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
CrD---- Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
EcC---- Eden	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.
EdE3---- Eden	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, slope, hard to pack.
EkA---- Elk	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight----	Fair: too clayey.
EkB---- Elk	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----	Fair: too clayey.
EkC---- Elk	Moderate: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.
ElA, ElB---- Elk	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
ElC---- Elk	Severe: flooding.	Severe: slope, flooding.	Severe: flooding.	Severe: flooding.	Fair: slope, too clayey.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FaC---------- Faywood	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
FdD---------- Faywood	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: area reclaim, too clayey, hard to pack, slope.
FkF*: Faywood----------	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: area reclaim, too clayey, hard to pack, slope.
Beasley----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, hard to pack.
Rock outcrop.					
FlE*: Faywood----------	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: area reclaim, too clayey, hard to pack, slope.
Cynthiana----------	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, slope, too clayey.
FnF*: Faywood----------	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock.	Poor: area reclaim, too clayey, hard to pack, slope.
Fairmount----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, slope, hard to pack.
Woolper----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey, hard to pack.
GmF---------- Garmon	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage, slope.	Severe: slope, seepage, depth to rock.	Poor: slope, thin layer, area reclaim.

See footnote at end of table.

TABLE 12--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HaC---------- 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.
La---------- Lawrence	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Le---------- Lawrence	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
LfE*: 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.
Carpenter----------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
LoB---------- Lowell	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.
LoC, LsC3---------- Lowell	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
MaB---------- Markland	Severe: wetness, percs slowly.	Severe: flooding.	Severe: too clayey.	Moderate: flooding.	Poor: too clayey, hard to pack.
MbD3---------- Markland	Severe: flooding, wetness, percs slowly.	Severe: flooding, slope.	Severe: flooding, too clayey.	Severe: flooding,	Poor: too clayey, hard to pack, SLOPE.
Mc---------- McGary	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Mv---------- McGary Variant	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Mo---------- Montgomery	Severe: ~~ponding,~~ percs slowly, WETNESS.	Severe: ~~ponding.~~ WETNESS.	Severe: ~~ponding,~~ WETNESS, too clayey.	Severe: ~~ponding.~~ WETNESS.	Poor: too clayey, hard to pack, ~~ponding.~~ WETNESS.
Ne---------- Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
NhA, NhB---------- Nicholson	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
NhC---------- Nicholson	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
No---------- Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding.	Fair: too clayey.
OtA---------- Otwell	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
OtB---------- Otwell	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
OtC---------- Otwell	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: slope, wetness.	Fair: too clayey, slope, wetness.
OwB---------- Otwell	Severe: flooding, wetness, percs slowly.	Severe: wetness, flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
Pt*. Pits					
Sg---------- Sensabaugh	Severe: flooding.	Severe: seepage, flooding.	Severe: seepage, wetness.	Severe: seepage, flooding.	Fair: small stones, too clayey.
ShB---------- Shelbyville	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
TrC---------- Trappist	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.
TrD---------- Trappist	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, slope, hard to pack.
WoB---------- Woolper	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
WoC---------- Woolper	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ZaB---------- Zanesville	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock.	Moderate: depth to rock, wetness.	Fair: too clayey, area reclaim, wetness.
ZaC---------- Zanesville	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: depth to rock.	Moderate: depth to rock, slope, wetness.	Fair: slope, wetness, too clayey, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
BeB, BeC---------- Beasley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BeD---------- Beasley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
BfC3---------- Beasley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BfD3---------- Beasley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Bo---------- Boonesboro	Poor: area reclaim, thin layer.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones.
CaB, CaC---------- Caneyville	Poor: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CbD*: Caneyville----------	Poor: area reclaim, low strength, thin layer.	Improbable: excess fines, depth to rock.	Improbable: excess fines, depth to rock.	Poor: too clayey, slope.
Beasley----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
CnD*: Caneyville----------	Poor: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
CnE*: Caneyville----------	Poor: area reclaim, low strength, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
CrB---------- Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
CrC--- Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
CrD--- Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
EcC--- Eden	Poor: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, too clayey.
EdE3--- Eden	Poor: area reclaim, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, slope.
EkA, EkB--- Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
EkC--- Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
ElA, ElB--- Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
ElC--- Elk	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
FaC--- Faywood	Poor: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FdD--- Faywood	Poor: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
FkF*: Faywood---	Poor: area reclaim, slope, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Beasley---	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
FlE*: Faywood---	Poor: area reclaim, low strength, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FlE* Cynthiana	Poor: area reclaim, low strength, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, slope.
FnF*: Faywood	Poor: area reclaim, slope, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Fairmount	Poor: area reclaim, low strength, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, large stones, slope.
Woolper	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
GmF Garmon	Poor: area reclaim, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HaC Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
La, Le Lawrence	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
LfE*: Lenberg	Poor: area reclaim, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey slope.
Carpenter	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, too clayey.
LoB, LoC, LsC3 Lowell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MaB Markland	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MbD3 Markland	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Mc McGary	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Mv---------- McGary Variant	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Mo---------- Montgomery	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
Ne---------- Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NhA, NhB---------- Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
NhC---------- Nicholson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
No---------- Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
OtA, OtB---------- Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
OtC---------- Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
OwB---------- Otwell	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Pt*. Pits				
Sg---------- Sensabaugh	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
ShB---------- Shelbyville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
TrC---------- Trappist	Poor: area reclaim, low strength, thin layey.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
TrD---------- Trappist	Poor: area reclaim, low strength, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
WoB, WoC---------- Woolper	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ZaB, ZaC---------- Zanesville	Severe: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
BeB---------- Beasley	Slight----------	Moderate: thin layer.	Deep to water----	Erodes easily----	Erodes easily.
BeC, BeD---------- Beasley	Slight----------	Moderate: thin layer.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
BfC3, BfD3-------- Beasley	Slight----------	Moderate: thin layer.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
Bo---------- Boonesboro	Severe: seepage.	Severe: thin layer, piping.	Deep to water----	Depth to rock, erodes easily.	Depth to rock, erodes easily.
CaB---------- Caneyville	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water----	Depth to rock, erodes easily.	Depth to rock, erodes easily.
CaC---------- Caneyville	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.
CbD*: Caneyville-------	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Beasley----------	Severe: slope.	Moderate: thin layer.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
Rock outcrop.					
CnD*: Caneyville-------	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.					
CnE*: Caneyville-------	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.					
CrB---------- Crider	Moderate: seepage.	Severe: piping.	Deep to water----	Favorable--------	Favorable.
CrC, CrD---------- Crider	Moderate: seepage.	Severe: piping.	Deep to water----	Slope----------	Slope.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
EcC---------- Eden	Moderate: depth to rock.	Severe: hard to pack, large stones, thin layer.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, erodes easily.
EdE3---------- Eden	Severe: slope.	Severe: hard to pack, thin layer.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
EkA, EkB---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
EkC---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Slope, erodes easily.	Slope,. erodes easily.
ElA, ElB---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
ElC---------- Elk	Moderate: seepage.	Severe: piping.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
FaC, FdD---------- Faywood	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
FkF*:					
Faywood----------	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Beasley----------	Severe: slope.	Moderate: thin layer.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
Rock outcrop.					
FlE*:					
Faywood----------	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Cynthiana--------	Severe: depth to rock, slope.	Severe: hard to pack, thin layer.	Deep to water----	Slope, erodes easily, depth to rock.	Depth to rock, slope, erodes easily.
FnF*:					
Faywood----------	Severe: slope.	Severe: thin layer, hard to pack.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Fairmount--------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water----	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Woolper----------	Severe: slope.	Severe: hard to pack.	Deep to water----	Erodes easily, percs slowly, slope.	Slope, erodes easily, percs slowly.
GmF---------- Garmon	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water----	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
HaC---------- Hagerstown	Moderate: seepage.	Moderate: hard to pack, thin layer, piping.	Deep to water----	Slope----------	Slope.
La, Le---------- Lawrence	Slight----------	Severe: piping.	Percs slowly-----	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
LfE*: Lenberg----------	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Carpenter--------	Severe: slope.	Severe: piping.	Deep to water----	Slope----------	Slope.
LoB---------- Lowell	Moderate: depth to rock.	Moderate: hard to pack, thin layer.	Deep to water----	Erodes easily----	Erodes easily.
LoC, LsC3--------- Lowell	Moderate: depth to rock.	Moderate: hard to pack, thin layer.	Deep to water----	Slope, erodes easily.	Slope, erodes easily.
MaB---------- Markland	Slight----------	Moderate: hard to pack.	Deep to water----	Erodes easily, percs slowly.	Erodes easily, percs slowly.
MbD3---------- Markland	Severe: slope.	Moderate: hard to pack.	Deep to water----	Erodes easily, percs slowly, slope.	Erodes easily, percs slowly, slope.
Mc---------- McGary	Slight----------	Severe: wetness.	Percs slowly-----	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Mv---------- McGary Variant	Slight----------	Severe: wetness.	Percs slowly-----	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Mo---------- Montgomery	Slight----------	Severe: hard to pack, wetness.	Percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ne---------- Newark	Moderate: seepage.	Severe: piping, wetness.	Flooding---------	Erodes easily, wetness.	Wetness, erodes easily.
NhA---------- Nicholson	Slight----------	Moderate: hard to pack, wetness.	Percs slowly-----	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, wetness.
NhB---------- Nicholson	Slight----------	Moderate: hard to pack, wetness.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, wetness.
NhC---------- Nicholson	Slight----------	Moderate: hard to pack, wetness.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
No---------- Nolin	Moderate: seepage.	Severe: piping.	Deep to water----	Erodes easily----	Erodes easily.
OtA---------- Otwell	Moderate: seepage.	Moderate: piping, wetness.	Percs slowly-----	Erodes easily, rooting depth, percs slowly.	Erodes easily, rooting depth, percs slowly.
OtB---------- Otwell	Moderate: seepage.	Moderate: piping, wetness.	Percs slowly, slope.	Erodes easily, rooting depth, percs slowly.	Erodes easily, rooting depth, percs slowly.
OtC---------- Otwell	Moderate: seepage.	Moderate: piping, wetness.	Percs slowly, slope.	Slope, erodes easily, rooting depth.	Slope, erodes easily, rooting depth.
OwB---------- Otwell	Moderate: seepage.	Moderate: wetness, piping.	Percs slowly, slope, flooding.	Erodes easily, rooting depth, percs slowly.	Erodes easily, rooting depth, percs slowly.
Pt*. Pits					
Sg---------- Sensabaugh	Severe: seepage.	Severe: piping.	Deep to water----	Large stones-----	Large stones.
ShB---------- Shelbyville	Moderate: seepage.	Slight----------	Deep to water----	Favorable--------	Favorable.
TrC---------- Trappist	Moderate: depth to rock.	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
TrD---------- Trappist	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
WoB---------- Woolper	Slight----------	Severe: hard to pack.	Deep to water----	Erodes easily----	Erodes easily.
WoC---------- Woolper	Slight----------	Severe: hard to pack.	Deep to water----	Erodes easily, slope.	Slope, erodes easily.
ZaB---------- Zanesville	Moderate: depth to rock, seepage.	Slight----------	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
ZaC---------- Zanesville	Moderate: depth to rock.	Slight----------	Percs slowly, slope.	Slope, erodes easily, rooting depth.	Slope, erodes easily, rooting depth.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BeB, BeC, BeD---- Beasley	0-5	Silt loam--------	ML, CL-ML	A-4	0-5	90-100	85-100	80-100	75-100	25-35	4-10
	5-26	Silty clay, clay	CH, CL	A-7	0-5	90-100	85-100	85-100	75-100	45-70	20-40
	26-46	Silty clay, clay, cherty silty clay.	CL, CH	A-7	0-10	70-100	55-100	50-100	50-95	40-65	15-35
	46-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
BfC3, BfD3------- Beasley	0-5	Silty clay loam	CL	A-6, A-7	0-5	90-100	85-100	80-100	75-100	34-42	15-22
	5-21	Silty clay, clay	CH, CL	A-7	0-5	90-100	85-100	85-100	75-100	45-70	20-40
	21-41	Silty clay, clay, cherty silty clay.	CL, CH	A-7	0-10	70-100	55-100	50-100	50-95	40-65	15-35
	41-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Bo---------- Boonesboro	0-12	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	90-100	85-100	80-100	70-95	25-35	4-11
	12-28	Gravelly silt loam, flaggy loam, very gravelly loam.	GM, GC, CL CL-ML	A-2, A-4, A-6, A-7	0-20	50-75	40-70	35-65	25-60	25-42	4-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CaB, CaC--------- 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.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-33	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CbD*:											
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.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-33	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Beasley---------	0-5	Silt loam--------	ML, CL-ML	A-4	0-5	90-100	85-100	80-100	75-100	25-35	4-10
	5-26	Silty clay, clay	CH, CL	A-7	0-5	90-100	85-100	85-100	75-100	45-70	20-40
	26-46	Silty clay, clay loam, cherty silty clay.	CL, CH	A-7	0-10	70-100	55-100	50-100	50-95	40-65	15-35
	46-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CnD*, CnE*: 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.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-33	Clay, silty clay	CH	A-7	0-3	90-100	85-100	75-100	65-100	50-75	30-45
	33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
CrB, CrC, CrD---- Crider	0-9	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	9-37	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	4-20
	37-84	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
EcC---------- Eden	0-5	Silty clay loam	CL, CH	A-7, A-6	0-15	85-100	80-100	75-100	70-100	35-65	12-35
	5-31	Flaggy silty clay flaggy clay, silty clay.	CH, CL	A-7	10-35	75-100	70-100	65-100	65-95	45-75	20-45
	31-64	Weathered bedrock	---	---	---	---	---	---	---	---	---
EdE3---------- Eden	0-5	Flaggy silty clay	CL, CH	A-7, A-6	15-35	75-95	70-95	70-95	65-95	35-65	12-35
	5-26	Flaggy silty clay flaggy clay, silty clay.	CH, CL	A-7	15-35	75-100	70-100	65-100	65-95	45-75	20-45
	26-59	Weathered bedrock	---	---	---	---	---	---	---	---	---
EkA, EkB, EkC, ElA, ElB, ElC--- Elk	0-10	Silt loam	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	70-95	25-35	3-10
	10-50	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
	50-70	Silty clay loam, silt loam, silty clay.	ML, CL, CL-ML, SM-SC	A-4, A-6	0	75-100	50-100	45-100	40-95	25-40	5-15
FaC---------- Faywood	0-5	Silt loam	ML, CL, CL-ML	A-4	0-15	100	95-100	90-100	85-100	25-35	4-10
	5-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FdD---------- Faywood	0-5	Silty clay loam	CL	A-6, A-7	0-15	100	95-100	90-100	85-100	34-42	15-22
	5-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FkF*: Faywood---------	0-5	Silt loam	ML, CL, CL-ML	A-4	0-15	100	95-100	90-100	85-100	25-35	4-10
	5-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FkF*:											
Beasley	0-5	Silt loam	ML, CL-ML	A-4	0-5	90-100	85-100	80-100	75-100	25-35	4-10
	5-26	Silty clay, clay	CH, CL	A-7	0-5	90-100	85-100	85-100	75-100	45-70	20-40
	26-46	Silty clay, clay loam, cherty silty clay.	CL, CH	A-7	0-10	70-100	55-100	50-100	50-95	40-65	15-35
	46-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
F1E*:											
Faywood	0-5	Silt loam	ML, CL, CL-ML	A-4	0-15	100	95-100	90-100	85-100	25-35	4-10
	5-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cynthiana	0-5	Silty clay loam	CL, CL-ML	A-4, A-6, A-7	0-15	70-100	65-100	60-100	55-100	25-42	4-20
	5-17	Flaggy clay, flaggy silty clay, clay.	CH, CL	A-7	5-20	70-100	65-100	60-100	55-100	45-75	20-45
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FnF*:											
Faywood	0-5	Silt loam	ML, CL, CL-ML	A-4	0-15	100	95-100	90-100	85-100	25-35	4-10
	5-30	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-15	90-100	90-100	85-100	75-100	42-70	20-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Fairmount	0-7	Silty clay loam	CL	A-6, A-7	5-35	80-100	70-100	65-100	60-95	35-45	15-22
	7-16	Flaggy silty clay loam, flaggy clay, silty clay.	CH, CL	A-7	5-35	80-100	70-100	65-100	60-100	40-70	20-40
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Woolper	0-10	Silty clay loam	CL	A-6, A-7	0-10	95-100	90-100	85-100	75-100	34-42	15-22
	10-17	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0-10	95-100	90-100	85-100	75-100	35-65	15-40
	17-80	Clay, silty clay	CH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-45
GmF	0-13	Silt loam	CL, CL-ML	A-4, A-6	0-10	75-95	75-95	65-95	55-90	20-35	5-15
Garmon	13-21	Loam, shaly silt loam, channery silty clay loam.	GM-GC, CL-ML, CL SM-SC	A-4, A-6	0-15	60-85	50-85	45-80	36-70	20-40	5-20
	21-29	Shaly silt loam, channery silty clay loam, channery loam.	GM-GC, CL-ML, CL SM-SC	A-4, A-6	0-15	60-85	50-85	45-80	36-70	20-40	5-20
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HaC---------- Hagerstown	0-16	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-5	90-100	85-100	80-100	70-95	25-50	5-25
	16-53	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-10	90-100	85-100	75-100	75-95	30-70	15-40
La, Le---------- Lawrence	0-8	Silt loam--------	ML	A-4	0	100	95-100	90-100	80-100	25-35	2-10
	8-20	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
	20-48	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
	48-64	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
LfE*: Lenberg---------	0-4	Silt loam--------	ML, CL, CL-ML	A-4, A-6,	0-5	75-100	75-100	75-95	65-90	20-35	2-15
	4-9	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
	9-17	Silty clay, clay, gravelly clay.	CL, CH, ML MH	A-7	0-25	75-100	55-100	54-95	50-90	45-70	19-40
	17-36	Channery silty clay, clay, silty clay.	CL, CH, SC GC	A-7	0-25	60-95	40-95	40-95	36-90	45-70	20-40
	36-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
Carpenter-------	0-6	Flaggy silt loam-	ML, CL-ML	A-4	15-25	70-95	60-85	55-80	55-80	<35	NP-10
	6-15	Gravelly silt loam, silt loam, flaggy silt loam.	CL, CL-ML	A-4, A-6	5-35	65-95	55-90	55-80	55-80	20-40	5-20
	15-46	Gravelly silty clay loam, silty clay loam, clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	5-35	60-90	55-85	55-80	55-80	20-45	5-20
	46-51	Channery silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	5-20	75-95	70-90	65-90	65-90	30-60	15-40
	51-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
LoB, LoC---------- Lowell	0-5	Silt loam--------	ML, CL, CL-ML	A-4	0	100	95-100	90-100	85-100	22-32	4-10
	5-16	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	16-63	Clay, silty clay	CH, MH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-40
	63	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LsC3---------- Lowell	0-5	Silty clay loam	CL	A-6, A-7	0	100	95-100	90-100	85-100	34-42	15-22
	5-26	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-32
	26-57	Clay, silty clay	CH, MH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-40
	57	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MaB---------- Markland	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	6-33	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	20-35
	33-64	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	100	100	90-100	75-95	35-60	15-30
MbD3---------- Markland	0-5	Silty clay.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	5-28	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	20-35
	28-59	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	100	100	90-100	75-95	35-60	15-30
Mc---------- McGary	0-8	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-90	25-36	5-15
	8-40	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	46-58	24-32
	40-72	Stratified silty clay loam to clay.	CL, CH	A-6, A-7	0	95-100	95-100	95-100	85-100	38-54	20-32
Mv---------- McGary Variant	0-12	Silt loam--------	ML, CL-ML	A-4	0	95-100	90-100	90-100	80-100	<35	NP-10
	12-26	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	80-95	25-40	5-20
	26-48	Silty clay, silty clay loam.	CH, CL	A-7, A-6	0	95-100	90-100	85-100	80-95	35-55	20-40
	48-96	Clay, silty clay	CH, CL	A-7	0	95-100	90-100	80-100	75-95	40-55	20-40
Mo---------- Montgomery	0-9	Silty clay loam	CL	A-7	0	100	100	100	85-100	40-50	20-30
	9-40	Silty clay loam, silty clay.	CH	A-7	0	100	100	95-100	90-100	50-65	30-42
	40-62	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	85-100	40-55	20-32
Ne---------- Newark	0-9	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	9-34	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-95	22-42	3-20
	34-60	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20
NhA, NhB, NhC---- Nicholson	0-7	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	85-100	80-95	25-35	5-10
	7-24	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	85-100	85-100	80-100	25-45	5-20
	24-42	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-4, A-7	0	95-100	90-100	80-100	75-95	25-45	5-20
	42-72	Silty clay, clay, channery clay.	CH, CL	A-6, A-7	0-10	80-100	70-100	60-100	55-95	34-70	16-40
No---------- Nolin	0-9	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	9-52	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
	52-78	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

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
OtA, OtB, OtC, OwB---------- Otwell	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	8-26	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	20-30
	42-62	Stratified silt loam to silty clay.	CL	A-6, A-7	0	95-100	90-100	85-100	80-95	35-50	15-25
Pt*. Pits											
Sg---------- Sensabaugh	0-8	Gravelly loam----	CL-ML, CL, ML, SM	A-4	0-18	75-90	65-75	55-65	40-55	16-29	3-9
	8-34	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	2-18	70-95	55-90	45-75	35-65	20-35	5-14
	34-54	Gravelly loam, very gravelly fine sandy loam, gravelly fine sandy loam.	SM-SC, SC, GM-GC, GC	A-4, A-6, A-2	5-30	55-90	25-75	25-65	20-55	20-36	6-15
ShB---------- Shelbyville	0-9	Silt loam--------	ML, CL	A-4, A-6	0	100	95-100	90-100	85-100	25-40	3-15
	9-37	Silty clay loam, silt loam.	CL	A-6, A-4, A-7	0	100	95-100	90-100	85-100	30-45	10-25
	37-92	Silty clay, clay	CH, CL, MH	A-7	0-10	80-100	80-100	70-100	65-100	45-75	20-45
TrC, TrD---------- Trappist	0-4	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-95	20-35	2-14
	4-23	Silty clay, clay, shaly silty clay.	CL, CH	A-7, A-6	0	80-100	60-100	55-100	50-95	35-60	12-30
	23	Very shaly clay, very shaly silty clay, shaly clay.	GC, CL, CH SC	A-2, A-7, A-6	0-5	30-75	20-65	20-60	15-60	35-60	12-30
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WoB, WoC---------- Woolper	0-10	Silty clay loam	CL	A-6, A-7	0-10	95-100	90-100	85-100	75-100	34-42	15-22
	10-17	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0-10	95-100	90-100	85-100	75-100	35-65	15-40
	17-80	Clay, silty clay	CH, CL	A-7	0-10	95-100	90-100	85-100	75-100	45-75	20-45
ZaB, ZaC---------- Zanesville	0-6	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	6-31	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
	31-40	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	90-100	85-100	80-100	60-100	20-40	2-20
	40-63	Silty clay, clay.	CL, CH	A-7	0-5	65-95	65-90	65-90	30-60	30-60	15-40
	63	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	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
BeB, BeC, BeD----	0-5	10-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-7.3	Low----------	0.43	3	.5-4
Beasley	5-26	40-60	1.30-1.55	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28		
	26-46	40-60	1.50-1.70	0.2-0.6	0.10-0.16	6.6-8.4	Moderate-----	0.28		
	46-50	---	---	---	---	---	----------	----		
BfC3, BfD3-------	0-5	27-40	1.20-1.40	0.6-2.0	0.14-0.23	4.5-7.3	Low----------	0.32	3	.5-2
Beasley	5-21	40-60	1.30-1.55	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28		
	21-41	40-60	1.50-1.70	0.2-0.6	0.10-0.16	6.6-8.4	Moderate-----	0.28		
	41-46	---	---	---	---	---	----------	----		
Bo----------	0-12	15-27	1.20-1.40	0.6-2.0	0.18-0.23	6.1-7.8	Low----------	0.37	3	3-5
Boonesboro	12-28	15-35	1.20-1.40	6.0-20	0.06-0.12	6.1-7.8	Low----------	0.17		
	28	---	---	---	---	---	----------	----		
CaB, CaC---------	0-5	10-27	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low----------	0.43	3	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		
	21-33	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate-----	0.28		
	33	---	---	---	---	---	----------	----		
CbD*:										
Caneyville------	0-5	10-27	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		
	21-33	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate-----	0.28		
	33	---	---	---	---	---	----------	----		
Beasley---------	0-5	10-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-7.3	Low----------	0.43	3	.5-4
	5-26	40-60	1.30-1.55	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28		
	26-46	40-60	1.50-1.70	0.2-0.6	0.10-0.16	6.6-8.4	Moderate-----	0.28		
	46-50	---	---	---	---	---	----------	----		
Rock outcrop.										
CnD*, CnE*:										
Caneyville------	0-5	10-27	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		
	21-33	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.6-7.8	Moderate-----	0.28		
	33	---	---	---	---	---	----------	----		
Rock outcrop.										
CrB, CrC, CrD----	0-9	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	9-37	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low----------	0.28		
	37-84	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.0	Moderate-----	0.28		
EcC----------	0-5	27-40	1.35-1.55	0.06-0.6	0.12-0.18	4.5-8.4	Moderate-----	0.43	3	.5-3
Eden	5-31	40-60	1.45-1.65	0.06-0.2	0.08-0.13	5.1-8.4	Moderate-----	0.28		
	31-64	---	---	---	---	---	----------	0.17		
EdE3----------	0-5	27-60	1.45-1.65	0.06-0.6	0.11-0.17	4.5-8.4	Moderate-----	0.17	3	.5-3
Eden	5-26	40-60	1.45-1.65	0.06-0.2	0.08-0.13	5.1-8.4	Moderate-----	0.28		
	26-59	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
EkA, EkB, EkC, E1A, E1B, E1C--- E1k	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
	10-50	18-34	1.20-1.50	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.28		
	50-70	15-40	1.20-1.50	0.6-2.0	0.14-0.20	4.5-6.5	Low----------	0.28		
FaC---------- Faywood	0-5	15-27	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
	5-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	30	---	---	---	---	---	----------	----		
FdD---------- Faywood	0-5	27-40	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
	5-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	30	---	---	---	---	---	----------	----		
FkF*: Faywood---------	0-5	15-27	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
	5-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	30	---	---	---	---	---	----------	----		
Beasley---------	0-5	10-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-7.3	Low----------	0.43	3	.5-4
	5-26	40-60	1.30-1.55	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28		
	26-46	40-60	1.50-1.70	0.2-0.6	0.10-0.16	6.6-8.4	Moderate-----	0.28		
	46-50	---	---	---	---	---	----------	----		
Rock outcrop.										
F1E*: Faywood---------	0-5	15-27	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
	5-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	30	---	---	---	---	---	----------	----		
Cynthiana-------	0-5	27-40	1.20-1.40	0.6-2.0	0.15-0.20	6.1-7.8	Moderate-----	0.37	2	1-4
	5-17	40-60	1.35-1.60	0.2-0.6	0.08-0.15	6.1-7.8	Moderate-----	0.28		
	17	---	---	---	---	---	----------	----		
FnF*: Faywood---------	0-5	15-27	1.30-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low----------	0.37	3	1-4
	5-30	35-60	1.35-1.45	0.06-0.6	0.12-0.17	5.1-7.8	Moderate-----	0.28		
	30	---	---	---	---	---	----------	----		
Fairmount-------	0-7	27-40	1.20-1.40	0.06-0.6	0.12-0.20	6.6-8.4	Moderate-----	0.37	2	3-7
	7-16	35-60	1.40-1.60	0.06-0.6	0.10-0.18	6.6-8.4	Moderate-----	0.37		
	16	---	---	---	---	---	----------	----		
Woolper---------	0-10	27-35	1.30-1.50	0.6-2.0	0.18-0.22	6.1-7.8	Low----------	0.37	3	4-6
	10-17	36-50	1.30-1.55	0.2-2.0	0.13-0.19	6.1-7.8	Moderate-----	0.28		
	17-80	40-60	1.45-1.65	0.06-0.6	0.12-0.17	6.1-7.8	Moderate-----	0.28		
GmF---------- Garmon	0-13	7-27	1.20-1.40	2.0-6.0	0.14-0.20	4.5-7.3	Low----------	0.32	3	<3
	13-21	18-34	1.20-1.50	2.0-6.0	0.05-0.16	4.5-7.3	Low----------	0.28		
	21-29	18-34	1.20-1.50	2.0-6.0	0.05-0.16	5.6-7.3	Low----------	0.20		
	29	---	---	---	---	---	----------	----		
HaC---------- Hagerstown	0-16	15-27	1.20-1.40	0.6-6.0	0.16-0.24	4.5-6.5	Low----------	0.32	4	1-5
	16-53	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
La, Le---------- Lawrence	0-8	12-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.5	Low----------	0.43	3	1-4
	8-20	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.5	Low----------	0.37		
	20-48	18-35	1.50-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Low----------	0.43		
	48-64	18-60	1.50-1.70	0.06-0.6	0.08-0.12	4.5-7.3	Low----------	0.37		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
LfE*:										
Lenberg	0-4	12-27	1.30-1.50	0.6-2.0	0.18-0.23	4.5-5.5	Low	0.43	3	.5-3
	4-9	35-60	1.40-1.60	0.2-0.6	0.10-0.19	4.5-5.5	Moderate	0.37		
	9-17	40-60	1.40-1.65	0.2-0.6	0.10-0.18	4.5-5.5	Moderate	0.37		
	17-36	40-60	1.40-1.65	0.2-0.6	0.10-0.16	4.5-5.5	Moderate	0.28		
	36-48	---	---	---	---	---	---	---		
Carpenter	0-6	10-27	1.20-1.40	2.0-6.0	0.16-0.22	4.5-6.5	Low	0.28	4	1-4
	6-15	18-30	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.5	Low	0.28		
	15-46	18-35	1.20-1.50	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.28		
	46-51	30-55	1.20-1.60	0.06-0.6	0.07-0.16	4.5-6.0	Moderate	0.28		
	51-54	---	---	---	---	---	---	---		
LoB, LoC	0-5	12-27	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low	0.37	3	1-4
Lowell	5-16	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate	0.28		
	16-63	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	63	---	---	---	---	---	---	---		
LsC3	0-5	27-40	1.20-1.40	0.6-2.0	0.18-0.23	4.5-6.5	Low	0.37	3	.5-2
Lowell	5-26	35-60	1.30-1.60	0.2-2.0	0.13-0.19	4.5-6.5	Moderate	0.28		
	26-57	40-60	1.50-1.70	0.2-0.6	0.12-0.17	5.1-7.8	Moderate	0.28		
	57	---	---	---	---	---	---	---		
MaB	0-6	20-27	1.30-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low	0.43	3	1-3
Markland	6-33	40-55	1.55-1.70	0.06-0.2	0.11-0.13	5.1-6.5	High	0.32		
	33-64	35-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High	0.32		
MbD3	0-5	40-55	1.30-1.45	0.6-2.0	0.12-0.16	5.1-7.3	Moderate	0.43	3	1-3
Markland	5-28	40-55	1.55-1.70	0.06-0.2	0.11-0.13	5.1-6.5	High	0.32		
	28-59	35-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High	0.32		
Mc	0-8	22-27	1.35-1.50	0.6-2.0	0.22-0.24	6.6-7.3	Low	0.43	3	1-4
McGary	8-40	35-50	1.60-1.75	<0.2	0.11-0.13	5.1-7.8	High	0.32		
	40-72	35-50	1.60-1.75	<0.2	0.14-0.16	7.9-8.4	High	0.32		
Mv	0-12	18-27	1.20-1.40	0.6-2.0	0.20-0.24	6.1-7.3	Low	0.43	5	1-4
McGary Variant	12-26	20-35	1.20-1.45	0.6-2.0	0.16-0.22	5.1-6.5	Low	0.43		
	26-48	35-48	1.40-1.55	<0.2	0.14-0.16	6.1-7.8	High	0.32		
	48-96	40-65	1.40-1.55	<0.2	0.11-0.14	6.6-8.4	High	0.32		
Mo	0-9	35-40	1.35-1.55	0.2-0.6	0.20-0.23	6.1-7.8	High	0.37	5	3-6
Montgomery	9-62	40-55	1.45-1.65	<0.2	0.11-0.18	6.1-7.8	High	0.37		
Ne	0-9	12-27	1.20-1.40	0.6-2.0	0.15-0.23	5.6-7.8	Low	0.43	5	1-4
Newark	9-34	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low	0.43		
	34-60	12-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low	0.43		
NhA, NhB, NhC	0-7	12-27	1.20-1.40	0.6-2.0	0.19-0.23	4.5-6.0	Low	0.43	3	2-4
Nicholson	7-24	18-35	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.43		
	24-42	18-35	1.50-1.70	0.06-0.2	0.07-0.12	4.5-6.0	Low	0.43		
	42-72	35-60	1.40-1.60	0.06-0.6	0.07-0.12	5.1-7.8	Moderate	0.37		
No	0-9	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.43	5	2-4
Nolin	9-52	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.43		
	52-78	10-30	1.30-1.55	0.6-6.0	0.10-0.23	5.6-8.4	Low	0.43		
OtA, OtB, OtC,	0-8	18-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	.5-2
OwB	8-26	22-35	1.30-1.45	0.6-2.0	0.18-0.22	4.5-5.5	Low	0.43		
Otwell	26-42	18-30	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Low	0.43		
	42-62	20-30	1.55-1.65	0.06-0.2	0.19-0.21	5.1-6.5	Moderate	0.43		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	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
Pt*. Pits										
Sg---------- Sensabaugh	0-8	8-25	1.25-1.40	0.6-6.0	0.10-0.16	5.6-7.8	Low----------	0.20	5	1-3
	8-34	18-35	1.30-1.50	0.6-6.0	0.10-0.16	5.6-7.8	Low----------	0.20		
	34-54	12-38	1.25-1.50	0.6-6.0	0.08-0.14	5.6-7.8	Low----------	0.17		
ShB---------- Shelbyville	0-9	10-27	1.30-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low----------	0.32	4	2-5
	9-37	18-35	1.30-1.45	0.6-2.0	0.18-0.22	5.1-7.3	Low----------	0.37		
	37-92	40-60	1.35-1.50	0.2-0.6	0.12-0.18	5.1-7.8	Moderate-----	0.28		
TrC, TrD---------- Trappist	0-4	7-27	1.20-1.40	0.6-2.0	0.15-0.23	3.6-5.5	Low----------	0.37	3	1-3
	4-23	30-60	1.40-1.65	0.2-0.6	0.08-0.18	3.6-5.5	Moderate-----	0.28		
	23	35-60	1.40-1.60	0.06-0.2	0.05-0.12	3.6-5.5	Moderate-----	0.24		
	35	---	---	---	---	---	----------	----		
WoB, WoC---------- Woolper	0-10	27-35	1.30-1.50	0.6-2.0	0.18-0.22	6.1-7.8	Low----------	0.37	3	4-6
	10-17	36-50	1.30-1.55	0.2-2.0	0.13-0.19	6.1-7.8	Moderate-----	0.28		
	17-80	40-60	1.45-1.65	0.2-0.6	0.12-0.17	6.1-7.8	Moderate-----	0.28		
ZaB, ZaC---------- Zanesville	0-6	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-5.5	Low----------	0.43	3	1-2
	6-31	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-5.5	Low----------	0.37		
	31-40	18-33	1.50-1.75	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.37		
	40-63	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-5.5	Moderate-----	0.28		
	63	---	---	---	---	---	----------	----		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "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]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
BeB, BeC, BeD, BfC3, BfD3---- Beasley	C	None----	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate.
Bo---- Boonesboro	B	Frequent----	Brief----	Jan-Apr	>6.0	---	---	20-40	Hard	Low----	Low.
CaB, CaC---- Caneyville	C	None----	---	---	>6.0	---	---	20-40	Hard	High----	Moderate.
CbD*:											
Caneyville----	C	None----	---	---	>6.0	---	---	20-40	Hard	High----	Moderate.
Beasley----	C	None----	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate.
Rock outcrop.											
CnD*, CnE*:											
Caneyville----	C	None----	---	---	>6.0	---	---	20-40	Hard	High----	Moderate.
Rock outcrop.											
CrB, CrC, CrD---- Crider	B	None----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
EcC, EdE3---- Eden	C	None----	---	---	>6.0	---	---	20-40	Soft	Moderate	Low.
EkA, EkB, EkC---- Elk	B	None----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
ElA, ElB, ElC---- Elk	B	Occasional	Brief----	Jan-Apr	>6.0	---	---	>60	---	Moderate	Moderate.
FaC, FdD---- Faywood	C	None----	---	---	>6.0	---	---	20-40	Hard	High----	Moderate.
FkF*:											
Faywood----	C	None----	---	---	>6.0	---	---	20-40	Hard	High----	Moderate.
Beasley----	C	None----	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate.
Rock outcrop.											

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
FlE*:											
Faywood	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Cynthiana	D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
FnF*:											
Faywood	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
Fairmount	D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Low.
Woolper	C	None	---	---	>6.0	---	---	>60	---	Moderate	Low.
GmF Garmon	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate.
HaC Hagerstown	C	None	---	---	>6.0	---	---	40-80	Hard	Moderate	Low.
La Lawrence	C	Rare	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	High	High.
Le Lawrence	C	None	---	---	1.0-2.0	Perched	Dec-Apr	>60	---	High	High.
LfE*:											
Lenberg	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate.
Carpenter	B	None	---	---	>6.0	---	---	>40	Soft	Low	Moderate.
LoB, LoC, LsC3 Lowell	C	None	---	---	>6.0	---	---	>40	Hard	High	Moderate.
MaB Markland	C	Rare	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	High	Moderate.
MbD3 Markland	C	Occasional	Brief	Jan-May	3.0-6.0	Perched	Mar-Apr	>60	---	High	Moderate.
Mc McGary	C	Rare	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	High	Low.
Mv McGary Variant	C	Rare	---	---	1.0-3.0	Apparent	Feb-Apr	>60	---	High	Low.
Mo Montgomery	D	None	---	---	0-1.0	Apparent	Dec-May	>60	---	High	Low.
Ne Newark	C	Frequent	Brief	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High	Low.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
NhA, NhB, NhC----- Nicholson	C	None--------	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High-----	Moderate.
No---------- Nolin	B	Frequent----	Brief-----	Feb-Apr	3.0-6.0	Apparent	Feb-Mar	>60	---	Low------	Moderate.
OtA, OtB, OtC----- Otwell	C	None--------	---	---	2.0-3.0	Perched	Jan-Apr	>60	---	Moderate	High.
OwB---------- Otwell	C	Occasional	Brief-----	Jan-Apr	2.0-3.0	Perched	Jan-Apr	>60	---	Moderate	High.
Pt*. Pits											
Sg---------- Sensabaugh	B	Occasional	Very brief	Jan-Apr	4.0-6.0	Apparent	Jan-Apr	>60	---	Low------	Low.
ShB---------- Shelbyville	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
TrC, TrD---------- Trappist	C	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	High.
WoB, WoC---------- Woolper	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low.
ZaB, ZaC---------- 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 18.--PHYSICAL ANALYSES OF SELECTED SOILS

[A dash indicates material was not detected. The Cr horizon was not sampled in these soils.]

Soil name, report number, horizon, and depth in inches	Total			Size class and particle diameter (mm)								Coarse fragments
				Sand					Sand coarser than very fine (2-0.1)	Very fine sand plus silt (0.1-0.002)	Textural class	
	Sand (2-0.05)	Silt (0.05-0.002)	Int. IV Clay (< 0.002)	Very coarse (2.1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)				>2 mm
	Pct <2 mm											Pct
Carpenter flaggy silty loam 1: (78KY-029-3)												
A1 -- 0- 3	2.9	80.1	17.0	0.9	1.0	0.4	0.3	0.3	2.6	80.4	SiL	---
A2 -- 3- 6	4.9	78.9	16.2	1.6	1.3	0.5	0.7	0.8	4.1	79.7	SiL	17.5
B1 -- 6-10	6.7	75.3	18.0	2.5	1.7	0.7	0.9	0.8	5.8	76.1	SiL	12.7
B21t -- 10-15	6.4	71.4	22.2	2.7	1.5	0.6	0.8	0.8	5.6	72.2	SiL	5.4
B22t -- 15-25	5.8	66.8	27.4	1.5	1.6	0.7	1.1	0.9	4.9	67.7	SicL	---
B23t -- 25-35	4.4	59.5	36.1	0.9	1.0	0.5	0.9	1.2	3.3	60.7	SicL	---
IIB3 -- 35-46	3.8	64.4	31.8	0.7	0.8	0.5	1.0	0.8	3.0	65.2	SicL	4.1
IIC -- 46-51	3.7	61.5	34.8	0.5	0.8	0.5	1.1	0.8	2.9	62.3	SicL	10.9
Lenberg silt loam 2: (76KY-029-1)												
A1 -- 0- 4	5.3	73.8	20.9	1.6	1.0	0.7	1.0	1.0	4.3	74.8	SiL	1.4
B21t -- 4- 9	2.9	62.3	34.8	0.8	0.5	0.4	0.6	0.6	2.3	62.9	SicL	3.5
B22t -- 9-17	4.8	50.9	44.3	2.3	1.0	0.4	0.6	0.5	4.3	51.4	Sic	16.9
B23t -- 17-22	1.2	51.9	46.9	0.3	0.2	0.2	0.2	0.3	1.0	52.2	Sic	0.7
B3 -- 22-36	0.9	54.9	44.2	0.1	0.2	0.1	0.3	0.2	0.7	55.1	Sic	---
Otwell silt loam 3: (76KY-029-3)												
Ap -- 0- 9	3.5	82.4	14.1	0.8	1.0	0.4	0.4	0.9	2.6	83.3	Sil	0.5
B21t -- 9-20	3.8	78.8	17.4	0.9	1.0	0.5	0.5	1.0	2.9	79.8	Sil	0.1
B22t -- 20-25	3.3	78.2	18.5	0.7	0.8	0.5	0.5	0.9	2.5	79.1	Sil	0.3
Bx1 -- 25-36	4.1	68.0	27.9	0.6	0.9	0.6	0.8	1.1	2.9	69.1	Sicl	0.4
Bx2 -- 36-52	3.7	77.1	19.2	1.0	0.7	0.3	0.6	1.1	2.6	78.2	Sil	0.7
Bx3 -- 52-72	3.9	75.0	21.1	1.3	0.7	0.3	0.5	1.1	2.8	76.1	Sil	0.8
Bx4 -- 72-92	6.4	68.6	25.0	2.0	1.3	0.8	1.2	1.3	5.3	69.9	Sil	2.2

1. In Bullitt County, approximately 1.7 miles east of Cermont, 0.6 mile north of Kentucky Highway 245, and 200 feet west of a gravel road. The textural class shown on the table differs from the text in some of the horizons, because the textural class shown on the table does not reflect the fragments larger than 76mm that were discarded in sampling. Many of the small shale fragments were destroyed in sample preparation in the lab. In the field, coarse fragments were sieved and weighed and determined to be about 20 percent in the control section. This supports the family classification of fine-loamy.

2. In Bullitt County, approximately 2.5 miles northwest of Shepherdsville, 130 yards southwest of Pryor Valley Road.

3. In Bullitt County, approximately 5 miles north of Shepherdsville, 0.6 mile west of Kentucky Highway 1020 at Brooks, 0.2 mile north of Kentucky Highway 1526, and 300 yards east of a narrow blacktop road.

TABLE 19.--CHEMICAL ANAYLSES OF SELECTED SOILS

[A dash indicates the element was not detected.]

Soil name, report number, horizon, and depth in inches	pH		Extractable cations					Cation exchange capacity				Base saturation				
	H_2O (1:1)	KCl 1N (1:1)	Ca	Mg	K	Na	TEC	AA	SUM	EA	Al	AA	SUM	OM	CCE	P
	Milliequivalents per 100 grams of soil											Pct	Pct	Pct	Ppm	
Carpenter flaggy silt loam 1: (78KY-029-3)																
A1 -- 0- 3	5.2	4.2	5.0	2.61	0.45	0.05	8.11	13.6	22.9	14.8	0.22	59.6	35.4	6.6	---	2.7
A2 -- 3- 6	5.0	3.6	1.13	0.94	0.18	0.03	1.43	8.0	11.8	10.4	0.03	17.9	12.1	1.5	---	0.9
B1 -- 6-10	4.9	3.6	0.75	0.76	0.15	0.03	1.69	28.9	11.9	10.2	0.61	5.8	14.2	0.8	---	0.6
B21t -- 10-15	4.8	3.5	0.5	1.06	0.13	0.04	1.73	9.1	12.8	11.0	0.16	19.0	13.6	0.6	---	0.2
B22t -- 15-25	4.7	3.5	0.25	2.64	0.19	0.04	3.12	12.0	16.3	13.2	0.02	26.0	19.1	0.5	---	0.0
B23t -- 25-35	4.7	3.4	0.15	3.90	0.26	0.07	4.38	14.7	19.5	15.1	0.13	29.8	22.4	0.4	---	0.2
IIB3 -- 35-46	4.6	3.0	0.25	5.12	0.27	0.23	5.87	15.0	19.4	13.5	0.19	39.1	30.2	0.3	---	0.2
IIC -- 46-51	4.7	2.9	0.5	5.80	0.27	0.35	6.92	15.0	19.5	12.6	0.14	46.1	35.5	0.3	---	0.1
Lenberg silt loam 2: (76KY-029-1)																
A1 -- 0- 4	4.6	3.3	---	1.22	0.17	0.03	1.42	12.9	17.1	15.7	0.6	11.0	8.3	3.5	0.3	2.6
B21t -- 4- 9	4.4	3.4	---	1.11	0.23	0.03	1.37	11.4	14.9	13.6	0.8	12.0	9.2	1.1	0.2	1.3
B22t -- 9-17	4.4	3.4	---	1.71	0.31	0.03	2.05	13.4	17.5	15.4	0.7	15.3	11.7	0.6	0.2	4.7
B23t -- 17-22	4.5	3.2	---	2.95	0.33	0.04	3.32	14.6	19.0	15.7	0.8	22.7	17.5	0.5	0.3	2.3
B3 -- 22-36	4.6	3.2	---	3.42	0.33	0.20	3.95	13.1	16.5	12.6	0.7	30.2	23.9	0.4	0.3	0.6
Otwell silt loam 3: (76KY-029-3)																
Ap -- 0- 9	5.3	3.9	2.8	1.27	0.09	0.10	4.26	7.4	12.1	7.9	0.1	57.4	35.2	1.7	0.2	1.7
B21t -- 9-20	4.9	3.4	1.25	0.86	0.10	0.10	2.31	7.1	10.7	8.4	0.3	32.7	21.6	0.5	0.2	0.9
B22t -- 20-25	4.9	3.3	0.85	1.08	0.13	0.10	2.16	8.5	9.6	7.4	0.4	25.4	22.5	0.2	0.2	0.5
Bx1 -- 25-36	4.9	3.0	0.60	2.26	0.26	0.19	3.31	15.5	20.2	16.9	0.9	21.4	16.4	0.2	0.2	0.3
Bx2 -- 36-52	4.9	2.8	0.45	2.01	0.14	0.24	2.84	10.5	14.0	11.2	0.6	27.1	20.3	0.1	0.6	0.9
Bx3 -- 52-72	5.2	2.8	1.60	3.33	0.14	0.43	5.50	10.9	13.8	8.3	0.6	50.5	39.9	0.1	0.4	0.9
Bx4 -- 72-92	5.3	2.8	3.10	5.46	0.15	0.83	9.54	13.3	15.7	6.2	0.5	72.0	60.8	0.1	0.3	0.3

1. In Bullitt County, approximately 1.7 miles east of Clermont, 0.6 mile north of Kentucky Highway 245, and 200 feet west of a gravel road.

2. In Bullitt County, approximately 2.5 miles northwest of Shepherdsville, 130 yards southwest of Pryor Valley Road. The B21t and B22t horizons show soil reaction 0.1 of a unit lower than the official series range which is within the range of sampling and laboratory error. No samples were taken at the Cr contact. Since it is known that the Cr horizon has base saturation of more than 50 percent, it is assumed that base saturation is more than 35 percent at the contact.

3. In Bullitt County, approximately 5 miles north of Shepherdsville, 0.6 mile west of Kentucky Highway 1020 at Brooks, 0.2 mile north of Kentucky Highway 1526, and 300 yards east of a narrow blacktop road.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Beasley	Fine, mixed, mesic Typic Hapludalfs
Boonesboro	Fine-loamy, mixed, mesic Fluventic Hapludolls
Caneyville	Fine, mixed, mesic Typic Hapludalfs
Carpenter	Fine-loamy, mixed, mesic Ultic Hapludalfs
Crider	Fine-silty, mixed, mesic Typic Paleudalfs
Cynthiana	Clayey, mixed, mesic Lithic Hapludalfs
Eden	Fine, mixed, mesic Typic Hapludalfs
Elk	Fine-silty, mixed, mesic Ultic Hapludalfs
Fairmount	Clayey, mixed, mesic Lithic Hapludolls
Faywood	Fine, mixed, mesic Typic Hapludalfs
Garmon	Fine-loamy, mixed, mesic Dystric Eutrochrepts
Hagerstown	Fine, mixed, mesic Typic Hapludalfs
Lawrence	Fine-silty, mixed, mesic Aquic Fragiudalfs
Lenberg	Fine, mixed, mesic Ultic Hapludalfs
Lowell	Fine, mixed, mesic Typic Hapludalfs
Markland	Fine, mixed, mesic Typic Hapludalfs
McGary	Fine, mixed, mesic Aeric Ochraqualfs
McGary Variant	Fine-silty, mixed, mesic Aeric Ochraqualfs
Montgomery	Fine, mixed, mesic Typic Haplaquolls
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nicholson	Fine-silty, mixed, mesic Typic Fragiudalfs
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Otwell	Fine-silty, mixed, mesic Typic Fragiudalfs
Sensabaugh	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Shelbyville	Fine-silty, mixed, mesic Mollic Hapludalfs
Trappist	Clayey, mixed, mesic Typic Hapludults
Woolper	Fine, mixed, mesic Typic Argiudolls
*Zanesville	Fine-silty, mixed, mesic Typic Fragiudalfs

*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.

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If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).