United States Department of Agriculture

Soil Conservation Service

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

Soil Survey of Pike County, Kentucky

How To Use This Soil Survey

General Soil Map

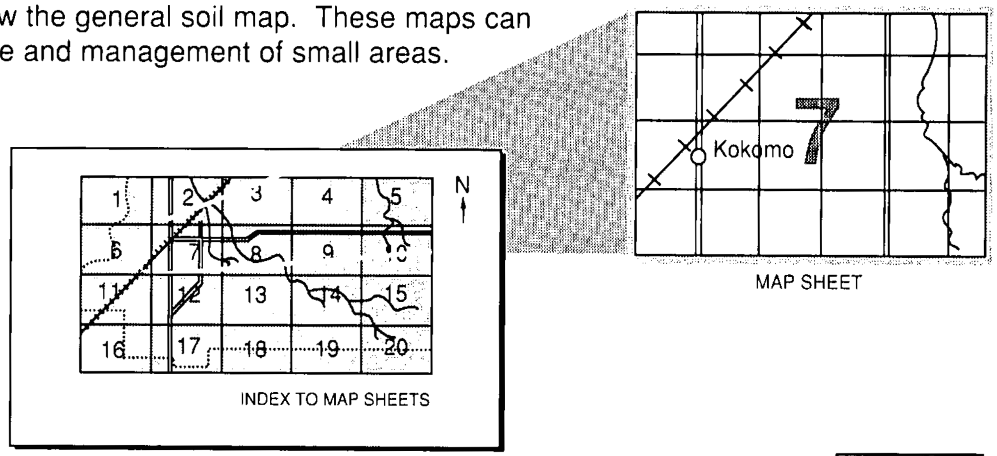
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

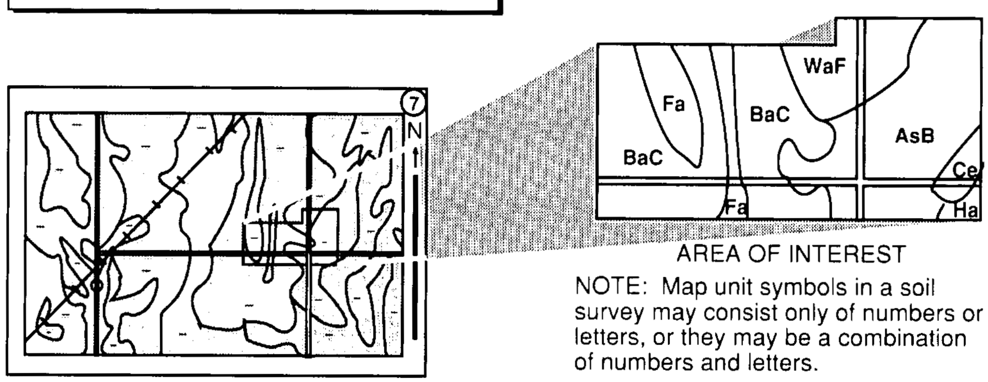
Detailed Soil Maps

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

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



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



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

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

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.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1985. This soil survey was made cooperatively by the Soil Conservation Service, the Kentucky Natural Resources and Environmental Protection Cabinet, and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Pike 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.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Elkhorn City is along the Russell Fork of the Big Sandy River. The soils in this area are in the Nelse-Shelbiana-Udorthents general soil map unit.

Contents

Issued June 1990

Index to Map Units

Summary of Tables

Foreword

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

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

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

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

Randall W. Giessler
State Conservationist
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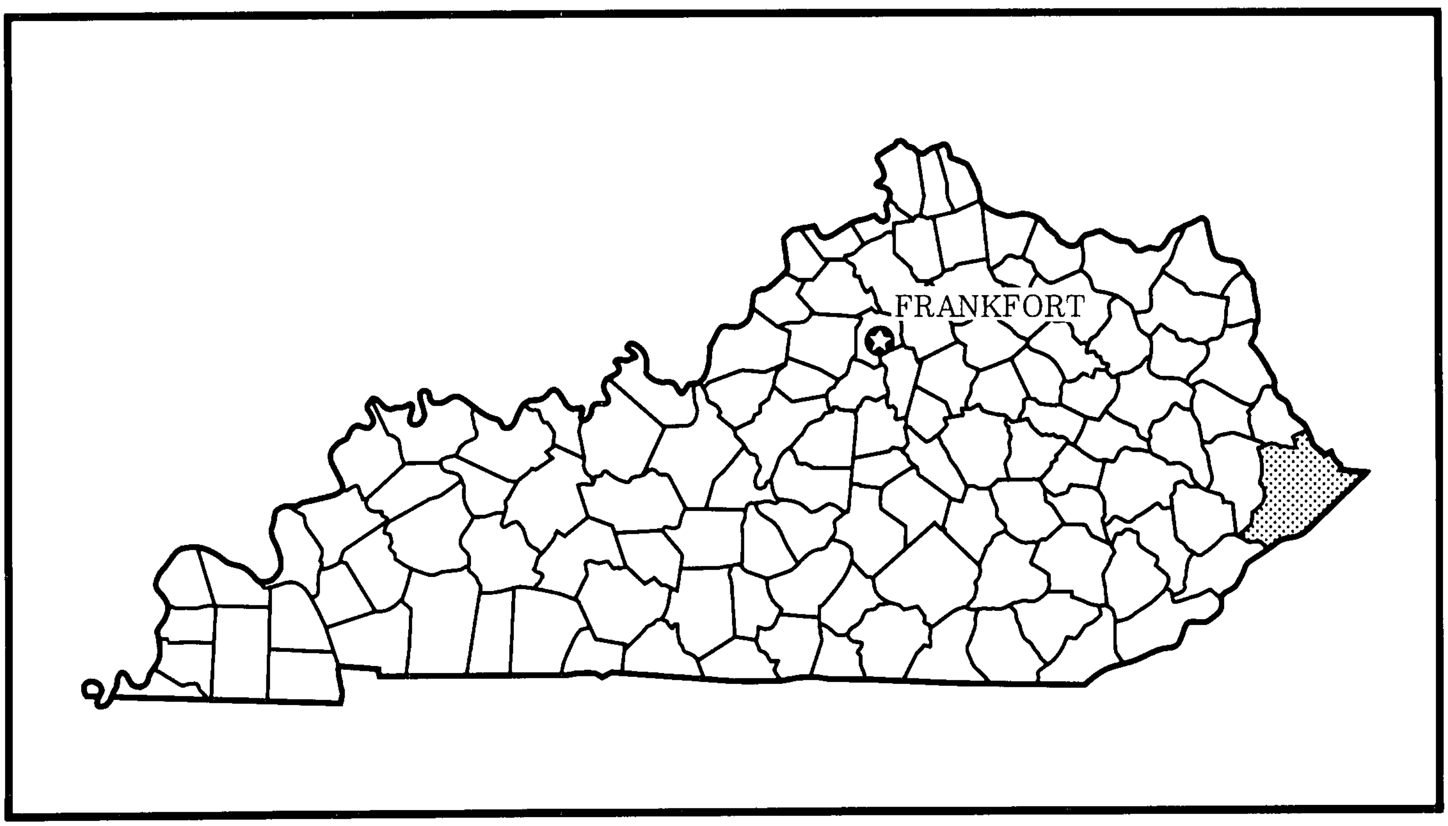

Location of Pike County in Kentucky.

Soil Survey of
Pike County, Kentucky

By John A. Kelley, Soil Conservation Service

Fieldwork assistance by Kenneth J. Bates and Michael J. Horvath, Kentucky Natural Resources and Environmental Protection Cabinet

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

PIKE COUNTY is in the Big Sandy River Valley in extreme eastern Kentucky, bounded by West Virginia on the northeast and Virginia on the southeast. The Kentucky counties surrounding Pike County are Martin, Floyd, Knott, and Letcher. Pikeville, the county seat and principal city (fig. 1), is in western Pike County and has a population of about 4,756. The population of Pike County is about 81,123 *(46)*. The projected county population for the year 2000 is about 128,600 *(20)*.

Pike County, the largest county in Kentucky, has a land area of 502,182 acres and water area of 2,624 acres for a total area of 504,806 acres or about 786 square miles *(20)*. The elevation ranges from about 650 feet above sea level in the lowest valleys to about 3,200 feet along the crest of Pine Mountain. The topography is steep, rugged mountains that have long sharp ridges and are separated by deep coves and narrow valleys. The soils formed in material weathered from interbedded sandstone, siltstone, shale, and a minor component of limestone. Pike County is part of the Mountains and Eastern Coalfields Physiographic Region and is on the western border of the Appalachian Plateau *(6)*.

Most of the acreage in the county is privately owned woodland, but some large tracts are owned by mining companies. A small area along the crest of Pine Mountain is in the Jefferson National Forest. The narrow valleys are used intensively for homesites, urban development, gardens, and some cultivated crops. Pike County is one of the largest coal-producing counties in Kentucky, and about 5 percent, or 25,500 acres, have been strip mined for coal.

This survey updates a previous soil survey of Pike County that was published in 1965 as part of the Reconnaissance Soil Survey of Fourteen Counties in Eastern Kentucky *(23)*. It provides additional and more detailed information.

General Nature of the Survey Area

This section gives general information on the history and development, climate, transportation and industry, farming, and natural resources in Pike County.

History and Development

Pike County was formed from a part of Floyd County on December 19, 1821, by an act of the General Assembly of the Commonwealth of Kentucky under governor John Adair. The area was part of Mason County when the state was established in 1792 *(28)*. Pike County was named in honor of General Zebulon Montgomery Pike, one of the great explorers of the northern and western parts of the Mississippi Valley *(14)*.

The county's original population was mostly settlers from the New River Section of Virginia. These settlers came by foot through Pound Gap of Pine Mountain near

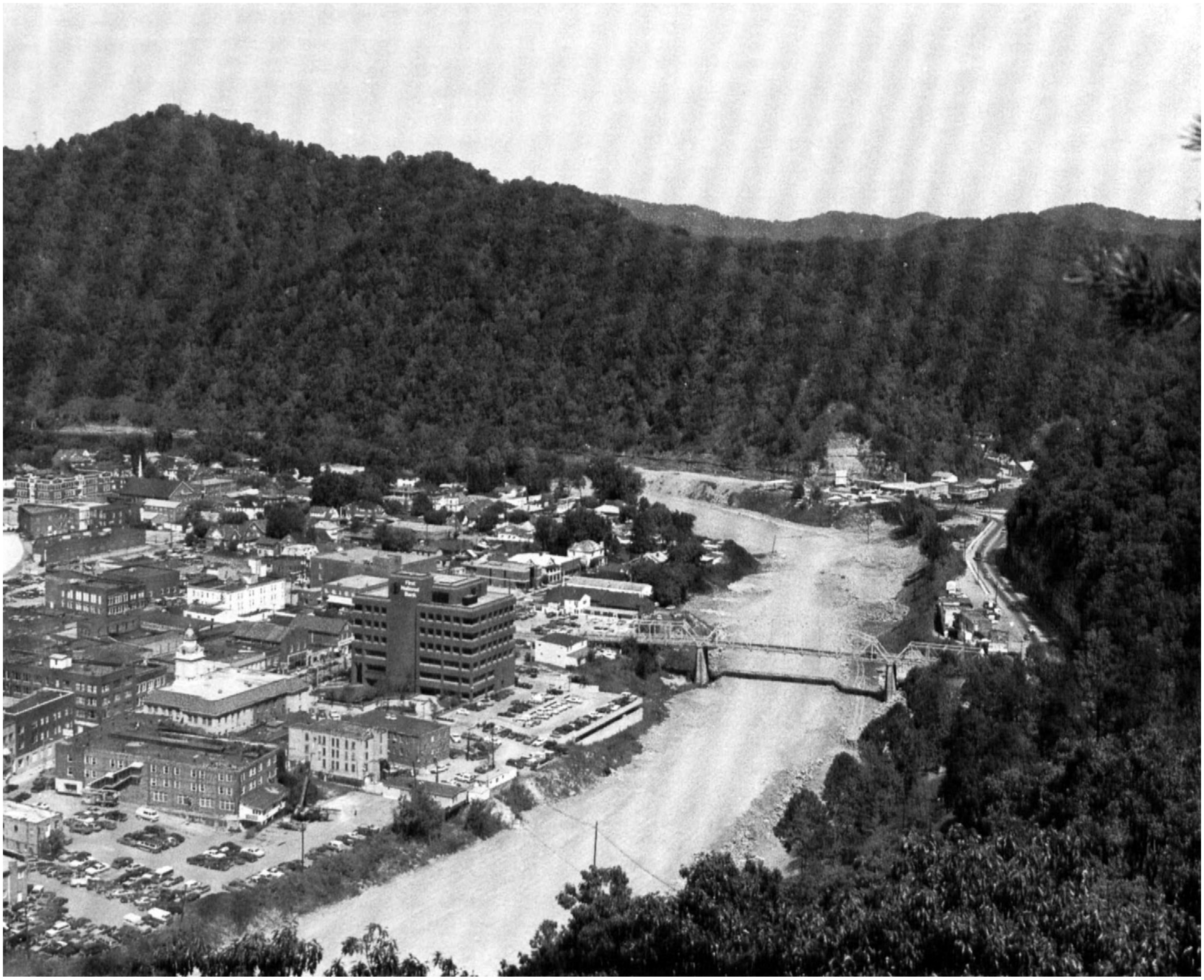

Figure 1.—Downtown Pikeville was built along the Levisa Fork riverbed. The soil in this area is Udorthents-Urban land complex, 0 to 4 percent slopes, rarely flooded.

Jenkins, Kentucky; however, flatboat traffic on the Russell, Levisa, and Tug Forks of the Big Sandy River soon became the county's major migration route.

The first Pike County Court was held March 4, 1822, and on March 25, 1822, a commission was appointed by the county court to select a permanent county seat. The townsite was to have ample level land and be near the river for navigation and at a crossing of the roads. "Peach Orchard Bottom," opposite the mouth of Lower Chloe Creek, met these requirements.

The townsite was surveyed and the courthouse built in 1824. The courthouse of hewn logs was 24 feet square, a story and a half high, and was covered with wood shingles. The first post office was called "Pike" but was changed to "Piketon" in 1829 by postmaster William Williams. In 1881, the name was changed to Pikeville by postmaster Lewis C. Dils *(28)*.

The railroad first came to Pikeville on April 28, 1905.

The line was laid by the Chesapeake and Ohio Railway Company and was finished to Elkhorn City in 1907. The first passenger train entered Pikeville on Sunday, June 5, 1905. The Edgewater Coal and Coke Company opened one of the first coal mines along the new C&O Railroad on Marrowbone Creek of the Russell Fork that year.

The first coal mines in Pike County were opened along the Tug Fork of the Big Sandy River on the Norfolk & Western Railway, which was built through to Williamson, West Virginia, in 1892. From 1905 to 1906, the total production of all Pike County mines was 289,311 tons *(29)*.

Climate

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

Winter is cold and snowy at higher elevations in Pike County. It is also frequently cold in valleys, but intermittent thaws preclude a long-lasting snow cover. Summer is fairly warm on mountain slopes and very warm with occasional very hot days in the valleys. Rainfall is evenly distributed during the year, but it is appreciably heavier on the windward, west-facing slopes than in the valleys. Normal annual precipitation is adequate for all crops, although summer temperature and growing season length, particularly at higher elevations, may be inadequate.

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

In winter the average temperature is 39 degrees F, and the average daily minimum temperature is 29 degrees. The lowest temperature on record, which occurred at Pikeville on January 24, 1963, is -11 degrees. In summer the average temperature is 76 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Pikeville on July 28, 1952, is 104 degrees.

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

The total annual precipitation is 45 inches. Of this, 24 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 2 inches. The heaviest 1-day rainfall during the period of record was 3.12 inches at Pikeville on June 17, 1971. Thunderstorms occur on about 46 days each year, and most occur in summer.

The average seasonal snowfall is 15 inches. The greatest snow depth at any one time during the period of record was 10 inches. On the average, 4 days have at least 1 inch of snow on the ground, but 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, 12 miles per hour, in spring.

Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

Transportation and Industry

Highway accessibility to Pike County has greatly increased in the last few years. Reconstruction of U.S. Highway 23 between Pikeville and Prestonsburg provided a major outlet to the Mountain Parkway and to the newly constructed Kentucky Highway 80 that runs from Prestonsburg to Hazard. Construction has begun on new lanes on U.S. Highway 119 between Pikeville and South Williamson, and continuation of U.S. Highway 23 from Pikeville to Jenkins is also underway.

The Chessie System, Clinchfield Railroad, and the Norfolk and Western Railway provide freight service to Pike County, and Amtrak passenger service is available at Williamson, West Virginia, and Ashland, Kentucky.

The nearest commercial airport is Tri-State Airport in Huntington, West Virginia. Pike County has a new airstrip 4 miles north of U.S. Highway 23 at Cowpen.

Most Pike County residents are employed in the mining industry. In 1983, about 6,550 people were employed in surface and underground mining *(31)*. The total civilian labor force in 1980 was about 34,600 *(10)*. The majority of non-mine employees worked in wholesale and retail trade, transportation and communication, construction, government, and service related businesses.

Figure 2.—The very steep mountainous areas in Pike County are used mainly as pastureland or woodland. Marrowbone-Dekalb-Muskingum complex, 30 to 80 percent slopes, very rocky, is on the upper slopes, and Kimper-Sharondale-Muskingum complex, 30 to 80 percent slopes, very stony, is on the lower slopes.

Farming

Agriculture was very important to Pike County's economy in the early part of this century but has steadily decreased since 1950. During the 1950's, 4,088 farms reported agriculture production, but in 1982 only 53 farms, about 1,289 acres of total cropland, reported production *(47)*.

Pike County is in the Cumberland Plateau and Mountains Major Land Resource Area *(44)*. The mountains in most of the county are too steep and rocky for use of conventional farm machinery (fig. 2). The farmland available for production has high agricultural potential but is in direct competition with housing, road construction, and industrial development, mainly because of a population growth of about 33 percent from 1970 to 1980 *(46)*. From 1969 to 1979, between 1,000 and 2,500 acres of Pike County's best agricultural lands was lost to urban buildup and other nonagricultural uses *(43)*. In 1985, only about 2,000 acres of Pike County met the requirements for prime farmland.

In 1982, the total cash receipts from farm marketing was about $218,000. Livestock receipts, about

$151,000, made up about 69 percent of total cash receipts *(17)*. Tobacco and commercial small grains are not produced in the county.

Acreage of farms decreased from 212,304 acres in 1950 to 8,633 acres in 1982. The average farm size in 1982 was about 160 acres *(47)*. The remaining agriculture is mainly livestock production for local marketing, and most farmland is in pasture and hay. A small acreage of corn is produced for livestock consumption.

Natural Resources

Other than soil and water, the major natural resources in Pike County are coal, petroleum and natural gas, oil shales, limestone, sand, gravel, and trees.

Coal is the most profitable mineral resource in Pike County. In 1983, 445 mines yielded the state's highest coal production of 21,727,634 tons *(31)*. Most of the coal is in the high volatile bituminous groups A and B. The coal is especially suitable for metallurgical by-product coke, gas making, ceramic products, cement and lime burning, foundry facing, and domestic trade.

Coal production has steadily increased in Pike County since 1961 because of several interrelated factors:

- Electrical power generation has increased, and several power plants have been built, which created new markets.
- Long-term contracts for coal were developed that permitted long-term financing resulting in long life mechanical modern mine coal preparation facilities.
- The supply of natural gas and petroleum is decreasing.
- The development of the unit train allows direct mine-to-plant haulage.

These factors have made more production possible and have assured the continued use of coal as a competitive fuel while lowering the unit price of coal per man ton *(18)*.

Most surface mining has been deep mining, contour stripping, auger mining, mountaintop removal, and valley fill. Before the mining began, the land generally was used as woodland. After mining, most areas have been reclaimed to grasses, legumes, shrubs, and trees. Nearly level areas have been seeded dominantly to grasses and legumes, and several varieties of trees have been planted on steep outslopes.

Petroleum and natural gas wells are scattered throughout the county and are part of the Big Sandy Gas Field. In 1980, oil production was about 49,241 barrels; however, most oil is currently produced by secondary recovery methods, which results in low production *(30)*.

Oil shale deposits show promise as an energy source for Pike County. These deposits include the Ohio and Sunbury shales, which are 800 feet thick and are along the base of Pine Mountain. These shales contain organic matter, which when heated yield oil, gas, and other bituminous substances. Tests on these shales show an average of 21 gallons, or 0.5 barrel of oil per ton, and 3,000 to 4,000 cubic feet of fuel with a net heat value of 337 BTU per cubic foot *(19)*. At present these shales are not being developed because they cannot compete with higher grade deposits; however, the additional demands from a growing population and the increasing prices of foreign oil in the near future could make the mining of oil shales economically feasible.

Moderate quantities of limestone are along the north face of Pine Mountain. Active quarries are near Elkhorn City and Ashcamp. The production of limestone has sharply increased over the last few years mainly because of the increased highway building program in eastern Kentucky and the increased demands in the chemical industry for high grade calcium compounds.

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

Commonly, individual soils on the landscape merge into one another 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.

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.

1. Marrowbone-Fedscreek-Kimper-Dekalb

Moderately deep and deep, steep to extremely steep, well drained soils that have a loamy subsoil; on ridge crests and mountain side slopes

This map unit is dominant throughout Pike County. The landscape is steep to extremely steep, sharp-crested mountains separated by deep, narrow, nearly level to sloping valleys. Slopes range from 6 to 120 percent but are dominantly 35 to 80 percent. Soils on this landscape are underlain by acid to slightly calcareous Pennsylvanian bedrock. Rock formations are interbedded sandstone, siltstone, shale, and coal. Rock outcrops in the shape of ledges, bluffs, and chimney rock are common along the head of drainageways and along points of ridges.

Many ridgetops and mountainsides have been reshaped by coal mine operations. Reconstruction commonly consists of mountaintop removal, head of hollow fill, or a series of strip-mine benches. The natural vegetation is mostly mixed hardwoods and small scattered stands of pines. Some areas on the less sloping, lower side slopes and foot slopes have been cleared and are used for pasture. Numerous short drainageways with intermittent streams connect to form small creeks and perennial streams that flow through the narrow valleys.

Most of the soils in this map unit are poorly suited to development because of steep slopes; however, most valleys are heavily populated and have a high concentration of residential and commercial development. Roads, coal storage and processing plants, and gas transmission lines make up the important structures.

This map unit makes up about 95 percent of the county. It is about 21 percent Marrowbone soils, 16 percent Fedscreek soils, 12 percent Kimper soils, 11 percent Dekalb soils, and 40 percent soils of minor extent.

Marrowbone soils are moderately deep and well drained. They are on convex ridge crests and upper and middle side slopes. Slopes dominantly range from 30 to 80 percent. These soils formed in loamy residuum or colluvium and are underlain by sandstone and siltstone. Typically, they have a fine sandy loam surface layer and a fine sandy loam, loam, or channery loam subsoil that has moderate or moderately rapid permeability.

Fedscreek soils are deep and well drained. They are on slightly concave to convex middle and lower side slopes on dominantly warm aspects. Slopes range from 20 to 80 percent. These soils formed in loamy colluvium and are underlain by sandstone, siltstone, and shale. Typically, they have a channery loam surface layer and a channery silt loam and channery loam subsoil that has moderately rapid permeability.

Kimper soils are deep and well drained. They are on concave to slightly convex middle and lower side slopes on dominantly cool aspects. Slopes range from 30 to 80 percent. These soils formed in loamy colluvium and are underlain by sandstone, siltstone, and shale. Typically, they have a very channery loam surface layer and a channery loam or very channery loam subsoil that has moderate or moderately rapid permeability.

Dekalb soils are moderately deep and well drained. They are on convex ridge crests. Slopes are 30 to 80 percent. These soils formed in loamy residuum, are underlain by sandstone and siltstone, and generally are associated with rock outcrops. Typically, they have a channery fine sandy loam surface layer and a channery and very channery fine sandy loam subsoil that has moderately rapid or rapid permeability.

The minor soils are Muskingum soils on upper side slopes, Sharondale soils in coves on cool aspects, Myra soils in strip mined areas, Gilpin soils on upper hill slopes and ridgetops, and Hayter soils on colluvial foot slopes.

The soils of this map unit are not suited to cultivated crops, hay, or pasture but are well suited to woodland and as habitat for woodland wildlife. Most areas are in second growth hardwoods. On side slopes on warm aspects and on ridgetops, native trees are predominantly scarlet oak, white oak, black oak, red maple, and hickory. Virginia pine and shortleaf pine are in a few small areas. Yellow poplar, white oak, American beech, and some black locust, American basswood, and black walnut are on cool aspects. Productivity is moderate or moderately high on warm aspects and high on cool aspects. The erosion hazard, equipment use limitations, seedling mortality, and plant competition are concerns in managing timber production.

These soils are not suited to urban uses because of steepness of slope and the rock outcrops. These soils are susceptible to landslides if they are undercut for construction of roads or buildings.

2. Nelse-Shelbiana-Udorthents

Deep, nearly level to steep, well drained soils that have underlying layers of loamy material or have a loamy subsoil; on riverbanks, stream terraces, and in reconstructed valleys

This map unit is in broad valleys along the major streams in Pike County (fig. 3). The landscape is long, winding, nearly level low stream terraces and flood plains breaking to short, moderately steep alluvial side slopes. Slopes range from 0 to 25 percent, but short, steep areas are along the upper edge of riverbanks. Drastically disturbed and reshaped areas are adjacent to major towns. Soils on this landscape formed in mixed alluvium derived from soils weathered from acid to slightly calcareous Pennsylvanian bedrock. Udorthents formed in a mixture of materials from construction sites. These materials have been significantly altered. The areas of these soils were formed by filling previous river or stream channels with soil and rock material from highway construction and by the relocation and filling of the old Levisa Fork riverbed at Pikeville. Most of the larger cities in Pike County, including South Williamson, Elkhorn City, and Pikeville, are in areas of this map unit.

Most areas of this map unit are used for residential, commercial, or industrial development, but some are small farmsteads. These farms are used for hay, pasture, corn, and garden crops. Small isolated areas of woodland are in wet areas and on steep riverbanks. Major streams and creeks connect to form the Levisa, Russell, and Tug Forks of the Big Sandy River. The soils in this map unit, if not protected, are subject to rare flooding. In addition to many towns and small communities, roads, coal storage and processing plants, and gas transmission lines make up the important structures.

This map unit makes up about 1 percent of the county. It is about 37 percent Nelse soils, 12 percent Shelbiana soils, 11 percent Udorthents, and 40 percent soils of minor extent.

Nelse soils are deep and well drained. They are on concave to convex riverbanks. Slopes range from 4 to 25 percent. These soils formed in recent loamy alluvium derived from soils weathered from sandstone, siltstone, and shale. Typically, they have a stratified loam and loamy fine sand surface layer that is underlain by fine sandy loam and loamy fine sand. Permeability is moderately rapid or rapid in the underlaying layers.

Shelbiana soils are deep and well drained. They are on low stream terraces. Slopes range from 0 to 2 percent. These soils formed in mixed alluvium derived from soils weathered from sandstone, siltstone, and shale. Typically, they have a loam surface layer and a loam subsoil that has moderate permeability.

Udorthents are deep and well drained. They are in reconstructed valleys. Slopes range from 0 to 4 percent. These soils formed in a mixture of soil and rock materials transported from areas of road construction and from the Levisa Fork river relocation site. Major soil characteristics are highly variable, and a typical condition does not exist.

The minor soils are Hayter soils on colluvial foot slopes, Combs soils on stream terraces, Melvin soils in wet areas, and urban land in the densely populated areas.

The nearly level and gently sloping Nelse and Shelbiana soils are well suited to cultivated crops commonly grown in the county and to hay and pasture. These soils are also well suited to specialty crops, such as vegetables and nursery plants. The soils in more

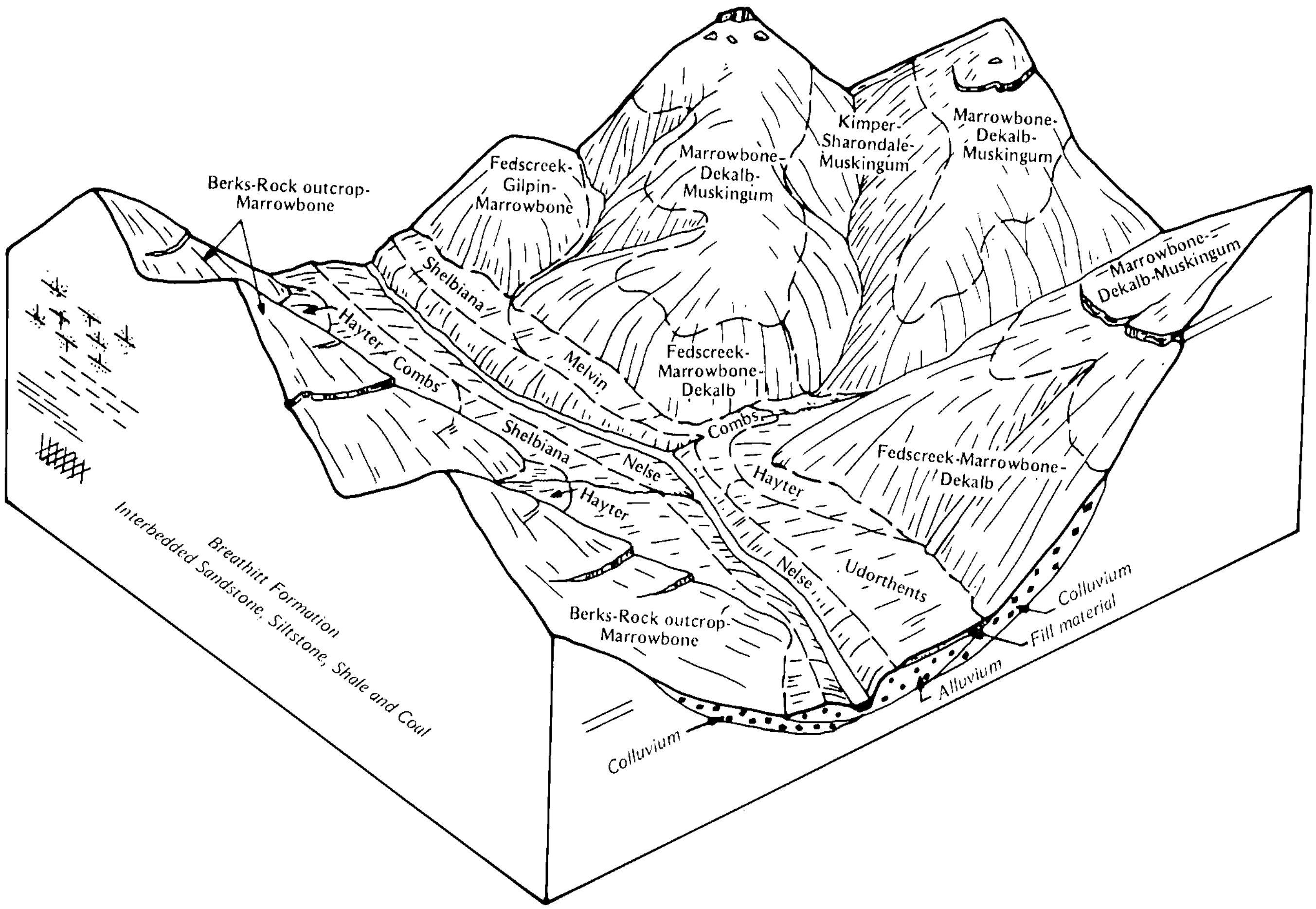

Figure 3.—Along the Levisa and Russell Forks of the Big Sandy River, the soils in the valleys are in the Nelse-Shelbiana-Udorthents general soil map unit and those on the mountains are in the Marrowbone-Fedscreek-Kimper-Dekalb map unit.

sloping areas are best suited to hay, pasture, or timber production. The main limitations for farming are steepness of slope and, in low-lying areas, wetness. Erosion is a hazard in most areas.

Nelse and Shelbiana soils are well suited to woodland, and productivity is high. Native trees are sweetgum, black walnut, green ash, boxelder, and American sycamore. Plant competition is a concern in managing timber production. These soils are also well suited to use as habitat for woodland wildlife.

If the soils of this map unit are protected from flooding, they are well suited to urban uses. Flooding is frequent to rare. Steepness of slope is the main limitation for Nelse and Shelbiana soils. Because of the contrasting and variable composition of Udorthents, onsite investigation is necessary to determine limitations and suitability for a proposed use. Uneven settling is a major concern in areas of Udorthents.

3. Yeager-Grigsby-Potomac-Hayter

Deep, nearly level to moderately steep, well drained and somewhat excessively drained soils that have underlying layers of sandy or loamy material or have a loamy subsoil; on flood plains and foot slopes

This map unit is in narrow valleys along the major streams in Pike County (fig. 4). The landscape is long, winding, narrow flood plains dissected by many small colluvial fans. Slopes range from 0 to 30 percent. Soils on this landscape formed in alluvium or colluvium weathered from soils that are underlain by acid to slightly calcareous Pennsylvanian bedrock. Numerous drainageways with intermittent streams connect to form

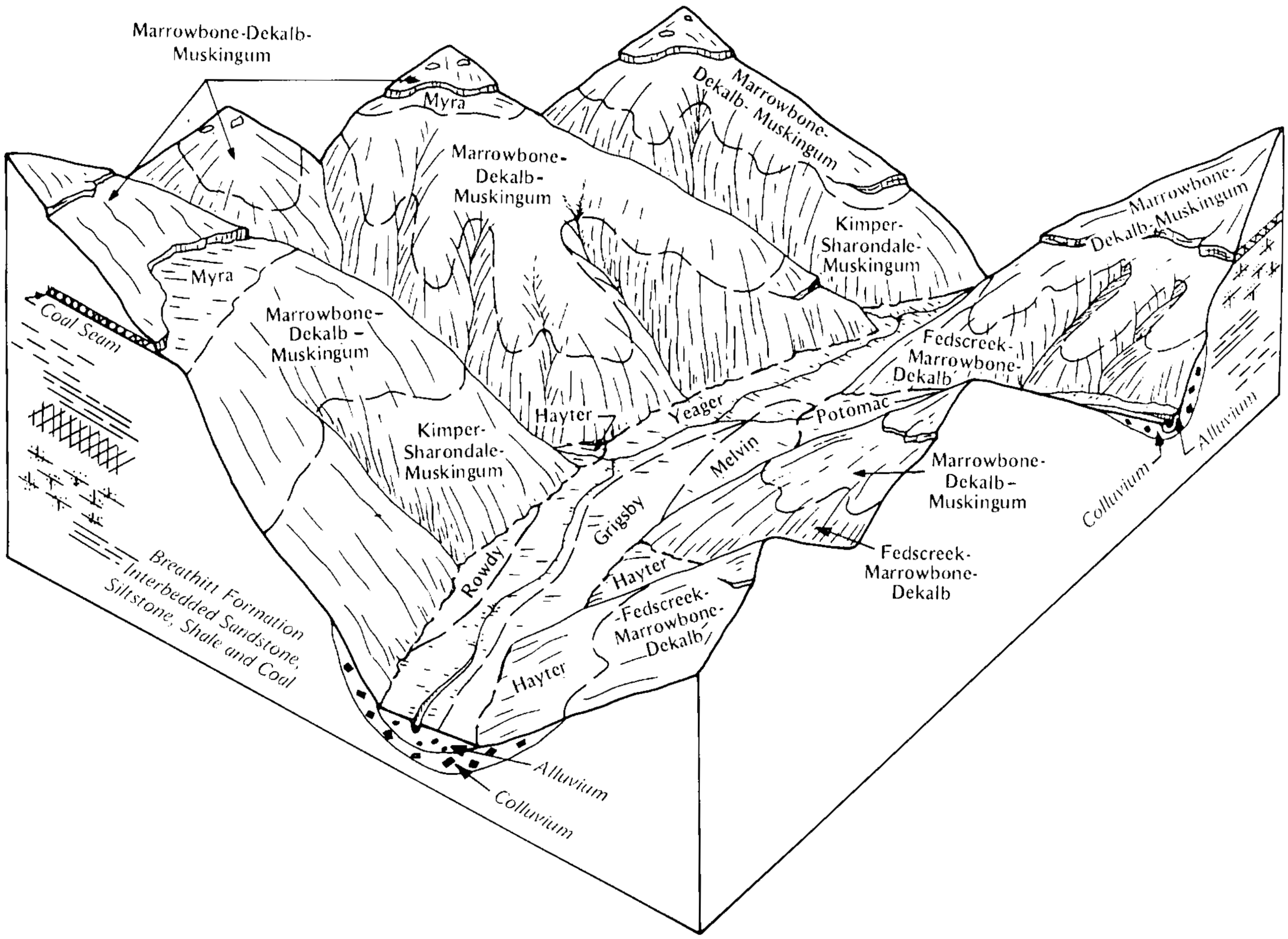

Figure 4.—Along the major tributaries in Pike County, the soils on the mountains are in the Marrowbone-Fedscreek-Kimper-Dekalb general soil map unit and those in the valleys are in the Yeager-Grigsby-Potomac-Hayter map unit.

small creeks and perennial streams that flow through the narrow valleys.

The less sloping areas of this map unit are used for residential and commercial development, and many areas are heavily populated. Roads, coal storage and processing plants, and gas transmission lines make up the important structures. The remaining acreage is small farmsteads and is used for hay, pasture, or timber. Low-lying areas adjacent to stream channels are subject to frequent or occasional flooding.

This map unit makes up about 2 percent of the county. It is about 33 percent Yeager soils, 20 percent Grigsby soils, 9 percent Potomac soils, 9 percent Hayter soils, and 29 percent soils of minor extent.

Yeager soils are deep and well drained. They are on flood plains. Slopes range from 0 to 2 percent. These soils formed in recent sandy alluvium derived from soils weathered from sandstone, siltstone, and shale. Typically, they have a stratified loam and sand surface layer that is underlain by fine sandy loam, loamy fine sand, loamy sand, and loam. Permeability is moderately rapid or rapid in the underlying layers.

Grigsby soils are deep and well drained. They are on flood plains. Slopes range from 0 to 2 percent. These soils formed in loamy alluvium from soils weathered from sandstone, siltstone, and shale. Typically, they have a sandy loam surface layer and a sandy loam subsoil that has moderate or moderately rapid permeability.

Potomac soils are deep and somewhat excessively drained. They are on flood plains. Slopes range from 0 to 3 percent. These soils formed in recent sandy alluvium derived from soils weathered from sandstone, siltstone, and shale. Typically, they have a loam surface layer that is underlain by gravelly sandy loam, very cobbly loamy sand, and extremely cobbly loamy sand. Permeability is rapid or very rapid in the underlying layers.

Hayter soils are deep and well drained. They are on fans and foot slopes. Slopes range from 2 to 15 percent. These soils formed in colluvium or local alluvium from soils weathered from sandstone, siltstone, and shale. Typically, they have a loam surface layer and a gravelly loam subsoil that has moderately rapid permeability.

The minor soils are Rowdy soils on small, narrow terraces and Stokly and Melvin soils in wet, low-lying areas on flood plains.

In this map unit, the nearly level and gently sloping soils are well suited to cultivated crops and to specialty crops, such as vegetables and nursery plants. The soils in the more sloping areas are suited to hay, pasture, or timber production. In low-lying areas, the main limitations for farming are steepness of slope and wetness. In addition, erosion and flooding are hazards. The low available water capacity is a limitation to use of the sandy soils.

The soils of this map unit are well suited to woodland, and productivity is high or moderately high. Native trees include yellow poplar, American sycamore, northern red oak, and white oak. Equipment use limitations, seedling mortality, and plant competition are concerns in managing timber production.

These soils have varying suitability for urban uses. In the low-lying areas, these soils are poorly suited to urban uses because of the hazard of flooding and seepage. Soils in higher positions on the landscape are suited to some urban uses. Steepness of slope is a limitation; however, proper design and installation of structures can help to overcome this problem. Soils on steeper side slopes are susceptible to landslides if undercut for construction of roads or buildings.

4. Kimper-Sharondale-Berks-Shelocta

Deep and moderately deep, moderately steep to extremely steep, well drained soils that have a loamy subsoil; on ridgetops and side slopes

This map unit is along the northwest face of Pine Mountain. The landscape is a single long mountain ridge dissected by many deep drainageways (fig. 5). Slopes range from 15 to 120 percent but are dominantly 30 to 80 percent. Pine Mountain is the result of geologic faulting that has exposed rock formations that are normally at their lowest point 2,000 feet or more under the present soil surface. Exposed rock strata range from Pennsylvanian to Devonian and include interbedded conglomerate sandstone, siltstone, limestone, and contrasting types of shale. Rock outcrops are common throughout the middle and upper parts of this map unit and are bands of bedrock tilted at angles of 30 to 45 degrees. The bedrock exposures are a few feet to more than 100 feet thick. In major drainageways, large fragments have broken from the rock outcrop, resulting in extremely stony soils or areas of rubbleland. These drainageways connect with Elkhorn Creek at the base of Pine Mountain and extend through narrow valleys northeast to Russell Fork.

Most of the soils in this map unit are poorly suited to development because of steepness of slope and rock outcrop. These soils are used almost entirely as woodland. Accessibility is limited. The natural vegetation is mostly mixed hardwoods and hemlock with large areas of giant rhododendron along the sandstone and siltstone bluffs. Limestone quarries, which are southeast of Ashcamp and southwest of Elkhorn City, make up the important structures.

This map unit makes up about 2 percent of the county. It is about 17 percent Kimper soils, 14 percent Sharondale soils, 10 percent Berks soils, 10 percent Shelocta soils, and 49 percent soils of minor extent.

Kimper soils are deep and well drained. They are on concave to convex upper side slopes. Slopes range from 35 to 80 percent. These soils formed in loamy colluvium underlain by siltstone, shale, and sandstone. Typically, they have a very channery loam surface layer and a channery loam and very channery loam subsoil that has moderate or moderately rapid permeability.

Sharondale soils are deep and well drained. They are on concave upper side slopes and in deep coves. Slopes range from 35 to 80 percent. In most areas, loose stones and boulders are on the surface. These soils formed in loamy colluvium underlain by sandstone, siltstone, and shale. Typically, they have a channery fine sandy loam surface layer and a very channery, very flaggy, or extremely flaggy loam, fine sandy loam, or sandy loam subsoil that has moderately rapid permeability.

Berks soils are moderately deep and well drained. They are on convex middle side slopes and on the point of ridges. Slopes range from 50 to 120 percent. These soils formed in loamy residuum underlain by siltstone and shale and are commonly associated with bands of rock outcrop. Typically, they have a channery silt loam surface layer and a very channery silt loam subsoil that has moderate or moderately rapid permeability.

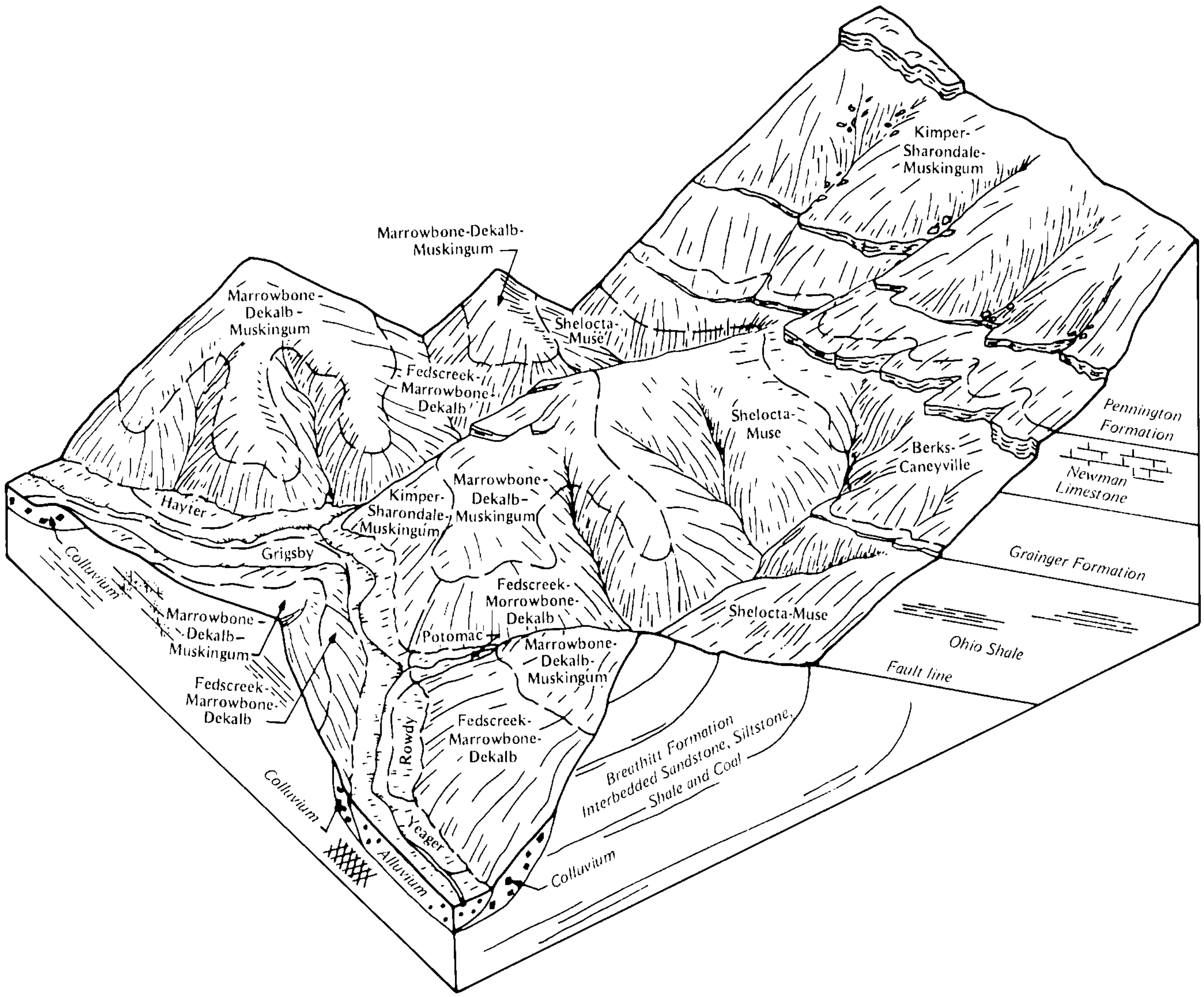

Figure 5.—Along Elkhorn Creek and Pine Mountain, the upper faulted mountains are in the Kimper-Sharondale-Berks-Shelocta general soil map unit, the lower mountains are in the Marrowbone-Fedscreek-Kimper-Dekalb map unit, and the valley is in the Yeager-Grigsby-Potomac-Hayter map unit.

Shelocta soils are deep and well drained. They are on slightly convex to concave lower side slopes. In most areas, the surface is very stony. Slopes range from 15 to 50 percent. These soils formed in mixed colluvium underlain by siltstone and shale. Typically, they have a channery silt loam surface layer and a channery silty clay loam subsoil that has moderate permeability.

The minor soils are Muskingum soils on upper side slopes, Muse soils on lower side slopes, and Caneyville soils on middle side slopes. Caneyville soils are intermingled with limestone rock outcrop.

The soils of this map unit are not suited to cultivated crops, hay, or pasture but are well suited to woodland and as habitat for woodland wildlife. Most areas are in second growth hardwoods. Native trees include yellow poplar, northern red oak, red maple, and white oak. Productivity is moderately high or high. Equipment use limitations, the erosion hazard, and plant competition are concerns in managing timber production.

These soils are not suited to urban uses because of the steepness of slope and the rock outcrops. These soils are susceptible to landslides if they are undercut for construction of roads or buildings.

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.

Each soil is rated according to its suitability for specific uses. The soil is rated well suited, suited, poorly suited, or not suited. Soils that are *well suited* have favorable properties for specified use and limitations are easy to overcome. Good performance and low maintenance can be expected. Soils that are *suited* have moderately favorable properties for the selected use. One or more properties make these soils less desirable than well suited soils. Soils that are *poorly suited* have one or more properties unfavorable for the selected use. Overcoming the limitations requires special design, extra maintenance, or costly alteration. Soils that are *not suited* do not meet the expected performance for the selected use or extreme measures are needed to overcome the undesirable features.

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Hayter loam, 4 to 15 percent slopes, is one of several phases in the Hayter 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. Marrowbone-Dekalb-Muskingum complex, 30 to 80 percent slopes, very rocky, 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. Rock outcrop is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

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

BcG—Berks-Caneyville complex, 50 to 120 percent slopes, very rocky. The soils in this complex are moderately deep, very steep and extremely steep, and well drained. They are on dominantly cool aspects of middle side slopes of Pine Mountain. Berks soil is on convex side slopes and nose slopes, and Caneyville soil is intermingled with limestone rock outcrops on convex side slopes and in shallow coves. The elevation ranges from about 1,680 to 2,440 feet. Berks and Caneyville soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape, but areas of each soil generally are less than 5 acres. This complex is about 50 percent Berks soil and 20 percent Caneyville soil. The rest is included soils. Rock outcrop makes up about 8 percent of the soil surface.

Typically, this Berks soil has a dark brown channery silt loam surface layer about 3 inches thick. The subsoil to a depth of about 27 inches is dark yellowish brown and yellowish brown very channery silt loam. It is underlain by interbedded sandstone and siltstone bedrock.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is low. Surface runoff is rapid. The root zone is moderately deep, and root penetration is limited by rock fragments. Depth to bedrock ranges from 20 to 40 inches.

Typically, this Caneyville soil has a dark brown silt loam surface layer about 5 inches thick. The subsoil to a depth of about 22 inches is strong brown and reddish brown silty clay. It is underlain by limestone bedrock.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately slow, and the available water capacity is moderate. Surface runoff is very rapid. The root zone is moderately deep, and penetration by some roots is restricted by the clayey subsoil. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Gilpin soils. In places are soils similar to the Caneyville soil; one is more shallow to bedrock and another is deeper and more yellow. Also included are soils similar to the Berks soil except they are redder, have more clay, and are medium acid to mildly alkaline. Included are areas of rock outcrop that commonly are limestone or siltstone cliffs. The rock outcrop is tilted to the south and is 5 to 100 feet thick. In many places, large stones and boulders have broken from the rock outcrop and are scattered throughout the landscape or have filled drainageways. The inclusions make up about 30 percent of this map unit. Individual areas of the included soils or rock outcrop average less than 10 percent of the delineations.

The soils in this complex are used as woodland.

These soils are not suited to cultivated crops, hay, or pasture because of steepness of slope, rock outcrops, and boulders.

These soils are well suited to woodland. White oak, black oak, scarlet oak, yellow poplar, and hickory are native trees. The understory plants are mostly sugar maple, red maple, greenbrier, flowering dogwood, white oak, eastern redcedar, sassafras, Virginia pine, Solomons-seal, blueberry, chestnut oak, scarlet oak, sourwood, and hickory. Some trees preferred for planting are eastern white pine, white oak, yellow poplar, and northern red oak. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the hazard of erosion, equipment use limitation, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Steepness of slope and rock outcrops restrict the use of wheeled and tracked equipment on skid trails. Cable skidding generally is safer and disturbs the soil less. Reforestation after harvesting must be carefully managed to reduce plant competition.

These soils are poorly suited to urban uses. Steepness of slope, rock outcrops, and a stony surface are limitations. Most areas are relatively inaccessible.

The Berks and Caneyville soils are in capability subclass VIIe.

BrG—Berks-Rock outcrop-Marrowbone complex, 60 to 120 percent slopes. The soils and Rock outcrop in this complex are on mountain side slopes. Berks and Marrowbone soils are moderately deep, extremely steep, and well drained. These soils are too intricately mixed with Rock outcrop to be mapped separately at the selected scale. The areas of these soils and Rock outcrop occur in a repeating pattern on the landscape. They are about 10 to 350 acres, but areas of each soil generally are less than 10 acres. This complex is about 45 percent Berks soil, 25 percent Rock outcrop, and 15 percent Marrowbone soil. The rest is included soils.

Typically, this Berks soil has a dark brown channery silt loam surface layer about 3 inches thick. The subsoil to a depth of about 27 inches is dark yellowish brown and yellowish brown very channery silt loam. It is underlain by interbedded sandstone and siltstone bedrock.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is low. Surface runoff is rapid. The root zone is moderately deep, and root penetration is limited by rock fragments. Depth to bedrock ranges from 20 to 40 inches.

Typically, this Rock outcrop is sandstone or siltstone cliffs and chimney rock that are 5 to 75 feet high.

Typically, this Marrowbone soil has a brown fine sandy loam surface layer about 5 inches thick. The subsoil to a depth of about 23 inches is brown and strong brown loam and fine sandy loam. To a depth of about 28 inches, it is yellowish brown channery loam that has strong brown and light yellowish brown mottles. The subsoil is underlain by olive sandstone.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep and easily penetrated by plant roots. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Gilpin and Dekalb soils on convex mountain side slopes and nose slopes and Fedscreek and Kimper soils in shallow coves. Also included are areas of shallow, loamy soils on convex side slopes. The included soils make up about 15 percent of this map unit, but individual areas average less than 10 percent of the delineations.

The soils in this complex are used mainly for second growth hardwoods (fig. 6).

The soils in this complex are not suited to cultivated crops or pasture because of the very steep slopes, hazard of erosion, surface stones, and rock outcrops.

These soils are suited to woodland. White oak, scarlet oak, chestnut oak, hickory, and pine are native trees. Isolated stands of red oak, American beech, maple, and yellow poplar are on lower, more moist sites and in coves. Understory plants include sassafras, mountain laurel, flowering dogwood, red maple, and sourwood. Ground cover includes greenbrier, grapevine, and Christmas ferns. Some trees preferred for planting on cool aspects are yellow poplar, eastern white pine, shortleaf pine, northern red oak, and white oak. Shortleaf pine, Virginia pine, and white oak are preferred trees for planting on warm aspects. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the erosion hazard, equipment use limitation, seedling mortality, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Steep slopes and rock outcrops restrict the use of wheeled and track equipment on skid trails. Cable skidding generally is safer and disturbs the soil less. On warm aspects, seedling mortality generally is severe in summer because of inadequate moisture in the soil. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are not suited to most urban uses because of steepness of slope and the rock outcrops.

The Berks and Marrowbone soils are in capability subclass VIIe. Rock outcrop is in capability subclass VIIIs.

Co—Combs fine sandy loam, rarely flooded. This soil is deep, nearly level, and well drained. It is on flood plains and stream terraces along the Levisa, Russell, and Tug Forks of the Big Sandy River. Slopes are uniform and range from 0 to 2 percent. The areas are mostly long and narrow and are about 2 to 35 acres.

Typically, this Combs soil has a very dark grayish brown fine sandy loam surface layer about 18 inches thick. The subsoil to a depth of about 64 inches is dark yellowish brown fine sandy loam and loam. The substratum to a depth of about 80 inches is dark yellowish brown loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause rare flooding in most areas.

Included with this soil in mapping are small areas of Shelbiana and Grigsby soils. In places are soils similar to the Combs soil except they have a thinner surface layer. A few areas of Combs soils that have slopes of 2 to 4 percent are included. The included soils make up about 20 percent of this map unit, but most areas are less than 2 acres.

Cropland is the major use of Combs soil. In many areas, this soil is used as sites for houses and gardens.

This soil is well suited to cultivated crops and produces high yields if properly managed. Corn, hay, and pasture are the common crops grown. The hazard of erosion is slight, and continuous row cropping is possible if management practices are used to maintain fertility, good tilth, and the supply of organic matter. These practices include conservation tillage, return of crop residue, cover crops, and crop rotation with grasses and legumes.

This soil is well suited to hay and pasture and produces high yields if properly managed. Improved varieties of grasses and legumes that can withstand flooding of short duration should be used to produce high quality hay and forage. Controlled or restricted grazing when the soil is wet can help maintain pasture

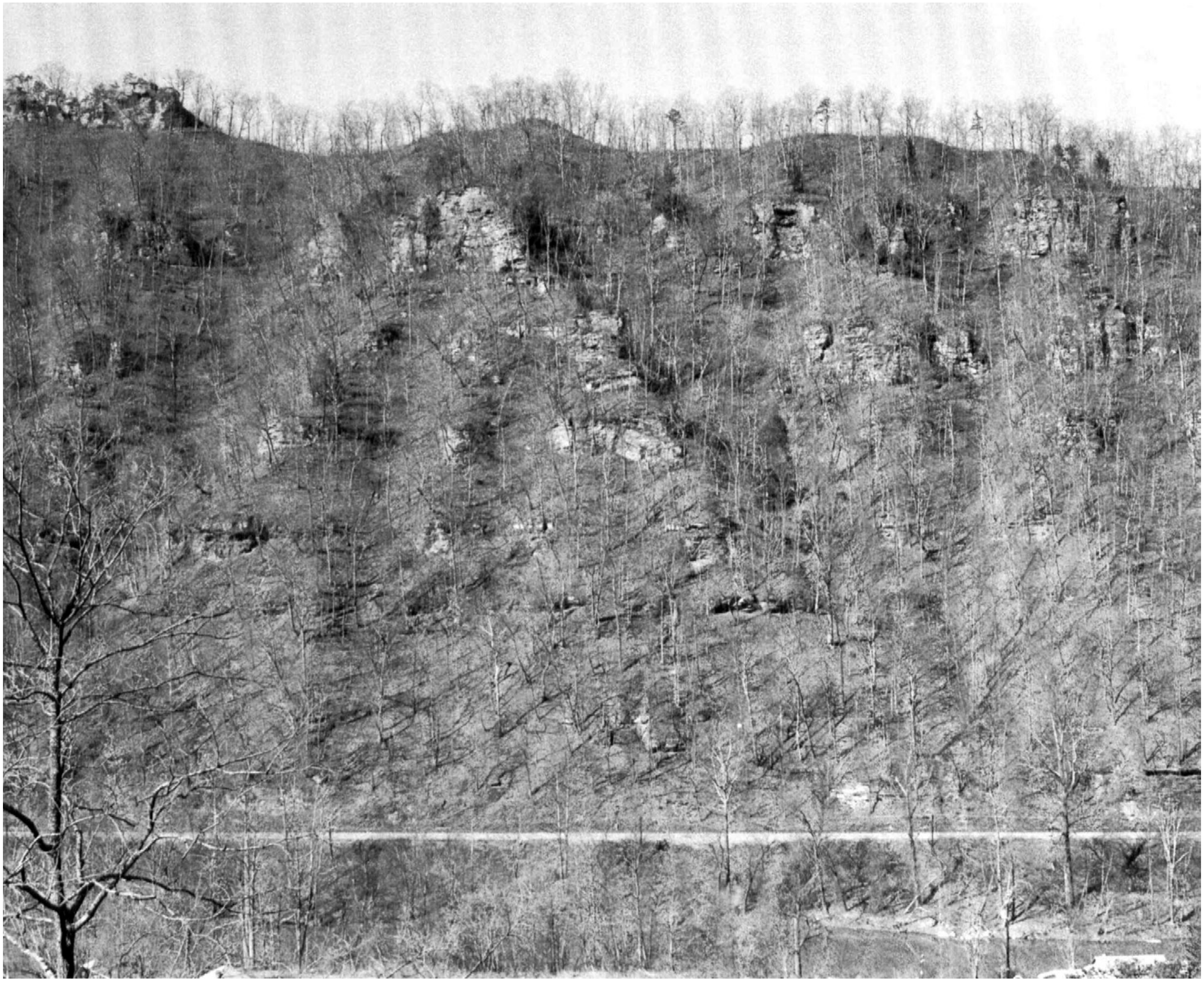

Figure 6.—The soils in the Berks-Rock outcrop-Marrowbone complex, 60 to 120 percent slopes, are used mainly as woodland.

plants. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages the plants and results in thin cover, which can increase weed competition and the need for early renovation. Lime and fertilizer should be applied according to crop needs, and a well planned harvesting and clipping schedule is important in producing high yields.

This Combs soil is well suited to woodland. Yellow poplar, northern red oak, white oak, American sycamore, and black walnut are native trees. Preferred trees for planting include yellow poplar, black walnut, white oak, eastern white pine, shortleaf pine, white ash, and northern red oak. See table 7 for specific information relating to potential productivity. This soil has few limitations for forest management; however, reforestation needs to be managed carefully to reduce plant competition.

This soil is poorly suited to most urban uses because of flooding; however, many areas can be protected from flooding by construction of dikes and levees.

This Combs soil is in capability subclass IIw.

Dm—Dumps, coal. This map unit consists of coal stockpiles and coal refuse dumps scattered throughout the survey area (fig. 7). The areas are about 3 to 60 acres and vary in shape. Typically, the stockpiles and dumps are level to very steep and include coal processing plants, coal tiples, railways, and areas that have been filled with coal waste material. Most areas are incapable of supporting plant life without major reclamation.

Included in the map unit are small areas of Myra soils. These soils make up about 25 percent of this map unit, but most areas are less than 2 acres.

Dumps, coal, is in capability subclass VIIIs.

FgE—Fedscreek-Gilpin-Marrowbone complex, 20 to 50 percent slopes. The soils in this complex are deep and moderately deep, steep and very steep, and well drained. They are on foothills and small mountains along major streams. Fedscreek soil is on concave hill slopes and in coves, and Gilpin and Marrowbone soils are on convex upper hill slopes and ridgetops. These soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape. The areas are broad, rounded delineations ranging from about 5 to 220 acres, but areas of each soil generally are less than 5 acres. This complex is about 45 percent Fedscreek soil, 20 percent Gilpin soil, and 20 percent Marrowbone soil. The rest is included soils.

Typically, this Fedscreek soil has a brown channery loam surface layer about 4 inches thick. The subsoil extends to a depth of about 48 inches. The upper part to a depth of 30 inches is yellowish brown channery silt loam and channery loam. The lower part is strong brown channery loam. The substratum to a depth of about 65 inches is strong brown very channery loam and dark yellowish brown channery silt loam. Light yellowish brown mottles are in the lower part of the substratum.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate, and surface runoff is rapid. The root zone is deep and easily penetrated by plant roots.

Typically, this Gilpin soil has a brown silt loam surface layer about 7 inches thick. The subsoil to a depth of about 25 inches is strong brown silty clay loam. The substratum to a depth of about 31 inches is strong brown channery silty clay loam that has a few light brownish gray mottles. It is underlain by interbedded siltstone and shale.

This soil is low in natural fertility and low to moderate in organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is medium. The root zone is moderately deep and easily penetrated by plant roots. Depth to bedrock ranges from 20 to 40 inches.

Typically, this Marrowbone soil has a brown fine sandy loam surface layer about 5 inches thick. The subsoil extends to a depth of about 28 inches. The upper part to a depth of about 23 inches is brown and strong brown loam and fine sandy loam. The lower part is yellowish brown channery loam that has light yellowish brown mottles. The subsoil is underlain by olive sandstone.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep and easily penetrated by plant roots. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Hayter and Kimper soils on lower parts of hill slopes and in coves. A few areas of deep and moderately deep, clayey soils are on ridgetops and upper parts of hill slopes. The included soils make up about 15 percent of this map unit, but most areas are less than 5 acres.

The soils in this complex are used mainly as woodland or pasture, but many areas are used as homesites.

The Fedscreek, Gilpin, and Marrowbone soils are not suited to cultivated crops because the steep slopes limit the use of modern machinery and the hazard of erosion is very severe.

In the less sloping areas, these soils are poorly suited to pasture, but moderate yields can be obtained if these soils are properly managed. Grasses and legumes that produce high quality forage, provide good ground cover, and require the least amount of renovation should be selected. Overgrazing reduces the stand of desirable plants, which can result in soil erosion.

These soils are well suited to woodland. Yellow poplar, white oak, black oak, and shortleaf pine are native trees on cool aspects. Understory plants include sawbrier, red maple, hickory, yellow poplar, sedum, Christmas fern, flowering dogwood, galax, and wild grape. Scarlet oak, white oak, black oak, shortleaf pine, and hickory are the native trees on warm aspects. Understory plants include red maple, sourwood, sawbrier, hickory, flowering dogwood, American beech, blackgum, lowbush blueberry, pussytoes, and sassafras. Yellow poplar, northern red oak, white oak,

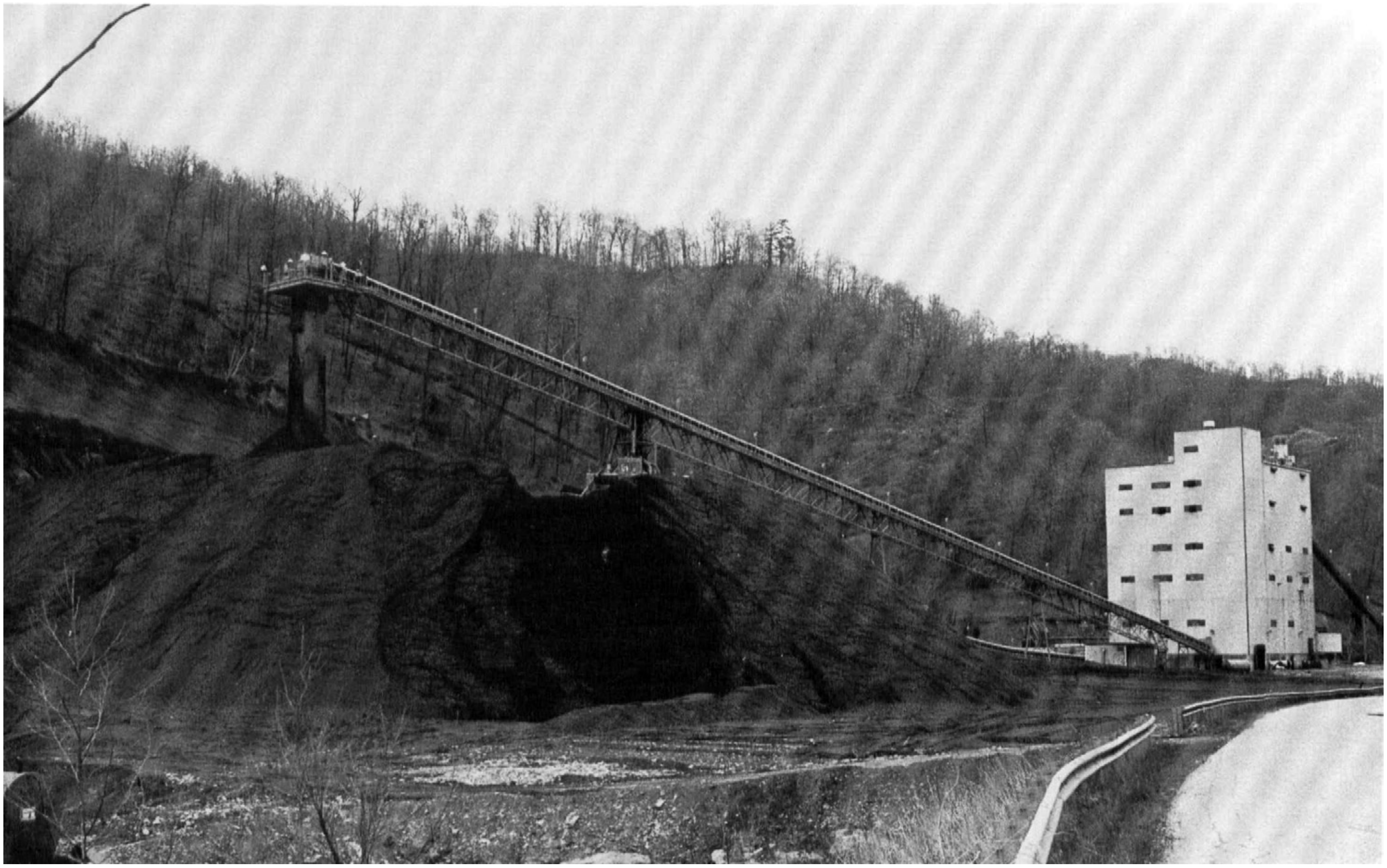

Figure 7.—Coal, which is processed and stored in areas of Dumps, coal, is the most profitable mineral resource in Pike County.

eastern white pine, and shortleaf pine are preferred trees for planting on cool aspects, and shortleaf pine and white oak are preferred for planting on warm aspects. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the erosion hazard, equipment use limitation, seedling mortality, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Steepness of slope restricts the use of wheeled and tracked equipment on skid trails. Cable skidding generally is safer and disturbs the soil less. On warm aspects, seedling mortality generally is severe in summer because of high temperatures and inadequate moisture in the soil. Reforestation after harvesting must also be managed carefully to reduce plant competition.

These soils are poorly suited to urban uses because of steepness of slope; however, some areas on ridgetops are less sloping and are suited to some urban uses.

The Fedscreek, Gilpin, and Marrowbone soils are in capability subclass VIIe.

FmF—Fedscreek-Marrowbone-Dekalb complex, 30 to 80 percent slopes, very stony. The soils in this complex are deep and moderately deep, very steep and extremely steep, and well drained. They are mostly on warm aspects of middle and lower mountain side slopes. Fedscreek soil is on concave to convex side slopes and in coves. Marrowbone and Dekalb soils are on convex linear side slopes and on nose slopes. Fedscreek, Marrowbone, and Dekalb soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape. The areas are about 5 to 1,200 acres, but areas of each soil generally are less than 10 acres. This complex is about 50 percent Fedscreek soil, 25 percent

Marrowbone soil, and 10 percent Dekalb soil. The rest is included soils. Slopes are dissected by a dendritic drainage pattern, and stones cover about 2 percent of the soil surface.

Typically, this Fedscreek soil has a brown channery loam surface layer about 4 inches thick. The subsoil extends to a depth of about 48 inches. The upper part to a depth of about 30 inches is yellowish brown channery silt loam and channery loam. The lower part is strong brown channery loam. The substratum to a depth of about 65 inches is brown very channery loam and dark yellowish brown channery silt loam. Light yellowish brown mottles are below a depth of 60 inches.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate, and surface runoff is rapid. The root zone is deep and easily penetrated by plant roots.

Typically, this Marrowbone soil has a brown fine sandy loam surface layer about 5 inches thick. The subsoil extends to a depth of about 28 inches. The upper part to a depth of about 23 inches is brown and strong brown loam and fine sandy loam. The lower part is yellowish brown channery loam that has light yellowish brown mottles. The subsoil is underlain by olive sandstone.

This soil is low in natural fertility and low to moderate in organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Typically, this Dekalb soil has a very dark grayish brown channery fine sandy loam surface layer about 3 inches thick. The subsoil to a depth of about 21 inches is brown and yellowish brown channery or very channery fine sandy loam. The substratum to a depth of about 28 inches is yellowish brown extremely flaggy fine sandy loam. It is underlain by brown fine grained sandstone.

This soil is low in natural fertility and organic matter content. Permeability is moderately rapid or rapid. The available water capacity is low. Surface runoff is rapid. The root zone is moderately deep, and root penetration is limited by rock fragments. Depth to bedrock is 20 to 40 inches.

Included in mapping are small areas of Muskingum and Berks soils on upper mountain slopes and nose slopes and Kimper and Sharondale soils in coves. Also included are areas of shallow soils and soils that have more coarse fragments than typical for Fedscreek soil. These soils make up about 15 percent of this map unit, but individual areas average less than 10 percent of the delineations and generally are less than 10 acres.

The soils in this complex are used mainly for second growth hardwoods.

These soils are not suited to cultivated crops or pasture because of steepness of slope, the hazard of erosion, surface stones, and rock outcrop.

These soils are suited to woodland. White oak, black oak, scarlet oak, hickory, red maple, shortleaf pine, and Virginia pine are native trees on warm aspects. Isolated stands of red oak, maple, and yellow poplar are on lower, more moist sites. Understory plants include trefoil tickclover, pussytoes, Virginia creeper, deer tongue, lowbush blueberry, sassafras, red maple, sedum, lousewort, American beech, flowering dogwood, mapleleaf viburnum, gall-of-the-earth, New Jersey tea, panicum, early saxifrage, azalea, greenbrier, blackgum, wild grape, wood sorrel, and horsebalm. Shortleaf pine and white oak are the preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the hazard of erosion, equipment use limitation, seedling mortality, and plant competition. Steep skid trails and roads are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Steepness of slope restricts the use of wheeled and tracked equipment on skid trails. Cable skidding generally is safer and disturbs the soil less. On warm aspects, seedling mortality generally is severe in summer because of high temperatures and inadequate moisture in the soil. Reforestation after harvesting must also be managed carefully to reduce undesirable plant competition.

These soils are not suited to urban uses because of steepness of slope.

The Fedscreek, Marrowbone, and Dekalb soils are in capability subclass VIIe.

GmD—Gilpin-Marrowbone complex, 6 to 20 percent slopes. The soils in this complex are moderately deep, sloping and moderately steep, and well drained. They are on convex ridgetops throughout the survey area, but the largest delineations are in the Flatwoods area of southwest Pike County. These soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape. The areas range from long and narrow to broad. They are about 5 to 150 acres, but areas of each soil generally are less than 5 acres. This complex is 65 percent Gilpin soil and 25 percent Marrowbone soil. The rest is included soils.

Typically, this Gilpin soil has a brown silt loam surface layer about 7 inches thick. The subsoil to a depth of about 25 inches is strong brown silty clay loam. The substratum to a depth of about 31 inches is strong brown channery silty clay loam that has a few light brownish gray mottles. It is underlain by interbedded shale and siltstone.

This soil is low in natural fertility and low to moderate in organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is medium. The root zone is moderately deep and easily penetrated by plant roots. Depth to bedrock ranges from 20 to 40 inches.

Typically, this Marrowbone soil has a brown fine sandy loam surface layer about 5 inches thick. The subsoil extends to a depth of about 28 inches. The upper part to a depth of about 23 inches is brown and strong brown loam and fine sandy loam. The lower part is yellowish brown channery loam that has light yellowish brown mottles. It is underlain by olive sandstone.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The root zone is moderately deep and easily penetrated by plant roots. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Berks and Dekalb soils on convex ridges and Fedscreek and Kimper soils on side slopes and in shallow coves. The included soils make up about 10 percent of this map unit, but most areas are less than 2 acres.

The soils in this complex are used mainly as pasture or woodland.

In the less sloping areas, these soils are suited to cultivated crops commonly grown in the county. Moderately high yields are possible if good management practices are used. The hazard of erosion is very severe if these soils are cultivated. Conservation tillage, contour tillage, terraces, stripcropping, cover crops, crop rotation with grasses and legumes, and application of fertilizer and lime according to crop needs can slow surface runoff, help to control erosion, and ensure continued high crop yields. Keeping crop residue on or near the surface also helps to slow surface runoff and control erosion. Incorporation of crop residue into the plow layer helps to maintain good tilth and the supply of organic matter. Permanent plant cover is needed in drainageways to control erosion.

The Gilpin and Marrowbone soils are well suited to hay and pasture, and high yields can be expected if these soils are properly managed. A high level of forage production is possible if pastures are renovated frequently enough to maintain the desired plants. Other management needs include adding lime and fertilizer according to crop needs and using proper seeding rates and mixtures, rotation grazing, and a well planned harvesting and clipping schedule.

These soils are well suited to woodland. White oak, black oak, hickory, scarlet oak, chestnut oak, and shortleaf pine are native trees. Understory plants include sawbrier, red maple, hickory, Christmas fern, sugar maple, flowering dogwood, blackgum, sourwood, sassafras, and wild grape. Shortleaf pine and white oak are preferred trees for planting. See table 7 for specific information relating to potential productivity. These soils have few limitations for forest management; however, reforestation must be carefully managed to reduce competition from undesirable plants.

These soils are poorly suited to most urban uses because of depth to bedrock and steepness of slope.

The Gilpin and Marrowbone soils are in capability subclass IVe.

Gy—Grigsby-Yeager complex, occasionally flooded. The soils in this complex are deep, nearly level, and well drained. They are on flood plains along major streams. Slopes are uniform and range from 0 to 2 percent. These soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape. The areas are mostly long and narrow. They are about 2 to 155 acres, but areas of each soil generally are less than 3 acres. This complex is about 60 percent Grigsby soil and 30 percent Yeager soil. The rest is included soils.

Typically, this Grigsby soil has a brown sandy loam surface layer about 6 inches thick. The subsoil to a depth of about 47 inches is dark yellowish brown sandy loam. The substratum to a depth of about 70 inches is dark yellowish brown sandy loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause occasional flooding during winter and early in spring. Water may remain on the surface for 2 to 7 days.

Typically, this Yeager soil has a stratified dark grayish brown and brown loam and yellowish brown sand surface layer about 9 inches thick. The underlying material to a depth of about 46 inches is dark yellowish brown fine sandy loam, brown loamy sand, and dark yellowish brown loamy fine sand. It has strata or bedding planes of yellowish brown and brownish yellow sand. To a depth of about 80 inches it is yellowish brown loam that has many light brownish gray and red mottles.

This soil is low in natural fertility and organic matter content. Permeability is moderately rapid or rapid, and the available water capacity is low or moderate. Surface runoff is slow. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause occasional flooding during winter and early in spring. Water may remain on the surface from 2 to 7 days.

Included in mapping are small areas of Nolin, Rowdy, Potomac, and Melvin soils. Soils that are similar to Grigsby soil except they are very strongly acid are on the Tug Fork. Throughout the area are soils that are frequently or rarely flooded. In places are a few areas of Grigsby and Yeager soils that have slopes of 2 to 4 percent. The included soils make up about 10 percent of this map unit, but most areas are less than 2 acres.

Cropland is the major use of the soils in this complex. In many areas, these soils are used as sites for houses and gardens.

The Grigsby and Yeager soils are suited to cultivated crops, and yields are moderately high if these soils are properly managed. Corn, hay, and pasture are the common crops. The hazard of erosion is slight, and continuous row cropping is possible if fertility, good tilth, and the supply of organic matter are maintained. Conservation tillage, returning crop residue to the soil, cover crops, and crop rotation with grasses and legumes help to maintain desirable soil structure and organic matter content. These soils are poorly suited to winter crops because of flooding. In some areas, surface runoff and overwash from adjacent soils can be reduced by constructing diversion ditches near the foot of nearby hills to intercept the water. In other areas, improvement of the stream channel can reduce overflow. Drainageways should be kept open and permanently vegetated to ensure adequate surface drainage.

These soils are well suited to hay and pasture and produce moderately high yields if properly managed. Improved varieties of grasses and legumes that can withstand flooding of short duration can provide high quality hay and forage. Controlled or restricted grazing when the soil is wet helps to maintain pasture plants. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants and results in thin cover, which can increase weed competition and the need for early renovation. Lime and fertilizer should be applied according to crop needs, and a well planned harvesting and clipping schedule is important in producing high yields.

Most areas of these soils are cleared, but the soils are well suited to woodland. Yellow poplar, American sycamore, sweetgum, black walnut, boxelder, hackberry, and green ash are native trees. Understory plants include giant ragweed, false nettle, clearweed, silver maple, and common elderberry. Yellow poplar, eastern white pine, white oak, and northern red oak are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the equipment use limitation, seedling mortality, and plant competition. The sandy texture of the surface layer hinders use of wheeled equipment, especially when the soil is saturated or very dry. Seedling mortality can be severe in areas that are subject to flooding. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are poorly suited to most urban uses because of flooding.

The Grigsby and Yeager soils are in capability subclass IIw.

HaC—Hayter loam, 4 to 15 percent slopes. This soil is deep, gently sloping to moderately steep, and well drained. It is on foot slopes and alluvial fans. Slopes are rounded and are concave or convex. The areas are mostly long, narrow or fan-shaped delineations at the base of hillsides or at the mouth of coves. They are about 3 to 15 acres.

Typically, this Hayter soil has a brown loam surface layer about 7 inches thick. The subsoil to a depth of about 55 inches is brown and dark yellowish brown gravelly loam. The substratum to a depth of about 65 inches is dark yellowish brown cobbly clay loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid, and the available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of Fedscreek and Kimper soils. In places are soils that have more silt in the subsoil than is typical for Hayter soil. The included soils make up about 10 percent of this map unit, but most areas are less than 2 acres.

This Hayter soil is used mainly for pasture, hay, or sites for houses and gardens. In some less sloping areas, it is used for cultivated crops.

This soil is well suited to cultivated crops commonly grown in the area, and it produces moderately high yields if good management practices are used. The hazard of erosion is severe if this soil is cultivated. Conservation tillage, contour tillage, terraces, stripcropping, cover crops, crop rotation with grasses and legumes, and application of fertilizer and lime according to crop needs help to slow surface runoff, control erosion, and insure continued high crop yields. Keeping crop residue on or near the surface also slows surface runoff and helps to control erosion. Incorporation of crop residue into the plow layer helps to maintain good tilth and the supply of organic matter. Permanent plant cover is needed in drainageways to reduce erosion.

This soil is well suited to hay and pasture, and high yields can be expected if it is properly managed. A high level of forage production is possible if pastures are renovated frequently enough to maintain the desired plants. Other management needs include addition of lime and fertilizer according to crop needs, proper seeding rates and mixtures, rotation grazing, and a well planned harvesting and clipping schedule.

This Hayter soil is well suited to woodland. Northern red oak, yellow poplar, white oak, and hickory are native trees. Understory plants include red maple, American beech, yellow poplar, flowering dogwood, Christmas fern, and sawbrier. Yellow poplar, white oak, eastern white pine, black walnut, and northern red oak are preferred trees for planting. See table 7 for specific information relating to potential productivity. This soil has few limitations for the management of timber; however, reforestation after harvesting needs to be managed carefully to reduce plant competition.

This soil is suited to most urban uses. Steepness of slope is a limitation; however, proper design and installation of urban structures can overcome this problem.

This Hayter soil is in capability subclass IIIe.

HaD—Hayter loam, 15 to 30 percent slopes. This soil is deep, moderately steep and steep, and well drained. It is on foot slopes and alluvial fans. Slopes are rounded and are concave or convex. The areas are mostly long, narrow or fan-shaped delineations at the base of hillsides or at the mouth of coves. They are about 3 to 30 acres.

Typically, this Hayter soil has a brown loam surface layer about 7 inches thick. The subsoil to a depth of about 55 inches is brown and dark yellowish brown gravelly loam. The substratum to a depth of about 65 inches is dark yellowish brown cobbly clay loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid, and the available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small areas of Fedscreek and Kimper soils. In places are soils that have more silt in the subsoil than is typical for Hayter soil. The included soils make up about 10 percent of this map unit, but most areas are less than 2 acres.

This Hayter soil is used mainly for pasture, hay, or sites for houses and gardens.

This soil is poorly suited to cultivated crops because of the steepness of slope and very severe hazard of erosion. Cultivated crops can be grown occasionally if adequate measures are taken to control erosion. Conservation tillage, stripcropping, contour tillage, crop rotation with grasses and legumes, and returning crop residue to the soil reduce runoff, help to control erosion, and help to maintain and improve tilth and the supply of organic matter.

This soil is suited to pasture and hay; however, production of hay is somewhat limited because of steepness of slope. Adding lime and fertilizer according to crop needs, renovating as needed using proper seeding rates and mixtures, and rotation grazing help to ensure a high level of forage production and prevent soil erosion.

This Hayter soil is well suited to woodland. Northern red oak, yellow poplar, white oak, and hickory are native trees. Understory plants include red maple, American beech, yellow poplar, flowering dogwood, Christmas fern, and sawbrier. Yellow poplar, white oak, eastern white pine, and northern red oak are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are the erosion hazard, equipment use limitation, seedling mortality, and plant competition. Steep skid trails and firebreaks are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Steepness of slope restricts the use of wheeled and tracked equipment. On warm aspects, seedling mortality generally is severe in summer because of inadequate moisture in the soil. Reforestation after harvesting must be managed carefully to reduce plant competition.

This soil is poorly suited to most urban uses because of steepness of slope.

This Hayter soil is in capability subclass is IVe.

HpC—Hayter-Potomac-Stokly complex, 2 to 15 percent slopes. The soils in this complex are deep, gently sloping to moderately steep, and somewhat poorly drained, well drained, and somewhat excessively drained. They are in narrow valleys throughout the survey area. Hayter soil is on foot slopes and has slopes of 2 to 15 percent. Potomac and Stokly soils are on flood plains and have slopes of 2 to 3 percent. These soils are too intricately mixed or too small to be mapped separately at the selected scale. The areas are very narrow or fan-shaped. They range from about 4 to 350 acres, but areas of each soil generally are less than about 5 acres. This complex is about 30 percent Hayter soil, 30 percent Potomac soil, and 15 percent Stokly soil. The rest is included soils.

Typically, this Hayter soil has a brown loam surface layer about 7 inches thick. The subsoil to a depth of 55 inches is brown and dark yellowish brown gravelly loam. The substratum to a depth of 65 inches is dark yellowish brown cobbly clay loam.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid, and the available water capacity is high. Surface runoff is medium. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

Typically, this Potomac soil has a brown loam surface layer about 7 inches thick. The subsurface layer to a depth of about 11 inches is dark yellowish brown gravelly sandy loam. The underlying material to a depth of about 60 inches is dark yellowish brown and yellowish brown very cobbly and extremely cobbly loamy sand.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid in the surface and subsurface layers. The available water capacity is low, and surface runoff is slow. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause occasional flooding during winter and early in spring.

Typically, this Stokly soil has a grayish brown loam surface layer 7 inches thick that has strong brown mottles. The subsoil to a depth of about 33 inches is mottled grayish brown and light brownish gray loam that has strong brown and dark yellowish brown mottles. The substratum to a depth of about 69 inches is gray loam that has dark yellowish brown mottles.

This soil is low in natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is moderate. Surface runoff is slow. This soil is easy to till, but can be worked only within a limited range of moisture content. It is saturated late in winter and in spring by a seasonal high water table that is within 6 to 12 inches of the surface. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause occasional flooding during winter and early in spring.

Included in mapping are small areas of Yeager, Grigsby, Rowdy, Fedscreek, and Kimper soils. Some alluvial soils that have gray mottles at a depth of more than 20 inches and are moderately well drained or somewhat poorly drained and some colluvial soils that have more than 35 percent rock fragments in the subsoil are at the head of watersheds. A few areas of Hayter, Potomac, and Stokly soils that have slopes of more than 15 percent are also included. The included soils make up about 25 percent of this map unit, but individual areas make up less than about 10 percent or about 2 acres or less of each delineation.

The soils in this complex are used mainly as sites for houses, gardens, and small commercial buildings.

In the less sloping areas, these soils are suited to row crops, and moderately high yields are possible. The hazard of erosion is very severe on the steeper colluvial side slopes. Conservation tillage, contour tillage, cover crops, crop rotation with grasses and legumes, and application of fertilizer and lime according to crop needs help to slow surface runoff and control erosion. Keeping crop residue on or near the surface also helps to slow runoff, and the incorporation of crop residue into the plow layer helps to maintain good tilth and the supply of organic matter.

These soils are well suited to hay and pasture, and high yields are possible if they are properly managed. The equipment use limitation caused by steepness of slope is a concern in management. Grasses and legumes that yield high quality forage and provide good ground cover should be selected when establishing a pasture. Pasture renovation should be frequent enough to maintain the desired plants. Lime and fertilizer, proper seeding rates and mixtures, rotation grazing, weed control, and a well planned clipping and harvesting schedule are needed.

The soils in this complex are well suited to woodland. Northern red oak, yellow poplar, white oak, American sycamore, and hickory are native trees. Understory plants include sweetgum, white ash, spicebush, jewelweed, sugar maple, red maple, witchhazel, flowering dogwood, wild hydrangia, and poison ivy. Yellow poplar, eastern white pine, northern red oak, and white oak are preferred trees for planting. Black walnut is suitable for planting on Hayter and Potomac soils. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the equipment use limitation, seedling mortality, and plant competition. The seasonal high water table can restrict the use of equipment on the Stokly soil to periods when the soil is dry. Seedling mortality can be severe in areas that are subject to flooding. Reforestation must be managed carefully to reduce plant competition.

These soils have varying suitability for urban uses. The lower-lying Potomac and Stokly soils are poorly suited because of occasional flash flooding. In addition, Stokly soils are limited because of wetness. Hayter soils are suited to most urban uses, but steepness of slope is a limitation. Proper design and installation of urban structures can overcome this problem.

The Hayter soil is in capability subclass IIIe, the Potomac soil is in capability subclass IVs, and the Stokly soil is in capability subclass IIw.

KmF—Kimper-Sharondale-Muskingum complex, 35 to 80 percent slopes, extremely stony. The soils in this complex are deep and moderately deep, very steep and extremely steep, and well drained. These soils are on dominantly cool aspects of upper side slopes of Pine Mountain. The elevation ranges from about 860 to 3,200 feet. Kimper soil is on concave slopes and benches, Sharondale soil is on concave smooth slopes and in coves, and Muskingum soil is on convex side slopes and nose slopes. These soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape, but areas of each soil generally are less than 10 acres. This complex is about 30 percent Kimper soil, 25 percent Sharondale soil, and 10 percent Muskingum soil. The rest is included soils and rock outcrop. Stones, boulders, and rock outcrop are scattered throughout areas of this complex and cover about 10 percent of the soil surface.

Typically, this Kimper soil has a very dark brown very channery loam surface layer about 8 inches thick. The subsoil to a depth of about 52 inches is brown, yellowish brown, and dark yellowish brown channery and very channery loam. The substratum to a depth of about 75 inches is brown very channery fine sandy loam or very channery loam. It is underlain by olive sandstone.

This soil is medium in natural fertility and high in organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is high. Surface runoff is rapid. The root zone is deep and easily penetrated by plant roots.

Typically, this Sharondale soil has a very dark gray and dark brown channery fine sandy loam or channery loam surface layer about 18 inches thick. The subsoil to a depth of about 75 inches is dark yellowish brown, brown, and yellowish brown very channery, very flaggy, and extremely flaggy loam, sandy loam, and fine sandy loam. The substratum to a depth of about 86 inches is yellowish brown very flaggy loam that has light yellowish brown and strong brown mottles. It is underlain by brown fractured sandstone.

This soil is high in natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is high. Surface runoff is medium or rapid. The root zone is deep.

Typically, this Muskingum soil has a dark grayish brown channery silt loam surface layer about 4 inches thick. The subsoil to a depth of about 24 inches is yellowish brown channery silt loam. The substratum to a depth of about 30 inches is yellowish brown very channery loam. It is underlain by olive sandstone.

This soil is low in natural fertility and low to moderate in organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Berks, Gilpin, Marrowbone, Fedscreek, and Shelocta soils. Also included are areas of rock outcrop, commonly tilted sandstone cliffs that dip to the south and are 5 to 100 feet high. In many places, large stones and boulders have broken from the rock outcrop and are scattered downslope. The inclusions make up about 30 percent of this complex, but individual areas of the soils or rock outcrop average less than 10 percent of each delineation.

The soils in this complex are used as woodland.

These soils are not suited to cultivated crops, hay, or pasture because of steepness of slope, rock outcrop, and boulders.

These soils are well suited to woodland. Yellow poplar, sugar maple, white basswood, sweet birch, northern red oak, black locust, cucumbertree, white oak, and red maple are native trees on cool aspects. Understory plants include sugar maple, Virginia creeper, jewelweed, spicebush, sweet cicely, Jack in the pulpit, Christmas fern, poison ivy, violets, black snakeroot, white ash, American elm, red maple, pawpaw, wood nettle, bloodroot, wild geranium, redbud, Solomons-seal, black locust, white pergamot, and alum root. Yellow poplar, white oak, northern red oak, and eastern white pine are preferred trees for planting. Black walnut is suitable for planting on Kimper and Sharondale soils but is questionable on Muskingum soil because of soil depth. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the erosion hazard, equipment use limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. The main limitation for the harvesting of timber is steepness of slope. Using standard-wheeled and tracked equipment when the soil is moist causes rutting and compaction. Puddling can also occur. Cable yarding systems are safer, reduce damage to the soil, and help to maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are not suited to urban uses. Steepness of slope, rock outcrop, and the stony surface are limitations.

The Kimper, Sharondale, and Muskingum soils are in capability subclass VIIe.

KsF—Kimper-Sharondale-Muskingum complex, 30 to 80 percent slopes, very stony. The soils in this complex are deep and moderately deep, very steep and extremely steep, and well drained. These soils are mostly on cool aspects of middle and lower mountain side slopes. Kimper soil is on concave to convex slopes. Sharondale soil is in coves, and Muskingum soil is on convex linear side slopes and nose slopes. These soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape. The areas are about 5 to 600 acres, but areas of each soil generally are less than 10 acres. Slopes are dissected by a dendritic drainage pattern, and stones cover about 2 percent of the soil surface. This complex is about 50 percent Kimper soil, 25 percent Sharondale soil, and 10 percent Muskingum soil. The rest is included soils.

Typically, this Kimper soil has a very dark brown very channery loam surface layer about 8 inches thick. The subsoil to a depth of about 52 inches is brown, yellowish brown, and dark yellowish brown channery or very channery loam. The substratum to a depth of about 75 inches is brown very channery fine sandy loam or channery loam. It is underlain by olive sandstone.

This soil is medium in natural fertility and high in organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is high. Surface runoff is rapid. The root zone is deep and easily penetrated by plant roots.

Typically, this Sharondale soil has a very dark gray and dark brown channery fine sandy loam or channery loam surface layer about 18 inches thick. The subsoil to a depth of about 75 inches is dark yellowish brown, brown, and yellowish brown very channery, very flaggy, and extremely flaggy loam, sandy loam, and fine sandy loam. The substratum to a depth of about 86 inches is yellowish brown very flaggy loam that has light yellowish brown and strong brown mottles. It is underlain by brown fractured sandstone.

This soil is high in natural fertility and organic matter content. Permeability is moderately rapid, and the available water capacity is high. Surface runoff is medium or rapid. The root zone is deep.

Typically, this Muskingum soil has a dark grayish brown channery silt loam surface layer about 4 inches thick. The subsoil to a depth of about 24 inches is yellowish brown channery silt loam. The substratum to a depth of about 30 inches is yellowish brown very channery loam. It is underlain by olive sandstone.

This soil is low in natural fertility and low to moderate in organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Dekalb, Berks, and Marrowbone soils on upper mountain slopes and nose slopes and Fedscreek soils on side slopes. Also included are areas of shallow soils and soils that have more rock fragments than typical for the Kimper soil. The included soils make up about 25 percent of this map unit, but individual areas average less than 10 percent of the delineations and generally are less than 10 acres.

The soils in this complex are used mainly for second growth hardwoods.

These soils are not suited to cultivated crops or pasture because of steepness of slope, the hazard of erosion, surface stones, and rock outcrop.

These soils are well suited to woodland. Yellow poplar, sugar maple, white basswood, sweet birch, northern red oak, black locust, cucumbertree, white oak, and red maple are native trees on cool aspects. Understory plants include jewelweed, violets, wood nettle, black snakeroot, Jack in the pulpit, yellow mandarin, Christmas fern, wild geranium, waterleaf, bedstraw, bloodroot, white bergamot, sweet cicely, grape fern, thimbleweed, maidenhair fern, wild geranium, and Solomons-seal. Yellow poplar, white oak, northern red oak, and eastern white pine are preferred trees for planting. Black walnut is suitable for planting on Kimper and Sharondale soils but questionable on Muskingum because of soil depth. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the hazard of erosion, equipment use limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. The main limitation for timber harvesting is steepness of slope. Using standard-wheeled and tracked equipment when the soil is moist causes rutting and compaction. Puddling can also occur. Cable yarding systems are safer, reduce damage to the soil, and help to maintain productivity. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are not suited to urban uses because of steepness of slope.

The Kimper, Sharondale, and Muskingum soils are in capability subclass VIIe.

MaF—Marrowbone-Dekalb-Muskingum complex, 30 to 80 percent slopes, very rocky. The soils in this complex are moderately deep, very steep and extremely steep, and well drained. They are on mountain ridgetops. Marrowbone soil is on convex side slopes, nose slopes, and in shallow coves. Dekalb soil is on convex linear side slopes and on nose slopes. Muskingum soil is on linear side slopes and in saddles between ridge crests. These soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape. The areas are about 5 to 12,600 acres, but areas of each soil generally are less than 10 acres. This complex is about 35 percent Marrowbone soil, 25 percent Dekalb soil, and 25 percent Muskingum soil. The rest is included soils. Rock outcrop and stones cover about 5 percent of the soil surface.

Typically, this Marrowbone soil has a brown fine sandy loam surface layer about 5 inches thick. The subsoil extends to a depth of about 28 inches. The upper part to a depth of about 23 inches is brown and strong brown loam and fine sandy loam. The lower part is yellowish brown channery loam that has light yellowish brown mottles. The subsoil is underlain by olive sandstone.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep and easily penetrated by plant roots. Depth to bedrock ranges from 20 to 40 inches.

Typically, this Dekalb soil has a very dark grayish brown channery fine sandy loam surface layer about 3 inches thick. The subsoil to a depth of about 21 inches is brown and yellowish brown channery or very channery fine sandy loam. The substratum to a depth of about 28 inches is yellowish brown extremely flaggy fine sandy loam. It is underlain by brown fine grained sandstone.

This soil is low in natural fertility and organic matter content. Permeability is moderately rapid or rapid, and the available water capacity is low. Surface runoff is rapid. The root zone is moderately deep, and root penetration is limited by rock fragments. Depth to bedrock ranges from 20 to 40 inches.

Typically, this Muskingum soil has a dark grayish brown channery silt loam surface layer about 4 inches thick. The subsoil to a depth of about 24 inches is yellowish brown channery silt loam. The substratum to a depth of about 30 inches is yellowish brown very channery loam. It is underlain by olive sandstone.

This soil is low in natural fertility and low to moderate in organic matter content. Permeability is moderate, and the available water capacity is moderate. Surface runoff is rapid. The root zone is moderately deep and easily penetrated by plant roots. Depth to bedrock ranges from 20 to 40 inches.

Included in mapping are small areas of Berks soils, some areas of Fedscreek and Kimper soils in coves, and some soils on upper mountain slopes and nose slopes that have more clay than the Muskingum soil. Also included are areas of shallow, loamy soils. The included soils make up about 15 percent of this map unit, but individual areas average less than 10 percent of the delineations.

The soils in this complex are used mainly for second growth hardwoods.

These soils are not suited to cultivated crops or pasture because of steepness of slope, the hazard of erosion, surface stones, and rock outcrop.

These soils are suited to woodland. White oak, American beech, yellow poplar, northern red oak, and shortleaf pine are native trees on cool aspects. White oak, black oak, scarlet oak, hickory, shortleaf pine, and Virginia pine are on warm aspects. Understory plants on cool aspects include flowering dogwood, sugar maple, sawbrier, American beech, blackgum, sassafras, Virginia pine, and Christmas fern. On warm aspects, they are red maple, sourwood, lowbush blueberry, blackgum, hickory, sassafras, chestnut oak, flowering dogwood, and sawbrier. Yellow poplar, northern red oak, white oak, eastern white pine, and shortleaf pine are preferred trees for planting on cool aspects. Shortleaf pine and white oak are preferred for planting on warm aspects. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the erosion hazard, equipment use limitation, seedling mortality, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Steepness of slope limits the type of equipment that can be used for harvesting. Cable yarding systems are safer, reduce damage to the soil, and help to maintain productivity. On warm aspects, seedling mortality generally is severe in summer because of high temperatures and inadequate moisture in the soil. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are not suited to urban uses because of steepness of slope and rock outcrop.

The Marrowbone, Dekalb, and Muskingum soils are in capability subclass VIIe.

MmF—Marrowbone-Fedscreek-Myra complex, 30 to 80 percent slopes, very stony. The soils in this complex are moderately deep and deep, very steep and extremely steep, and well drained. They are on mountainsides that have been strip or auger mined in long continuous bands. Marrowbone soil is on ridgetops and nose slopes, Fedscreek soil is on side slopes and in shallow coves, and Myra soil is on small benches and outslopes created by the contour mining of 3 to 7 separate seams of coal. These soils are too intricately mixed to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape. The areas are about 10 to 1,850 acres, but areas of each soil generally is less than 10 acres or they are too narrow to delineate separately. Slopes are dissected by a dendritic drainage pattern, and stones cover about 2 percent of the soil surface. This complex is about 35 percent Marrowbone soil, 30 percent Fedscreek soil, and 20 percent Myra soil. The rest is included soils.

Typically, this Marrowbone soil has a brown fine sandy loam surface layer about 5 inches thick. The subsoil extends to a depth of about 28 inches. The upper part to a depth of about 23 inches is brown and strong brown loam and fine sandy loam. The lower part is yellowish brown channery loam that has light yellowish brown mottles. It is underlain by olive sandstone.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately rapid, and the available water capacity is moderate. Surface runoff is medium. The root zone is moderately deep and easily penetrated by plant roots. Depth to bedrock ranges from 20 to 40 inches.

Typically, this Fedscreek soil has a brown channery loam surface layer about 4 inches thick. The subsoil extends to a depth of about 48 inches. The upper part to a depth of about 30 inches is yellowish brown channery silt loam and channery loam. The lower part is strong brown channery loam. The substratum to a depth of about 65 inches is dark yellowish brown very channery silt loam that has light yellowish brown mottles in the lower part.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate, and surface runoff is rapid. The root zone is deep and easily penetrated by plant roots.

Typically, this Myra soil has a dark grayish brown and gray very channery silt loam surface layer about 6 inches thick. The underlying material to a depth of 79 inches is mixed gray, light olive brown, grayish brown, dark grayish brown, and olive gray very channery silt loam.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately slow, and the available water capacity is moderate. Surface runoff is rapid. The root zone is deep, but root penetration is restricted because of rock fragments, stones, and compaction.

Included in mapping are small areas of Dekalb and Muskingum soils on upper mountain slopes and nose slopes and Kimper and Sharondale soils in coves and on east and north aspects. Also included are areas of shallow, loamy soils and soils that have more rock fragments than typical for Fedscreek or Kimper soils. The included soils make up about 15 percent of this map unit, but individual areas average less than 10 percent of the delineations.

The soils in this complex are used mainly for second growth hardwoods.

These soils are not suited to cultivated crops or pasture because of steepness of slope, the hazard of erosion, surface stones, and rock outcrop.

These soils are suited to woodland. Northern red oak, yellow poplar, American beech, shortleaf pine, sweet birch, white oak, blackgum, black oak, white basswood, and black walnut are native trees on cool aspects. Chestnut oak, black oak, scarlet oak, American beech, red maple, white oak, and black locust are on warm aspects. Myra soil is mined land and has been vegetated mostly to black locust, shortleaf pine, loblolly pine, American sycamore, or eastern white pine and tall fescue or sericea lespedeza. Understory plants on cool aspects are galax, wood nettle, wild yam, pea vine, black snakeroot, thimbleweed, white basswood, waterleaf, wood vetch, bedstraw, sugar maple, American elm, Virginia creeper, Solomons-seal, pawpaw, Christmas fern, wild geranium, and bloodroot. On warm aspects, they are lowbush blueberry, azalea, sassafras, Christmas fern, cinquefoil, pussytoes, early saxifrage, red maple, Virginia creeper, and sawbrier. The preferred trees for planting on cool aspects are yellow poplar, northern red oak, eastern white pine, white oak, and shortleaf pine. On warm aspects, they are shortleaf pine and white oak. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on these soils are the erosion hazard, equipment use limitation, seedling mortality, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Steepness of slope limits the type of equipment that can be used for harvesting. Cable yarding systems are safer, reduce damage to the soil, and help to maintain productivity. On warm aspects, seedling mortality generally is severe in summer because of high temperatures and inadequate moisture in the soil. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are not suited to urban uses because of steepness of slope.

The Marrowbone, Fedscreek, and Myra soils are in capability subclass VIIe.

Mo—Melvin silt loam, occasionally flooded. This soil is deep, nearly level, and poorly drained. It is on flood plains along major tributaries. Slopes are uniform and slightly concave, and they range from 0 to 2 percent. The areas are mostly long or oval and are about 5 to 15 acres.

Typically, this Melvin soil has a brown silt loam surface layer about 7 inches thick. The subsoil to a depth of about 22 inches is light brownish gray silt loam that has many strong brown mottles. The substratum to a depth of about 60 inches is light olive gray silt loam and silty clay loam that has many strong brown and yellowish brown mottles.

This soil is medium in natural fertility and low in organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is slow. This soil is easy to till but can be worked only within a limited range of moisture content. The soil is saturated late in winter and early in spring by a seasonal high water table that is within 12 inches of the surface. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause occasional flooding during winter and early in spring. Water may remain on the surface for 2 to 7 days.

Included with this soil in mapping are small areas of Grigsby and Stokly soils. Also included are small areas of soils that have more sand than is typical for Melvin soil. The included soils make up about 20 percent of this map unit, but most areas are less than 2 acres.

This Melvin soil is used mainly for pasture and hay, but many areas are idle and have reverted to native vegetation.

If artificially drained, this soil is well suited to most cultivated crops. It is poorly suited to winter crops because of a seasonal high water table and occasional flooding. Farming operations are often delayed in the spring because of excessive wetness and because the soil is slow to warm or to dry. Weed competition can become a serious problem. Tile drains and open ditches can improve internal drainage, and in some places, ditches can help to control surface runoff and overwash from adjacent soils. Artificial drainage can lengthen the effective growing season, shorten the delay of farming operations, and widen the range of suitable plants. Crop residue management, green manure cover crops, conservation tillage, application of lime and fertilizer according to crop needs, and crop rotation with grasses and legumes help to maintain tilth and the content of organic matter.

This soil is well suited to hay and pasture. Grasses and legumes should be selected that can tolerate wetness and withstand flooding for short periods. If drained, this soil is suited to a wide range of pasture plants. Grazing animals damage plants when the soil is saturated, and overgrazing results in a sparse cover of grasses and legumes and increases weed competition. The main management needs are proper seeding rates and mixtures, use of lime and fertilizer, weed control, and controlled grazing.

This soil is well suited to woodland. American sycamore, green ash, hackberry, hickory, sweetgum, red maple, pin oak, and black willow are native trees. Understory plants include sassafras, ironwood, hickory, green ash, poison ivy, wild grape, and American elm. Pin oak, American sycamore, and sweetgum are the preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are the equipment use limitation, seedling mortality, and plant competition. The seasonal high water table restricts the use of equipment to periods when the soil is dry. Only trees that can tolerate seasonal wetness should be planted. Seedling mortality can be severe in areas subject to flooding. Reforestation can be severely limited because of competition from undesirable understory plants.

This soil is poorly suited to urban uses because of wetness and flooding.

This Melvin soil is in capability subclass IIIw.

MyB—Myra very channery silt loam, 0 to 6 percent slopes. This soil is deep, nearly level to undulating, and well drained. It formed by the reshaping of soil material from surface coal mining (fig. 8). This soil is on ridgetops, benches, and in valleys. The areas are irregularly shaped and range from 5 to 60 acres.

Typically, this Myra soil has a dark grayish brown and gray very channery silt loam surface layer about 6 inches thick. The underlying material to a depth of about 79 inches is mixed gray, light olive brown, grayish brown, dark grayish brown, and olive gray very channery silt loam.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately slow, and the available water capacity is moderate. Surface runoff is slow. The root zone is deep, but root penetration is restricted because of rock fragments, stones, and compaction.

Included with this soil in mapping are small areas of Fedscreek, Marrowbone, and Dekalb soils; areas of soils that have a high concentration of acid in the surface layer or underlying layers; and soils similar to the Myra soil except they are medium acid. In places are soils that have slope of more than 6 percent, areas that are severely eroded and gullied, and some areas where topsoil has been added to the surface. The included soils make up about 25 percent of this map unit, but most areas generally are less than 5 acres.

Most areas of this Myra soil are reclaimed idle land. In some areas, this soil is used for pasture or building sites.

This Myra soil is poorly suited to cultivated crops. In most areas, it is suited to pasture and hay; however, grasses and legumes are difficult to establish. Rock fragments and large stones restrict the use of equipment, and differential settlement is a hazard in places. A fast-growing, protective, and permanent cover is needed. Before seeding the area, the spoil should be smoothed so that equipment can be used without interference in planting and harvesting. Good quality seed and adequate fertilizer and lime are needed.

This soil is well suited to woodland. Most areas of mined land have been revegetated to shortleaf pine, black locust, eastern white pine, loblolly pine, tall fescue, or sericea lespedeza. Eastern white pine, white oak, black locust, and shortleaf pine are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are the equipment use limitation, seedling mortality, and plant competition. Rock fragments and large stones restrict the use of equipment. In the steeper areas, erosion is a severe hazard and equipment use is limited. Soil compaction and large amounts of rock fragments can reduce seedling survival on mined sites. Seedling mortality can be severe in areas where tall fescue or sericea lespedeza is established.

If this soil is graded, reseeded, and planted to herbaceous or woody plants, it has potential as a source of food or cover for wildlife. Any planting that provides food and enough plant cover to control soil erosion is beneficial to wildlife. Applying fertilizer, reseeding, and replanting are needed in some areas to establish plants.

This soil is poorly suited to urban uses because of the stones, irregular settling, and moderately slow permeability.

This Myra soil is in capability subclass VIs.

MyD—Myra very channery silt loam, 6 to 30 percent slopes. This soil is deep, sloping to steep, and well drained. It formed by the reshaping of soil material from surface coal mining. This soil is on ridgetops and mountainsides. The areas are irregularly shaped and range from about 5 to 75 acres.

Typically, this Myra soil has a dark grayish brown and gray very channery silt loam surface layer about 6 inches thick. The underlying material to a depth of about 70 inches is mixed gray, light olive brown, grayish brown, dark grayish brown, and olive gray very channery silt loam.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately slow, and the available water capacity is moderate. Surface runoff is rapid. The root zone is deep, but root penetration is restricted because of rock fragments, stones, and compaction.

Included with this soil in mapping are small areas of Fedscreek, Marrowbone, and Dekalb soils; areas of soils that have a high concentration of acid in the surface layer or underlying layers; and soils similar to the Myra soil except they are medium acid. Severely

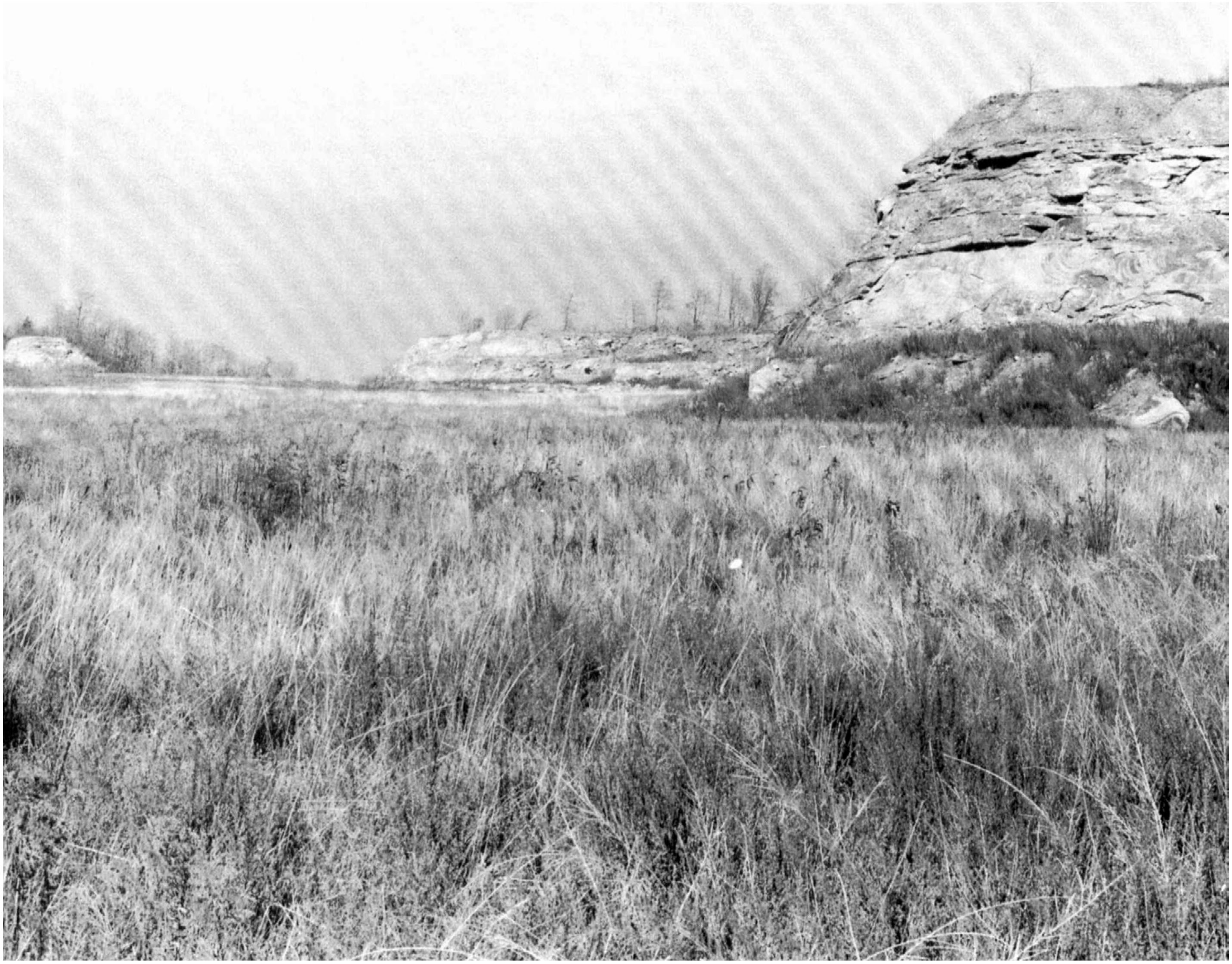

Figure 8.—This recently reclaimed strip-mined area is Myra very channery silt loam, 0 to 6 percent slopes. The vegetation is primarily sericea lespedeza.

eroded and gullied areas and some areas where topsoil has been added are also included. The included soils make up about 25 percent of this map unit, but most areas generally are less than 5 acres.

Most areas of this Myra soil are revegetated woodland. In some areas, this soil is used for pasture.

This Myra soil is not suited to cultivated crops because of a very severe hazard of erosion and steepness of slope. In most areas, it is moderately suited to pasture and hay; however, grasses and legumes are difficult to establish. Rock fragments and large stones restrict the use of equipment, and differential settlement is a hazard in places. A fast-growing, protective, and permanent plant cover is needed. Before seeding the area, the spoil should be smoothed so that equipment can be used without interference in planting and harvesting. Good quality seed and adequate fertilizer and lime are needed.

This soil is well suited to woodland. Most areas have been revegetated to shortleaf pine, black locust, eastern white pine, loblolly pine, tall fescue, or sericea lespedeza. Eastern white pine, white oak, black locust, and shortleaf pine are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are the erosion hazard, equipment use limitation, seedling mortality, and plant competition. In the steeper areas, erosion is a hazard and equipment use is limited. Soil compaction and large amounts of rock fragments can reduce seedling survival. Seedling mortality can be severe in areas where tall fescue or sericea lespedeza is established.

If this soil is graded, reseeded, and planted to herbaceous or woody plants, it has potential as a source of food or cover for wildlife. Any planting that provides food and enough plant cover to control soil erosion is beneficial to wildlife. Fertilizer, reseeding, and replanting are needed in some areas to establish plants.

This soil is poorly suited to urban uses because of steepness of slope, stones, irregular settling, and moderately slow permeability.

This Myra soil is in capability subclass VIs.

MyF—Myra very channery silt loam, 30 to 70 percent slopes, stony. This soil is deep, very steep and extremely steep, and well drained. It formed by the reshaping of soil material from surface coal mining (fig. 9). This soil is on ridgetops, benches, and in valleys. Stones cover widely scattered areas of the soil surface. The areas are irregularly shaped and range from about 5 to 60 acres.

Typically, this Myra soil has a dark grayish brown and gray very channery silt loam surface layer about 6 inches thick. The underlying material to a depth of 79 inches is mixed gray, light olive brown, grayish brown, dark grayish brown, and olive gray very channery silt loam.

This soil is low in natural fertility and organic matter content. Permeability is moderate or moderately slow, and the available water capacity is moderate. Surface runoff is rapid. The root zone is deep, but root penetration is restricted because of rock fragments, stones, and compaction.

Included with this soil in mapping are small areas of Fedscreek, Marrowbone, and Dekalb soils; areas of soils that have a high concentration of acid in the surface layer or underlying layers; and soils similar to the Myra soil except they are medium acid. In places are soils that have slope of more than 70 percent and areas that are severely eroded and gullied. The included soils make up about 25 percent of this map unit, but most areas generally are less than 5 acres.

Most areas of this soil are revegetated woodland or reclaimed idle land.

This Myra soil is not suited to cultivated crops, hay, or pasture because of steepness of slope. In most of the recently disturbed areas, the soil has been reshaped and seeded to grasses and legumes or planted to black locust or pines. In some of the older disturbed areas, the soil has become revegetated by natural processes.

This soil is poorly suited to most of the grasses and legumes grown in the county. Grasses and legumes are difficult to plant and maintain because the steepness of slope and rock fragments restrict the use of equipment. The steep outslopes, created by the removal of soil, parent material, and coal, commonly are unstable and are subject to slides. Differential settling is a hazard in places. A fast-growing, protective, and permanent plant cover is needed. In seeding the smoother areas, the spoil should be graded until it is smooth so that equipment can be used in planting and harvesting. Adequate amounts of seed, fertilizer, and lime should be applied.

This soil is suited to woodland. Most areas have been revegetated to shortleaf pine, black locust, eastern white pine, loblolly pine, tall fescue, or sericea lespedeza. Eastern white pine, white oak, black locust, and shortleaf pine are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are the erosion hazard, equipment use limitation, seedling mortality, and plant competition. Erosion is a severe hazard, and equipment use is severely limited. Soil compaction and large amounts of rock fragments can reduce seedling survival. Seedling mortality can be severe in areas where tall fescue or sericea lespedeza is established.

This soil is only a limited source of food or cover for wildlife because of steep slopes and rock fragments. Plantings for wildlife should consist of herbaceous plants, trees, and shrubs.

This soil is not suited to most urban uses because of steepness of slope, slow permeability, differential settlement potential, and slippage.

This Myra soil is in capability subclass VIIe.

NeD—Nelse loam, 4 to 25 percent slopes, frequently flooded. This soil is deep, gently sloping to steep, and well drained. It is on streambanks along the Levisa, Russell, and Tug Forks of the Big Sandy River.

Figure 9.—The upper Elkhorn coal seams northeast of Pikeville are being strip mined and reclaimed. The soil in this area is Myra very channery silt loam, 30 to 70 percent slopes, stony.

Slopes are short, concave to convex, and range from 4 to 25 percent. The areas are long and narrow and are about 10 to 265 acres.

Typically, this Nelse soil has a stratified very dark grayish brown loam and dark yellowish brown loamy fine sand surface layer about 12 inches thick. The underlying material to a depth of 80 inches is stratified dark brown, dark yellowish brown, and brownish yellow fine sandy loam and loamy fine sand.

This soil is medium in natural fertility and high in organic matter content. Permeability is moderately rapid or rapid, and the available water capacity is moderate. Surface runoff is slow or medium. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause frequent flooding, and water may remain on the surface for 2 to 7 days.

Included with this Nelse soil in mapping are small areas of Shelbiana and Combs soils. Soils that have short, steep slopes are along upper stream banks. The included soils make up about 10 percent of this map unit, but individual areas are less than 2 acres.

This Nelse soil is used mainly as woodland. In some less sloping, benched areas, it is used for corn, vegetable crops, and pasture.

This soil is poorly suited to row crops, hay, and pasture because of steepness of slope and flooding. If this soil is used as cropland, lime and fertilizer need to be added according to crop needs and conservation practices are needed to prevent streambank erosion.

This soil is well suited to woodland. Native trees include sweetgum, boxelder, silver maple, black willow, river birch, green ash, and American sycamore. Green ash, American sycamore, and sweetgum are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are the equipment use limitation, seedling mortality, and plant competition. Equipment use is restricted and seedling mortality is severe in areas that are subject to flooding. Plant competition reduces adequate or artificial reforestation without intensive site preparation and maintenance.

This soil is not suited to urban uses because of flooding and steep slopes.

This Nelse soil is in capability subclass VIe.

No—Nolin silt loam, occasionally flooded. This soil is deep, nearly level, and well drained. It is on flood plains along major streams. Slopes are uniform and range from 0 to 2 percent. The areas are long and narrow and are about 5 to 70 acres.

Typically, this Nolin soil has a brown silt loam surface layer about 8 inches thick. The subsoil to a depth of about 45 inches is dark yellowish brown silt loam. The substratum to a depth of about 65 inches is dark yellowish brown silt loam.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause occasional flooding during winter and early in spring. Water may remain on the surface for 2 to 7 days.

Included with this soil in mapping are small areas of Melvin, Grigsby, and Rowdy soils and a soil that is somewhat poorly drained and has more sand than is typical for Nolin soil. Also included are areas of soils that are frequently or rarely flooded. In places are a few areas of Nolin soils that have slopes of 2 to 4 percent. The included soils make up about 10 percent of this map unit, but most areas of these soils are less than 2 acres.

Cropland is the major use of this Nolin soil. In many areas, this soil is used as sites for houses and gardens.

This soil is well suited to cultivated crops and produces high yields if properly managed. Corn, hay, and pasture are the common crops. Continuous rowcropping is possible if management practices are used to maintain fertility, good tilth, and the supply of organic matter. Conservation tillage, return of crop residue, cover crops, and crop rotation with grasses and legumes help maintain desirable soil structure, good tilth, and the supply of organic matter.

This soil is poorly suited to winter crops because of the hazard of flooding in winter and early in spring (fig. 10). Surface runoff and overwash from adjacent soils in some areas can be reduced by constructing ditches near the foot of nearby hills to intercept the water. In some areas, improvement of the stream channel can reduce overflow. Drainageways should be kept open and permanently vegetated to ensure adequate surface drainage.

This soil is well suited to hay and pasture and produces high yields if properly managed. Improved varieties of grasses and legumes that can withstand flooding of short duration should be used to produce high quality hay and forage. Controlled or restricted grazing when the soil is wet helps to maintain pasture plants. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants and results in thin cover, which can increase weed competition and the need for early renovation. Lime and fertilizer should be applied according to crop needs, and a well planned harvesting and clipping schedule is important in producing high yields.

This Nolin soil is well suited to woodland. Yellow poplar, sweetgum, black walnut, American sycamore, river birch, and white ash are native trees. Yellow poplar, eastern white pine, black walnut, white oak, and sweetgum are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are seedling mortality and plant competition. Plant competition prevents adequate natural or artificial reforestation without intensive site preparation and maintenance.

This soil is poorly suited to most urban uses because of flooding. No other significant limitations affect its use for urban development.

This Nolin soil is in capability subclass IIw.

Rc—Rock outcrop. This map unit consists of very steep and extremely steep benched highwalls formed by the construction of highways. Slopes are essentially vertical but have small benches to catch loose bedrock material. The areas are 5 to 35 acres.

Typically, these excavated areas are 50 to 150 feet high and 100 to 1,500 feet wide. They expose

Figure 10.—Flooding is a problem on cropland and pastureland along Johns Creek in northwestern Pike County. Nolin silt loam, occasionally flooded, is along the base of the mountains, and Yeager loam-sand, frequently flooded, is adjacent to the stream.

underlying bedrock, dominantly sandstone, siltstone, shale, and coal. The many small benches are 5 to 15 feet wide. Most areas support native trees, such as American sycamore, and Virginia pine that has seeded naturally.

Included are small areas of Fedscreek, Kimper, Marrowbone, Gilpin, Dekalb, and Muskingum soils. The included soils make up less than 10 percent of this map unit, and most areas are less than 2 acres.

This map unit is in capability subclass VIIs.

Rd—Rowdy loam, occasionally flooded. This soil is deep, nearly level to gently sloping, and well drained. It is on stream terraces and alluvial fans. Slopes are uniform and range from 0 to 4 percent. The areas are short linear bands and fan-shaped delineations and are about 5 to 15 acres.

Typically, this Rowdy soil has a brown loam surface layer about 7 inches thick. The subsoil to a depth of about 76 inches is dark yellowish brown loam that has light yellowish brown mottles in the lower part. The substratum to a depth of about 86 inches is dark yellowish brown loam that has light yellowish brown mottles.

This soil is medium in natural fertility and low in organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is slow. This soil is easy to till and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause occasional flooding in winter and spring. Water may remain on the surface for 2 to 7 days.

Included with this soil in mapping are small areas of Nolin, Grigsby, and Hayter soils and a soil that is moderately well drained and has more clay than is typical for Rowdy soil. In places are soils that have slopes of more than 4 percent. The included soils make up about 10 percent of this map unit, but most areas are less than 2 acres.

This Rowdy soil is used mainly for pasture, hay, or sites for houses and gardens. In some small areas, it is used for cultivated crops.

This soil is well suited to cultivated crops, and high yields can be obtained if good management practices are used. This soil is poorly suited to winter crops because of flooding in winter and early in spring. Soil erosion is a moderate hazard in the more sloping areas. Conservation tillage, return of crop residue, cover crops, inclusion of grasses and legumes in the cropping sequence, and application of fertilizer and lime according to crop needs help to ensure continued high crop yields and to control surface runoff.

This soil is well suited to hay and pasture, and high yields can be obtained if it is properly managed. To ensure high forage productivity, pastures need to be renovated frequently enough to maintain the desired species. Other management needs include adding lime and fertilizer according to crop needs and using proper seeding rates and mixtures, rotation grazing, and a well planned harvesting and clipping schedule. Plants should be able to withstand flooding of short duration.

This soil is well suited to woodland. Yellow poplar, American sycamore, black walnut, river birch, white oak, American elm, sweetgum, and boxelder are native trees. Yellow poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, and northern red oak are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are seedling mortality and plant competition. Plant competition prevents adequate natural or artificial reforestation without intensive site preparation and maintenance.

This soil is poorly suited to most urban uses because of flooding.

This Rowdy soil is in capability subclass IIw.

Sh—Shelbiana loam, rarely flooded. This soil is deep, nearly level, and well drained. It is on stream terraces along the Levisa, Russell, and Tug Forks of the Big Sandy River. Slopes are uniform and range from 0 to 2 percent. The areas are long and narrow to broad and are about 5 to 90 acres.

Typically, this Shelbiana soil has a very dark grayish brown and dark brown loam surface layer about 16 inches thick. The subsoil to a depth of about 65 inches is dark yellowish brown loam that has grayish brown mottles in the lower part. The substratum to a depth of about 80 inches is dark yellowish brown loam that has grayish brown mottles.

This soil is high in natural fertility and moderate in organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is slow. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause rare flooding.

Included with this soil in mapping are small areas of Combs and Nolin soils and a soil that has more sand than is typical for Shelbiana soil. In places are a few areas of Shelbiana soils that have slopes of 2 to 4 percent. The included soils make up about 10 percent of this map unit, but most areas are less than 2 acres.

Cropland is the major use of Shelbiana soil, but in many areas this soil is used as sites for houses and gardens.

This soil is well suited to cultivated crops and produces very high yields if properly managed. Corn, hay, and pasture are the common crops. Continuous row cropping is possible if management practices are used to maintain fertility, good tilth, and the supply of organic matter. These practices include conservation tillage, return of crop residue, cover crops, and crop rotation with grasses and legumes.

This soil is well suited to hay and pasture, and very high yields are possible if it is properly managed (fig. 11). Improved varieties of grasses and legumes should be used to produce high quality hay and forage and provide good ground cover. Controlled or restricted grazing when the soil is wet can help maintain pasture plants. Grazing before the plants are well established, overgrazing, or grazing when the soil is wet damages plants and results in thin cover, which can increase weed competition and the need for early renovation.

Figure 11.—Shelbiana loam, rarely flooded, can produce high yields of all local crops, including fescue pasture.

Lime and fertilizer should be applied according to crop needs, and a well planned harvesting and clipping schedule is important in producing high yields.

Most areas of this Shelbiana soil are cleared, but this soil is well suited to woodland. Yellow poplar, sweetgum, black walnut, green ash, American sycamore, black cherry, and boxelder are native trees. Yellow poplar, black walnut, eastern white pine, northern red oak, white oak, sweetgum, and white ash are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concern in managing timber on this soil is plant competition, which prevents adequate natural or artificial reforestation without intensive site preparation and maintenance.

This soil is suited to some urban uses, but the hazard of flooding is a limitation for dwellings and small commercial buildings. No other significant limitations affect its use for urban development.

This Shelbiana soil is in capability class I.

SmE—Shelocta-Muse complex, 15 to 50 percent slopes, very stony. The soils of this complex are deep, moderately steep to very steep, and well drained. These soils are mostly on cool aspects of concave lower side slopes and benches at the base of Pine Mountain. The elevation ranges from about 1,400 to 2,040 feet. The Shelocta and Muse soils are too intermingled to be mapped separately at the selected scale. They occur in a repeating pattern on the landscape, but areas of each soil generally are less than 10 acres. Slopes are dissected by a dendritic drainage pattern, and stones and boulders cover about 2 percent of the soil surface. This complex is about 45 percent Shelocta soil and 35 percent Muse soil. The rest is included soils.

Typically, this Shelocta soil has a dark grayish brown channery silt loam surface layer about 5 inches thick. The subsoil to a depth of about 46 inches is yellowish brown and strong brown channery silty clay loam. The substratum to a depth of about 52 inches is yellowish brown very channery silty clay loam that has light yellowish brown mottles. It is underlain by interbedded shale and siltstone.

This soil is medium in natural fertility and moderate in organic matter content. Permeability is moderate, and the available water capacity is high. Surface runoff is medium. The root zone is deep and easily penetrated by plant roots.

Typically, this Muse soil has a brown silt loam surface layer about 6 inches thick. The subsoil extends to a depth of about 46 inches. The upper part to a depth of 11 inches is brown silty clay loam. The lower part is yellowish brown channery silty clay that has light brownish gray mottles. The substratum to a depth of about 53 inches is light brownish gray, strong brown, and yellowish brown very channery silty clay. It is underlain by interbedded sandstone and shale.

This soil is low in natural fertility and organic matter content. Permeability is slow, and the available water capacity is high. Surface runoff is rapid. The root zone is deep and easily penetrated by plant roots.

Included in mapping are small areas of Gilpin, Fedscreek, Kimper, and Sharondale soils. Also included are small areas of a soil that is redder than Muse soil and is medium acid to neutral. In many places large concentrations of stones and boulders have accumulated in drainageways. The included areas make up about 20 percent of this map unit, but individual soils, bouldery areas, or rock outcrop average less than 10 percent of the delineations.

The soils in this complex are used mainly as woodland.

These soils are not suited to cultivated crops, hay, or pasture because of steepness of slope and stoniness.

These soils are well suited to woodland. Shortleaf pine, yellow poplar, white oak, and black oak are native trees. Understory plants are mostly flowering dogwood, spicebush, poison ivy, wood nettle, red maple, hickory, greenbrier, Christmas fern, mayapple, and American beech. Yellow poplar, eastern white pine, shortleaf pine, and white oak are the preferred trees for planting. See table 7 for specific information relating to potential productivity.

The main concerns in managing timber on this soil are the erosion hazard, equipment use limitation, and plant competition. Steep skid trails, roads, and firebreaks are subject to rilling and gullying unless they are protected by adequate water bars, plant cover, or both. Steepness of slope limits the type of equipment that can be used for harvesting. Reforestation after harvesting must be managed carefully to reduce plant competition.

These soils are poorly suited to urban uses. Steepness of slope and a stony surface are limitations.

The Shelocta and Muse soils are in capability subclass VIIe.

UdB—Udorthents, loamy, 0 to 6 percent slopes. This soil is deep, nearly level and gently sloping, and well drained. It formed by the dumping and spreading of fill material from nearby mountains and from roadcuts. Small areas of this map unit are scattered throughout the survey area, but most of the acreage is along U.S. Highway 119 near South Williamson and along U.S. Highway 23 near Pikeville. Much of the material near Pikeville was transported from the cut-through and river relocation site. The areas range from about 2 to 180 acres.

This soil has been so altered or obscured that identification of the original soil features is not practical. The major soil characteristics are highly variable, and a typical condition does not exist. Most areas are deep to bedrock and have rock fragments that vary in size, shape, and amount.

In most areas, this soil is used as sites for residential developments and small commercial buildings. Onsite investigation is necessary to determine the limitations and suitability for a proposed use.

Maintaining existing plant cover, establishing plant cover in unprotected areas, and providing for proper surface water disposal help to control erosion and sedimentation.

This Udorthents, loamy, is in capability subclass VIs.

UdD—Udorthents, loamy, 6 to 30 percent slopes. This soil is deep, sloping to steep, and well drained. It formed by the dumping and spreading of fill material from nearby mountains and from roadcuts. Small areas of this soil are scattered throughout the survey area. The largest area is along Kentucky Highway 611 at the head of Trace Fork. The areas range from about 2 to 115 acres.

This soil has been so altered or obscured that identification of the original soil features is not practical. The major soil characteristics are highly variable, and a typical condition does not exist. Most areas are deep to bedrock and have rock fragments that vary in size, shape, and amount.

In most areas, this soil is used as sites for residential developments and small commercial buildings. Onsite investigation is necessary to determine the limitations and suitability for a proposed use.

Maintaining existing plant cover, establishing plant cover in unprotected areas, and providing for proper surface water disposal help to control erosion and sedimentation.

This Udorthents, loamy, is in capability subclass VIIe.

Ur—Udorthents-Urban land complex, 0 to 4 percent slopes. This complex is made up of deep, nearly level and gently sloping, and well drained soil material and urban land. Most of this complex is on stream terraces along the Levisa Fork in and around Pikeville and along the Tug Fork in and around South Williamson. The acreage around Pikeville was created mainly by valley fills from highway construction and by the Levisa Fork relocation project (fig. 12). The acreage in the South Williamson area was created by filling valleys with soil material from highway construction. This complex is about 55 percent Udorthents and 20 percent Urban land. The rest is included soils.

In Udorthents, the original soil has been so altered or mixed with underlying rock material that identification of soil features is not practical. The major soil characteristics are highly variable, and a typical condition does not exist. Most areas are deep to bedrock and have rock fragments that vary in size, shape, and amount. In many places, the soil material has been transported several hundred yards from the original site to the fill area.

Urban land is areas covered by streets, parking lots, buildings, and other structures or where the underlying soil has been altered so that identification of the soil is not feasible.

Included in mapping are small areas of Combs, Shelbiana, and Melvin soils. Also included are rarely flooded areas outside the protection of the Pikeville Floodwall. The included soils make up about 25 percent of this map unit, but most areas are less than 2 acres.

Most of this complex is used for commercial or residential development or is presently being developed. The soil in this complex is not suited to cropland or woodland because of the small percent of natural soil. The included soils are used for parks, lawns, gardens, and building sites. These soils are well suited to vegetable and flower gardens, trees, and shrubs.

Because of the contrasting and variable nature of the soil in this complex, onsite investigation is necessary to determine the limitations and suitability for a proposed use. Most areas are poorly suited to urban uses because of flooding. Maintaining the existing plant cover, establishing plant cover in unprotected areas, and proper surface water disposal help to control erosion and sedimentation.

Udorthents is in capability subclass is VIs, and Urban land is in capability subclass VIIIs.

Ye—Yeager loam-sand, frequently flooded. This soil is deep, nearly level, and well drained. It is on flood plains along major streams and tributaries. Slopes are uniform and range from 0 to 2 percent. The areas are mostly long and narrow delineations and are about 2 to 140 acres.

Typically, this Yeager soil has a stratified dark grayish brown and brown loam and yellowish brown sand surface layer about 9 inches thick. The underlying material to a depth of about 46 inches is dark yellowish brown fine sandy loam, brown loamy sand, and dark yellowish brown loamy fine sand. It has strata or bedding planes of yellowish brown or brownish yellow sand. To a depth of about 80 inches it is yellowish brown loam that has many light brownish gray and red mottles.

This soil is low in natural fertility and organic matter content. Permeability is moderately rapid or rapid, and the available water capacity is low or moderate. Surface runoff is slow. This soil is easily tilled and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots. Normal rainfall can cause frequent flooding (fig. 13), and water may remain on the surface for 2 to 7 days.

Included with this soil in mapping are small areas of Grigsby and Nolin soils and small areas of soils along streambanks that have slopes of more than 2 percent. About 2 to 10 inches of silt loam overwash is in areas along Brushy Creek, and large amounts of cobbles and stones and a few boulders are on islands along Russell Fork and Elkhorn Creek. The included soils make up about 10 percent of this map unit, but most areas of these soils are less than 2 acres.

Figure 12.—In areas of Udorthents-Urban land complex, 0 to 4 percent slopes, fill material is transported from the cut-through and river relocation site and deposited along the Levisa Fork riverbed.

Pasture and hay are the major uses of this Yeager soil, and in many areas, this soil is used for gardens.

This soil is poorly suited to cultivated crops. Productivity is low because of frequent flooding, the low available water capacity, and low natural fertility.

This soil is suited to hay and pasture, but hay crops can be damaged by flash flooding. In many areas, surface water runoff and overwash can be reduced by constructing ditches near the foot of nearby hills to intercept excess water. In other areas, improvement of the stream channel can reduce overflow. When establishing pasture, grasses or legumes should be selected that can withstand short duration flooding and droughty periods while providing good ground cover. Lime and fertilizer, proper seeding rates and mixtures, rotation grazing, maintenance of desired plants, and a well planned clipping and harvesting schedule can increase productivity.

Most wooded areas of this Yeager soil have been cleared, but this soil is well suited to woodland. Yellow poplar, sweetgum, hackberry, boxelder, and green ash are native trees. Understory plants are mostly silver maple, giant ragweed, false nettle, clearweed, and common elderberry. Yellow poplar, white oak, northern

Figure 13.—Sand is deposited from flooding on Yeager loam-sand, frequently flooded.

red oak, sweetgum, and eastern white pine are preferred trees for planting. See table 7 for specific information relating to potential productivity.

The concerns in managing timber on this soil are the equipment use limitation, seedling mortality, and plant competition. The sandy texture of the surface layer restricts the use of wheeled equipment especially when the soil is saturated or very dry. Reforestation is severely limited by the sandy texture and frequent flooding. Undesirable plants reduce adequate natural or artificial reforestation where intensive site preparation and maintenance are not done.

This soil is not suited to urban uses because of flooding.

This Yeager soil is in capability subclass IIIw.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Pike County 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 are used for producing food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

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.

The following map units, or soils, make up prime farmland in Pike County. 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 4. 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 or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. 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.

Co	Combs fine sandy loam, rarely flooded
Gy	Grigsby-Yeager complex, occasionally flooded
Mo	Melvin silt loam, occasionally flooded (where drained)
No	Nolin silt loam, occasionally flooded
Rd	Rowdy loam, occasionally flooded
Sh	Shelbiana loam, rarely flooded

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 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 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 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

William H. Amos, Jr., agronomist, 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.

In 1982, about 1,289 acres was used as cropland and pasture in Pike County *(47)*. Of this, about 631 acres was used for pasture or grazing. The remaining 658 acres was used for corn, hay, and small grains. All grain produced was used by local farmers for livestock.

Soil erosion is a primary concern in management of soils used for cultivated crops and forages in Pike County. Controlling erosion maintains yield potential, reduces sedimentation of lakes and streams, and improves water quality. Soils that have slopes of more than 2 percent are susceptible to excessive erosion. Because erosion is so damaging, a resource management plan should be developed that keeps the loss of soil at acceptable levels. Some practices that help prevent excessive soil erosion are contour farming, conservation tillage, stripcropping, growing grasses and legumes in rotation, managing crop residue, cover crops, grassed waterways, diversions, and terraces. A good cropping sequence provides sufficient organic residue to the soil for maintenance of soil organic matter.

Soil drainage is a management concern on about 3 percent of the soils used as cropland. Unless the somewhat poorly drained soils, such as the Melvin soils, are artificially drained, wetness will damage crops in most years. Tile drainage and open ditches are the main systems used to reduce wetness. Drainage by either tile or open ditches requires suitable outlets.

Soil fertility is inherently medium to low in most soils in Pike County. The Nolin and Combs soils are high in natural fertility, Shelbiana and Hayter soils are medium, and Yeager soils are low. Most of the soils in the area require application of fertilizer and lime for adequate crop yields. Addition of lime and fertilizer should be based on the results of soil tests, the need of the crop, and on the expected level of yields. The Cooperative Extension Service can help determine the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in seed germination and infiltration of water into the soil. Soils having good tilth are friable, granular and porous, and permit adequate movement of air and water. Penetration of roots and emergence of shoots occur more easily in soils that have these characteristics. Most soils used for crops in Pike County have a granular and porous loam surface layer; however, in areas that have been continually row cropped, the soil structure has been damaged and the organic matter depleted. When soil structure is broken down, the ability to provide proper amounts of air and water to plants has been hindered. In these areas, tillage for seedbed preparation should be kept to a minimum because it tends to break down soil structure. Adding organic matter helps to maintain soil structure.

Many soils in Pike County have a light colored surface layer that are naturally low in organic matter content. Organic matter must be maintained to achieve optimum production. This can be accomplished by controlling erosion, adding farm manure, managing crop residue, growing cover crops and high residue producing crops, and adding grasses and legumes to the cropping sequences.

Corn is the principal row crop grown in the county. Other crops, such as soybeans, are suitable for the soils and climate but generally are not grown. Wheat generally is used as a cover crop. Specialty crops, such as vegetables, orchards, and nursery stock, are minor crops in the county. The latest information and recommendations for growing specialty crops can be obtained from local offices of the Kentucky Cooperative Extension Service and the Soil Conservation Service.

Good pasture management is needed to provide quality forage for livestock and adequate ground cover to prevent erosion. Some of the more commonly used grasses and legumes are Kentucky bluegrass, tall fescue, orchardgrass, timothy, red clover, alfalfa, ladino clover, and annual lespedeza. Some severely eroded soils need plant mixtures that are hardy and drought tolerant to provide forage for grazing and maintain a good ground cover.

Yields Per Acre

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

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

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

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for 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 *(37)* 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 6. 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.

Before Pike County was settled in 1821, the area was entirely forested. The forest acreage has been reduced only about 11 percent, but the condition and composition of forest stands have been greatly altered by logging, fire, land clearing and abandonment, tree disease, and surface mining.

The original forest was mixed mesophytic, characterized mainly by at least 20 dominant species, including yellow poplar, American chestnut, red oak, white oak, American beech, and yellow buckeye, on moist, well drained, deep soils that had thick layers of humus. Because of land clearing, mining, and soil erosion, forests today are more xeric. The dominant timber type is the oak-hickory, which makes up about 60 percent of the woodland acreage. The maple-beech-birch type makes up about 25 percent; elm-ash-red maple type, 5 percent; oak-pine type, 3 percent; and pine and oak-gum types make up the rest.

The first cutting of timber was primarily to clear land for farming. Bottom land was cleared rapidly, but the trees could neither be used nor sold so they were burned in "log rollings." Small amounts of timber, mainly yellow poplar, black walnut, and white oak, were used in buildings, fences, and furniture. These species were also the principal ones sold as markets became available around 1880, which resulted in a gradual deterioration of the quality of the county's forest. At the turn of the century, poorer quality and smaller-size trees, as well as less desirable species, were harvested. The cutting of oak trees for railroad cross ties began. Small circular sawmills were put into operation to clean up the best of what remained in the culled-over areas.

After the best timber was cut, sawmills began to shut down and the people who had come in with the company-owned mills moved to new locations. Those people who remained in the area turned back to the land for a living. Much of the bottom land was occupied, and residents were forced to clear steep slopes for corn crops. The natural fertility and topsoil of the mountains were depleted rapidly. Farmers who had previously spent each fall and winter in logging now cleared a piece of new ground each year. The general depression of the 1930's accelerated land clearing. People who lived in industrial areas returned to the hills to live through the hard times.

The gradual clearing of hillsides in Pike County continued until about 1950. Then there was a decade or more of land abandonment. People moved to town or to other states searching for work and a better life. The cleared hillsides were left to revert once again to woody growth.

Nature's healing process was accelerated by a strong tree planting program implemented by State and Federal agencies during the late 50's and early 60's. Since 1951, Pike County's forest acreage has increased 20,000 acres largely because of tree planting efforts and natural succession and in spite of the large increase in surface mining of coal.

Pike County has about 441,700 acres of commercial forest land covering 88 percent of the county. Another 6,400 acres is classified as noncommercial and productive reserved forest land. The average landholding is about 84 acres, and forest growth is only 33 cubic feet per acre, which is well below the potential of most sites. The most important reason for the low growth is that most woodlands are not well stocked, not only because of past cutting practices where the best trees were taken and the worst were left, but also because of fire.

Fire causes persistent forest-management difficulties in Pike County. Because of repeated burning, many areas are stocked with trees of poor quality. When a fire passes over this steep terrain, nearly every tree will be killed. Large trees that are not killed generally are sufficiently scarred to provide an entryway for decay. A recent U.S. Forest Service survey in Kentucky showed an average loss of 83 dollars per acre per fire resulting from the mortality or loss in tree quality and value. Records by the Kentucky Division of Forestry show that an average of 6,588 acres are burned annually in the county.

Commercial sawmills in the county have declined over the years to only four in 1985. These sawmills purchase most tree species and produce such products as rough lumber, dimension stock, railroad crossties, timbers, and mine props. Markets are not available for the large volume of low quality hardwood that is available in the county.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth. Elevation and aspect are of particular importance in mountainous areas.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. In the section "Detailed Soil Map Units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. The common forest understory plants are also listed. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Common trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations expose the soil (fig. 14). The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of *moderate* or *severe* indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning of harvesting and reforestation operations, or use of specialized equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. On the steepest slopes, even tracked equipment cannot operate; more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil

Figure 14.—Soil erosion along skid trails is a concern in managing timber on Kimper-Sharondale-Muskingum complex, 30 to 80 percent slopes, very stony.

compaction. The rating is *severe* if slopes are steep enough that tracked equipment cannot be operated safely across the slope, if soil wetness restricts equipment use for more than 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. Mortality generally is greatest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing surface drainage, or providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is *moderate* or *severe*.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. *Plant competition* becomes more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants reduces adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants reduces natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A *moderate* or *severe* rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers must plan site preparation measures to ensure reforestation without delays.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The soils that are commonly used to produce timber have the yield predicted in cubic feet. The yield is predicted at the point where mean annual increment culminates.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands *(5, 7, 8, 9, 10, 11, 13, 15, 21, 22, 26, 27, 32, 34, 35, 38, 39, 42)*.

The *productivity* column shows an expected volume produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

In table 8, 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 8, 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 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have 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 Pike County consists of an estimated 40 species of mammals, 60 species of reptiles and amphibians, and 94 species of breeding birds. Probably many of the more than 200 kinds of birds that visit the state each year are in this county during certain seasons.

The kinds of wildlife most important to man at present are those that furnish recreation in the form of sport hunting or that furnish economic gain in the form of commercial trapping. This wildlife includes the gray squirrel, raccoon, mink, muskrat, cottontail rabbit, and ruffed grouse.

About 43 species of fish belonging to 10 families are in the county. Gilt darter, bluntnose minnow, hogsucker, and longear sunfish are plentiful.

The dominant vegetation of Pike County is mixed mesophytic forest and includes American beech, yellow poplar, white basswood, sugar maple, yellow buckeye, northern red oak, white oak, and eastern hemlock.

The understory trees are flowering dogwood, sourwood, striped maple, eastern redbud, eastern hophornbeam, American holly, and downy serviceberry. Beneath the trees, the shrub layer is mainly spicebush, pawpaw, witchhazel, wild hydrangea, and alternateleaf dogwood. Some of the species in the herbaceous community on the forest floor are trillium, yellow troutlily, violet, yellow lady slipper, bloodroot, spring beauty, and Dutchmans breeches.

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 *(4)*.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife *(48)*. 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, Kentucky bluegrass, orchardgrass, white clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, aster, tickclover, and cinquefoil.

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 Virginia pine, white pine, and redcedar.

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, cattail, rushes, sedges, and reeds.

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

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

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

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

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, 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, *and 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 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and 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. Depth to 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, depth to 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, depth to a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and 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 11 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 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to 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 11 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, depth to 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 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, depth to a 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 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help 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 12, 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 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, or stones, 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 or stones, 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 releases a variety of plant-available nutrients as it decomposes.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and 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 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. 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. These results are reported in table 20.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas *(40)*. 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 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "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 *(3)* and the system adopted by the American Association of State Highway and Transportation Officials *(2)*.

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. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 20.

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 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, 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 influence the soil's adsorption of cations, moisture retention, 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 earth-moving 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 ⅓ 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 movement of water through the soil 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 *(33)*.

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 15, 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 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are 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. Yeager soil is an example.

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. Some examples are the Fedscreek, Kimper, Sharondale, Shelbiana, and Combs soils.

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. Some examples are the Marrowbone, Dekalb, Gilpin, and Muskingum soils.

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. Melvin soil is an example.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *Common* is used when classification as occasional or frequent does not affect interpretations. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

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 is 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 16 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 highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

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.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is 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 several typical pedons in the survey area are given in table 17 and the results of chemical analysis in table 18. The mineralogy of selected soils is given 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 National Soil Survey Laboratory and 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 *(45)*.

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) KAES; (6A1o) NSSL.

Extractable cations—ammonium acetate pH 7.0,

uncorrected; calcium (6N2), magnesium (602), sodium (6P2), potassium (6Q2).
Extractable acidity—barium chloride-triethanolamine I (6H1a) KAES.
Extractable acidity—barium chloride-triethanolamine IV (6H5a) NSSL.
Cation-exchange capacity—ammonium acetate, pH 7.0 (5A1z) KAES.
Cation-exchange capacity—sum of cations (5A3a).
Cation-exchange capacity—ammonium acetate, pH 7.0 (5A8b) NSSL.
Base saturation—ammonium acetate, pH 7.0 (5C1).
Base saturation—sum of cations, TEA, pH 8.2 (5C3).
Reaction (pH)—1:1 water dilution (8C1a) KAES, (8C1f) NSSL.
Reaction (pH)—potassium chloride (8C1c) KAES.
Reaction (pH)—calcium chloride (8C1f) NSSL.
Carbonate as calcium carbonate—manometric (6E1g) NSSL.
Mineralogy-optical analysis—grain counts of 0.05 to 0.1 and 0.1 to 0.25 fraction (7B1a) NSSL.

Engineering Index Test Data

Table 20 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by Soil Conservation Service, Soil Mechanics Laboratory, Fort Worth, Texas.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM); and Specific gravity.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(41)*. 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 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

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

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

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series. The Melvin series is an example of fine-silty, mixed, nonacid, mesic Typic Fluvaquents.

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 (36)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (41)*. 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."

Berks Series

The Berks series consists of moderately deep, well drained soils that formed in loamy residuum from siltstone and fine grained sandstone. Permeability is moderate or moderately rapid. These soils are on mountainsides, ridge crests, and nose slopes and are intermingled with rock outcrop. Slopes range from 50 to 120 percent. Berks soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Berks soils are in similar landscape positions as Caneyville and Marrowbone soils. Caneyville soils are in a fine family and have fewer rock fragments. Marrowbone soils have less silt and are in a coarse-loamy family.

Typical pedon of Berks channery silt loam (90 percent slope, east aspect) in an area of Berks-Rock outcrop-Marrowbone complex, 60 to 120 percent slopes; about 0.5 mile south of Marrowbone on U.S. Highway 460 and 500 feet north of foot bridge; Kentucky Coordinate Grid 2,970,300/389,700; Hellier quadrangle.

O—1 to 0 inches; loose, partly decomposed leaf litter.

A—0 to 3 inches; dark brown (10YR 3/3) channery silt loam; moderate medium granular structure; friable; common fine to coarse roots; 20 percent siltstone fragments 0.1 inch to 6 inches long; very strongly acid; abrupt smooth boundary.

BA—3 to 7 inches; dark yellowish brown (10YR 4/4) very channery silt loam; moderate medium subangular blocky structure; friable; few fine to coarse roots; 40 percent siltstone and fine grained sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bw1—7 to 17 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; friable; few medium roots; 45 percent siltstone and fine grained sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bw2—17 to 27 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium subangular blocky structure; friable; 50 percent siltstone and fine grained sandstone fragments 0.1 inch to 6 inches long; very strongly acid; abrupt smooth boundary.

R—27 inches; interbedded fine grained sandstone and siltstone.

The solum is 18 to 40 inches thick, and depth to bedrock is 20 to 40 inches. Rock fragments of siltstone or sandstone make up 10 to 50 percent of the A horizon and 15 to 75 percent of the B horizon. Some pedons have a C horizon that has 35 to 90 percent rock fragments. The weighted average of rock fragments is 35 percent or more in the particle-size control section. Some pedons have very few to common silt coatings or very few clay films on faces of peds or rock surfaces below a depth of 20 inches. Reaction ranges from extremely acid to slightly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. Texture is channery silt loam.

The B horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. It is channery, very channery, flaggy, or very flaggy silt loam or loam.

Some pedons have a C horizon that has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is channery, very channery, flaggy, or very flaggy silt loam or loam.

Bedrock is commonly fractured fine grained sandstone or siltstone.

Caneyville Series

The Caneyville series consists of moderately deep, well drained soils that formed in limestone residuum. Permeability is moderately slow. These soils are on mountainsides and narrow benches on the north aspect of Pine Mountain. They are intermingled with rock outcrop. Slopes range from 50 to 120 percent. Caneyville soils are fine, mixed, mesic Typic Hapludalfs.

Caneyville soils are in similar landscape positions as Berks soils, which are in a loamy-skeletal family.

Typical pedon of Caneyville silt loam (105 percent slope, northwest aspect), in an area of Berks-Caneyville complex, 50 to 120 percent slopes, very rocky; about 0.9 mile south of Ashcamp at the head of Mill Branch; Kentucky Coordinate Grid 296,700/351,600; Hellier quadrangle.

O—1 to 0 inches; loose, partly decomposed leaf litter.

A—0 to 5 inches; dark brown (10YR 3/3) silt loam; moderate medium granular structure; friable; common fine and medium roots; 2 percent limestone fragments 0.1 inch to 4 inches long; neutral; abrupt smooth boundary.

Bt1—5 to 15 inches; strong brown (7.5YR 5/6) silty clay; moderate medium angular blocky structure; firm; few medium roots; 2 percent limestone fragments 0.1 inch to 4 inches long; neutral; abrupt smooth boundary.

Bt2—15 to 22 inches; reddish brown (5YR 4/4) silty clay; moderate medium angular blocky structure;

firm; 2 percent limestone fragments 0.1 inch to 4 inches long; neutral; abrupt smooth boundary.

R—22 inches; hard gray limestone.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. Rock fragments of fine grained sandstone or limestone range up to 10 percent throughout the soil. The Bt horizon has few to common clay films in pores, on faces of peds, and on rock surfaces. Reaction ranges from very strongly acid to neutral in the A horizon and the upper part of the Bt horizon and from medium acid to mildly alkaline in the lower part of the Bt horizon and in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. Texture is silt loam.

The upper part of the Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 4 to 6. The lower part of the Bt horizon has hue of 5YR. Texture of the Bt horizon is silty clay loam, silty clay, or clay. Some pedons have mottles in shades of red, brown, and yellow throughout this horizon and have mottles in shades of gray in the lower part of the horizon.

Some pedons have a C or BC horizon that has colors and textures similar to those of the Bt horizon.

Bedrock is hard, gray, fine to coarse grained limestone.

Combs Series

The Combs series consists of deep, well drained soils that formed in loamy alluvium. Permeability is moderate or moderately rapid. These soils are on low stream terraces of the Russell and Levisa Forks and are subject to rare flooding. Slopes range from 0 to 2 percent. Combs soils are coarse-loamy, mixed, mesic Fluventic Hapludolls.

The Combs soils in this survey area are taxadjuncts to the Combs series because they have lower base saturation than allowed for the series. This difference, however, does not affect use and management of the soils.

Combs soils are in similar landscape positions as Nelse, Shelbiana, and Melvin soils. Nelse soils have strata of coarser material and are on steeper slopes. Melvin and Shelbiana soils are in fine-silty families, and Melvin soils are poorly drained.

Typical pedon of Combs fine sandy loam, rarely flooded; about 7.4 miles northwest of Pikeville, in an idle field at the north end of Broad Bottom; Kentucky Coordinate Grid 2,916,300/454,700; Broad Bottom quadrangle.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam; moderate medium granular structure; friable; few fine and medium roots; very few sandstone fragments; slightly acid; clear smooth boundary.

A—8 to 18 inches; very dark grayish brown (10YR 3/2) fine sandy loam; moderate medium granular structure; friable; few fine and medium roots; very few sandstone fragments; slightly acid; clear smooth boundary.

Bw1—18 to 43 inches; dark yellowish brown (10YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; very few sandstone fragments; medium acid; clear smooth boundary.

Bw2—43 to 64 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; very few sandstone fragments; medium acid; clear smooth boundary.

C—64 to 80 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; very few sandstone fragments; medium acid.

The solum is more than 40 inches thick, and depth to bedrock is more than 6 feet. The mollic epipedon is 10 to 24 inches thick. Rock fragments range up to 5 percent. Reaction ranges from medium acid to neutral.

The Ap and A horizons have hue of 10YR, value of 3, and chroma of 2 or 3. Texture is fine sandy loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Texture is silt loam, loam, fine sandy loam, or sandy loam. Some pedons have a BC horizon that has color and texture ranges similar to those of the Bw horizon.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Texture is silt loam, loam, fine sandy loam, or sandy loam. Some pedons are stratified, and some have mottles in shades of brown or gray.

Dekalb Series

The Dekalb series consists of moderately deep, well drained soils that formed in loamy sandstone residuum. Permeability is moderately rapid or rapid. These soils are on mountainsides, ridge crests, or nose slopes. They are intermingled with rock outcrop. Slopes range from 30 to 80 percent. Dekalb soils are loamy-skeletal, mixed, mesic Typic Dystrochrepts.

Dekalb soils are in similar landscape positions as Muskingum and Marrowbone soils. Muskingum soils are in a fine-loamy family, and Marrowbone soils are in a coarse-loamy family.

Typical pedon of Dekalb channery fine sandy loam (70 percent slope, east aspect), in an area of Marrowbone-Dekalb-Muskingum complex, 30 to 80 percent slopes, very rocky; about 6.2 miles east of Kimper on a ridgetop at the head of Blackberry Fork of Johns Creek; Kentucky Coordinate Grid 3,019,250/444,800; Matewan quadrangle.

O—1 to 0 inches; partly decomposed hardwood leaf litter.
A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery fine sandy loam; fine granular structure; very friable; common fine and medium roots; 25 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.
BA—3 to 7 inches; brown (10YR 4/3) channery fine sandy loam; weak medium subangular blocky structure parting to moderate medium granular; very friable; common fine and medium roots; 25 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.
Bw—7 to 21 inches; yellowish brown (10YR 5/6) very channery fine sandy loam; weak medium subangular blocky structure; very friable; common fine to coarse roots; 45 percent sandstone fragments 0.1 inch to 15 inches long; very strongly acid; clear smooth boundary.
C—21 to 28 inches; yellowish brown (10YR 5/6) extremely flaggy fine sandy loam; single grained; loose; 75 percent sandstone fragments 0.1 inch to 15 inches long; very strongly acid; abrupt wavy boundary.
R—28 inches; brown fractured fine grained sandstone.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. Sandstone fragments from 0.1 inch to 10 inches in length range from 10 to 60 percent in the A and B horizons, and fragments from 0.1 inch to 15 inches in length range from 50 to 90 percent in the C horizon. Rock fragments commonly increase with depth and have a weighted average of 35 percent or more from a depth of 10 inches to bedrock. Some pedons have very few or few silt coatings or clay films on faces of peds, in pores, or on rock surfaces. Reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or 3. Texture is channery fine sandy loam.

The BA horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Texture is channery fine sandy loam or sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. Texture is channery, very channery, flaggy, or very flaggy loam or fine sandy loam.

The C horizon has colors and textures similar to those of the B horizon. Texture is fine sandy loam or sandy loam or their channery, very channery, flaggy, very flaggy, or extremely flaggy analogs.

Bedrock is brown, gray, or olive fine to coarse grained sandstone.

Fedscreek Series

The Fedscreek series consists of deep, well drained soils that formed in loamy colluvium from siltstone, sandstone, and shale. Permeability is moderately rapid in the solum and moderate or moderately rapid in the substratum. These soils are on mountainsides, in shallow coves, and on benches. Slopes range from 20 to 80 percent. Fedscreek soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Fedscreek soils are in similar landscape positions as Kimper, Sharondale, Marrowbone, Gilpin, Dekalb, and Myra soils. Kimper soils are in a fine-loamy family and have a dark surface layer. Sharondale soils are in a loamy-skeletal family and have a mollic epipedon. Marrowbone, Gilpin, and Dekalb soils are moderately deep. In addition, Gilpin soils are in a fine-loamy family, and Dekalb soils are in a loamy-skeletal family. Myra soils formed from regolith of surface coal mining and are in a loamy-skeletal family.

Typical pedon of Fedscreek channery loam (67 percent slope, southwest aspect), in an area of Fedscreek-Marrowbone-Dekalb complex, 30 to 80 percent slopes, very stony; about 7.2 miles south of Zebulon and about 1,735 yards east of the intersection of Raccoon Creek and Morris Branch; Kentucky Coordinate Grid 2,974,700/434,000; Millard quadrangle.

O—1 to 0 inches; partly decomposed hardwood leaf litter.
A—0 to 4 inches; brown (10YR 4/3) channery loam; moderate medium granular structure; very friable; common medium roots; 15 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; abrupt smooth boundary.
BA—4 to 8 inches; yellowish brown (10YR 5/4) channery silt loam; moderate medium subangular blocky structure; friable; few fine and medium roots; 15 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.
Bw1—8 to 16 inches; yellowish brown (10YR 5/6) channery loam; moderate medium subangular

blocky structure; friable; few fine to coarse roots; 15 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; gradual smooth boundary.

Bw2—16 to 30 inches; yellowish brown (10YR 5/6) channery loam; moderate medium angular blocky structure; friable; few fine to coarse roots; 20 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bw3—30 to 40 inches; strong brown (7.5YR 5/6) channery loam; moderate medium angular blocky structure; firm; few fine to coarse roots; 25 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bw4—40 to 48 inches; strong brown (7.5YR 5/6) channery loam; moderate medium angular blocky structure; firm; few fine and medium roots; few thin discontinuous strong brown (7.5YR 4/6) coatings on faces of peds; 25 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

C1—48 to 60 inches; brown (7.5YR 5/4) very channery loam; massive; firm; few medium roots; very few thin discontinuous strong brown (7.5YR 4/6) coatings on fracture surfaces and on rock fragments; 35 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

C2—60 to 65 inches; dark yellowish brown (10YR 4/6) channery silt loam; few medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; firm; 30 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; abrupt smooth boundary.

R—65 inches; interbedded sandstone and siltstone.

The thickness of the solum and depth to bedrock range from 40 to 72 inches. Rock fragments from 0.1 inch to 15 inches in length range from 5 to 59 percent in individual horizons. Reaction ranges from very strongly acid to medium acid.

The A horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 to 5, and chroma of 2 to 4. Texture is channery loam.

The B horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture is sandy loam, loam, or silt loam or their channery analogs. Some pedons have mottles in shades of brown, yellow, or red throughout this horizon and have mottles in shades of gray in the lower part of the horizon. Very few to common thin clay or silt coatings are in some pedons below a depth of 30 inches.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture is sandy loam, loam, silt loam, clay loam, or silty clay loam or their channery or very channery analogs. Some pedons are mottled in shades of brown, yellow, red, or gray. Very few to common thin clay or silt coatings are in some pedons.

Bedrock is unweathered sandstone, siltstone, or less commonly, shale.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils that formed in residuum of interbedded shale, siltstone, and sandstone. Permeability is moderate. These soils are on ridgetops, mountainsides, and nose slopes. Slopes range from 6 to 50 percent. Gilpin soils are fine-loamy, mixed, mesic Typic Hapludults.

Gilpin soils are in similar landscape positions as Marrowbone and Fedscreek soils. Marrowbone and Fedscreek soils are in a coarse-loamy family. Fedscreek soils are deep to bedrock.

Typical pedon of Gilpin silt loam (7 percent slope, southwest aspect), in an area of Gilpin-Marrowbone complex, 6 to 20 percent slopes; about 1 mile east of Shelbiana on a nose slope, about 665 yards northwest of the intersection of Kentucky Highway 1460 and U.S. Highway 460, adjacent to a cemetery; Kentucky Coordinate Grid 2,948,500/418,200; Millard quadrangle.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, moderate medium granular structure; friable; common fine roots; 5 percent siltstone fragments 0.1 inch to 2 inches long; very strongly acid; abrupt smooth boundary.

Bt1—7 to 18 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few medium roots; few faint yellowish brown (10YR 5/4) clay films on vertical faces of peds; 5 percent siltstone and shale fragments 0.1 inch to 2 inches long; very strongly acid; clear smooth boundary.

Bt2—18 to 25 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium angular blocky structure; firm; common faint yellowish brown (10YR 5/6) clay films on vertical faces of peds; 5 percent siltstone and shale fragments 0.1 inch to 2 inches long; very strongly acid; clear smooth boundary.

C—25 to 31 inches; strong brown (7.5YR 5/6) channery silty clay loam; few medium distinct light brownish gray (10YR 6/2) mottles; massive; firm; 30 percent siltstone and shale fragments 0.1 inch to 3 inches long; very strongly acid.

R—31 inches; interbedded siltstone and shale.

The solum is 18 to 36 inches thick, and depth to bedrock ranges from 20 to 40 inches. Thin flat rock fragments of shale, siltstone, or sandstone range from 5 to 40 percent in the Ap and Bt horizon and from 30 to 90 percent in the C horizon, but the weighted average of rock fragments in the particle-size control section is less than 35 percent. Reaction ranges from extremely acid to strongly acid.

The Ap horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5, and chroma of 4 to 8. Texture is loam, silt loam, or silty clay loam or their channery or very channery analogs.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 to 8. Texture is loam, silt loam, or silty clay loam or their channery or very channery analogs.

Bedrock generally is interbedded shale and siltstone, and it can include some sandstone.

Grigsby Series

The Grigsby series consists of deep, well drained soils that formed in loamy alluvium. Permeability is moderate or moderately rapid. These soils are on flood plains of major streams throughout the survey area and are subject to occasional flooding. Slopes range from 0 to 2 percent. Grigsby soils are coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts.

Grigsby soils are in similar landscape positions as Nolin, Yeager, Rowdy, and Melvin soils. Nolin soils are in a fine-silty family, and Yeager soils are in a sandy family. Rowdy soils are in a fine-loamy family and are more acid in the subsoil than the Grigsby soils. Melvin soils are in a fine-silty family and are poorly drained.

Typical pedon of Grigsby sandy loam, in an area of Grigsby-Yeager complex, occasionally flooded; about 1.5 miles north of McCombs and 175 feet south of Johns Creek, in a pasture; Kentucky Coordinate Grid 2,913,300/500,500; Thomas quadrangle.

Ap—0 to 6 inches; brown (10YR 4/3) sandy loam; moderate medium granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Bw1—6 to 18 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium subangular blocky structure; very friable; few fine roots; few thin continuous brown (10YR 4/3) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bw2—18 to 47 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; medium acid; clear smooth boundary.

C—47 to 70 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; very friable; medium acid.

The solum is 30 to 50 inches thick, and depth to bedrock is more than 60 inches. Rock fragments, mostly pebbles, range up to 15 percent in the solum and up to 60 percent in the C horizon. Reaction ranges from medium acid to neutral in the solum and from strongly acid to neutral in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Texture is sandy loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Some pedons have mottles in shades of brown or gray below a depth of 24 inches. Texture is silt loam, loam, fine sandy loam, or sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8. Texture is stratified loam, fine sandy loam, sandy loam, or loamy fine sand or their gravelly analogs.

Hayter Series

The Hayter series consists of deep, well drained soils that formed in colluvium or local alluvium from sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are on colluvial fans or toe slopes at the base of mountains. Slopes range from 4 to 30 percent. Hayter soils are fine-loamy, mixed, mesic Ultic Hapludalfs.

Hayter soils are in similar landscape positions as Potomac, Stokly, Fedscreek, Kimper, and Rowdy soils. Potomac and Stokly soils are alluvial soils. Potomac soils are in a sandy-skeletal family. Stokly soils are in a coarse-loamy family and are somewhat poorly drained. Fedscreek and Kimper soils are colluvial soils and are on steeper slopes than the Hayter soils. Fedscreek soils are in a coarse-loamy family. Kimper soils are in a fine-loamy family and do not have an argillic horizon. Rowdy soils are on low stream terraces and do not have an argillic horizon.

Typical pedon of Hayter loam, in an area of Hayter-Potomac-Stokly complex, 2 to 15 percent slopes; about 0.5 mile southwest of Gulnare and 1,335 yards southwest of the intersection of McCombs Branch and

Johns Creek; Kentucky Coordinate Grid 2,920,520/481,790; Broad Bottom quadrangle.

Ap—0 to 7 inches; brown (10YR 4/3) loam; weak fine and medium granular structure; friable; many fine roots; 10 percent siltstone and sandstone fragments 0.1 inch to 3 inches long; medium acid; clear smooth boundary.

BA—7 to 12 inches; brown (7.5YR 4/4) gravelly loam; moderate medium subangular blocky structure; friable; few fine roots; 15 percent sandstone and siltstone fragments 0.1 inch to 3 inches long; medium acid; clear smooth boundary.

Bt1—12 to 28 inches; brown (7.5YR 4/4) gravelly loam; moderate medium subangular blocky structure; friable; few discontinuous strong brown (7.5YR 4/6) clay films on faces of peds; 20 percent sandstone and siltstone fragments 0.1 inch to 3 inches long; medium acid; clear smooth boundary.

Bt2—28 to 42 inches; dark yellowish brown (10YR 4/4) gravelly loam; moderate medium subangular blocky structure; friable; few discontinuous strong brown (7.5YR 4/6) clay films on faces of peds; 20 percent sandstone and siltstone fragments 0.1 inch to 3 inches long; medium acid; clear smooth boundary.

BC—42 to 55 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium and coarse subangular blocky structure; friable; 20 percent sandstone and siltstone fragments 0.1 inch to 3 inches long; medium acid; clear smooth boundary.

C—55 to 65 inches; dark yellowish brown (10YR 4/4) cobbly clay loam; massive; firm; 25 percent sandstone and siltstone fragments 0.1 inch to 10 inches long; medium acid.

The solum is 40 to 60 inches thick, and depth to bedrock ranges from 4 to more than 7 feet. Rock fragments, mostly gravel, channers, or cobblestones, range from 2 to 30 percent in individual horizons. Reaction ranges from strongly acid to slightly acid except where lime has been added to the soil.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Texture is loam.

The Bt and BC horizons have hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 to 8. Some pedons have mottles in shades of brown, yellow, or red. Texture is loam or clay loam or their gravelly, channery, or cobbly analogs.

The C horizon has colors and textures similar to those of the BC horizon but can have a greater percentage of rock fragments.

Kimper Series

The Kimper series consists of deep, well drained soils that formed in loamy colluvium from sandstone, siltstone, and shale. Permeability is moderate or moderately rapid. These soils are on mountainsides, in coves, and on benches. Slopes range from 30 to 80 percent. Kimper soils are fine-loamy, mixed, mesic Umbric Dystrochrepts.

Kimper soils are in similar landscape positions as Fedscreek, Sharondale, Muskingum, Marrowbone, and Myra soils. Fedscreek soils are in a coarse-loamy family and have an ochric epipedon. Sharondale soils are dominantly in coves. They are in a loamy-skeletal family and have a mollic epipedon. Muskingum and Marrowbone soils are moderately deep. Marrowbone soils are in a coarse-loamy family. Muskingum soils have an ochric epipedon. Myra soils formed in regolith from surface coal mining and are in a loamy-skeletal family.

Typical pedon of Kimper channery loam (55 percent slope, north aspect), in an area of Kimper-Sharondale-Muskingum complex, 30 to 80 percent slopes, very stony; about 5.1 miles east of Fedscreek and 1,000 yards east of the intersection of Henroost Fork and Dicks Fork; Kentucky Coordinate Grid 3,036,900/414,000; Jamboree quadrangle.

O—2 to 0 inches; partly decomposed leaf litter.

A—0 to 8 inches; very dark brown (10YR 2/2) very channery loam; moderate fine and medium granular structure; very friable; common fine and medium roots; 40 percent sandstone fragments 0.1 inch to 6 inches long; slightly acid; clear smooth boundary.

BA—8 to 13 inches; brown (10YR 4/3) channery loam; weak medium subangular blocky structure; friable; common fine, medium, and coarse roots; 30 percent sandstone fragments 0.1 inch to 6 inches long; strongly acid; clear smooth boundary.

Bw1—13 to 27 inches; yellowish brown (10YR 5/4) channery loam; moderate medium subangular blocky structure; friable; few fine roots; 25 percent sandstone fragments 0.1 inch to 6 inches long; strongly acid; clear smooth boundary.

Bw2—27 to 41 inches; dark yellowish brown (10YR 4/4) channery loam; moderate medium subangular blocky structure; friable; 25 percent sandstone fragments 0.1 inch to 6 inches long; medium acid; clear smooth boundary.

Bw3—41 to 52 inches; dark yellowish brown (10YR 4/4) very channery loam; weak medium subangular blocky structure; friable; few thin discontinuous coatings on faces of peds and on rock surfaces; 40 percent sandstone fragments 0.1 inch to 6 inches long; 2 percent coal fragments 0.1 inch to 0.5 inches long; medium acid; clear smooth boundary.

C1—52 to 64 inches; brown (10YR 4/3) very channery fine sandy loam; massive; firm; few thin discontinuous coatings on fracture and rock surfaces; 40 percent sandstone fragments 0.1 inch to 6 inches long; 2 percent coal fragments 0.1 to 0.5 inch long; medium acid; clear smooth boundary.

C2—64 to 75 inches; brown (10YR 4/3) channery loam; massive; firm; few thin discontinuous silt coatings on fracture surfaces, in pores, and on rock surfaces; 30 percent sandstone fragments 0.1 inch to 6 inches long; 2 percent coal fragments 0.1 to 0.5 inch long; medium acid; clear smooth boundary.

R—75 inches; olive sandstone.

The solum is 40 to 60 inches thick, and depth to bedrock ranges from 60 to 100 inches or more. Rock fragments from 0.1 inch to 15 inches in length range from 5 to 60 percent in individual horizons; however, the 10- to 40-inch particle-size control section averages less than 35 percent rock fragments. Reaction ranges from strongly acid to neutral in the A horizon and from very strongly acid to medium acid in the B and C horizons.

The A horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 2 or 3, and chroma of 1 to 4. Texture is very channery loam.

The BA horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4, and chroma of 3 or 4. Texture is channery or very channery loam or silt loam.

The Bw horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 to 6. Texture is channery or very channery silt loam, loam, silty clay loam, or clay loam. Some pedons have mottles in shades of brown, yellow, or red throughout this horizon and have mottles in shades of gray in the lower part. Thin clay or silt coatings are absent in some pedons below a depth of 30 inches.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 8. Texture is silt loam, silty clay loam, loam, clay loam, or sandy loam or their channery or very channery analogs. Some pedons are mottled in shades of brown, yellow, red, or gray.

Bedrock is unweathered sandstone, siltstone, or shale.

Marrowbone Series

The Marrowbone series consists of moderately deep, well drained soils that formed in loamy residuum or colluvium from sandstone, siltstone, and shale. Permeability is moderate or moderately rapid. These soils are on mountainsides, nose slopes, and ridge crests. Slopes range from 6 to 120 percent. Marrowbone soils are coarse-loamy, mixed, mesic Typic Dystrochrepts.

Marrowbone soils are in similar landscape positions as Fedscreek, Kimper, Sharondale, Gilpin, Berks, Dekalb, and Myra soils. Fedscreek, Kimper, and Sharondale soils are deep. Gilpin soils are in a fine-loamy family and have an argillic horizon. Berks and Dekalb soils are in a loamy-skeletal family. Myra soils formed in regolith from surface coal mining and are in a loamy-skeletal family.

Typical pedon of Marrowbone fine sandy loam (44 percent slope, south aspect), in an area of Fedscreek-Marrowbone-Dekalb complex, 30 to 80 percent slopes, very stony; about 7.3 miles south of Zebulon and about 1,000 yards east of the intersection of Morris Branch and Raccoon Creek; Kentucky Coordinate Grid 2,976,200/433,750; Millard quadrangle (fig. 15).

O—0 to 1 inches; loose, partly decomposed hardwood leaf litter.

A—0 to 5 inches; brown (10YR 4/3) fine sandy loam; moderate medium granular structure; very friable; common fine to coarse roots; 10 percent, by volume, sandstone fragments 0.1 inch to 6 inches long; medium acid; clear smooth boundary.

Bw1—5 to 10 inches; brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; fine and medium roots; few thin discontinuous dark brown (10YR 4/3) organic coatings on faces of peds; 5 percent, by volume, sandstone fragments 0.1 inch to 6 inches long; strongly acid; clear smooth boundary.

Bw2—10 to 17 inches; strong brown (7.5YR 5/6) fine sandy loam; moderate medium subangular blocky structure; friable; few fine and medium roots; 10 percent sandstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bw3—17 to 23 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine and medium roots; very thin discontinuous silt coatings on faces of peds; 10 percent sandstone fragments 0.1 inch to 6 inches

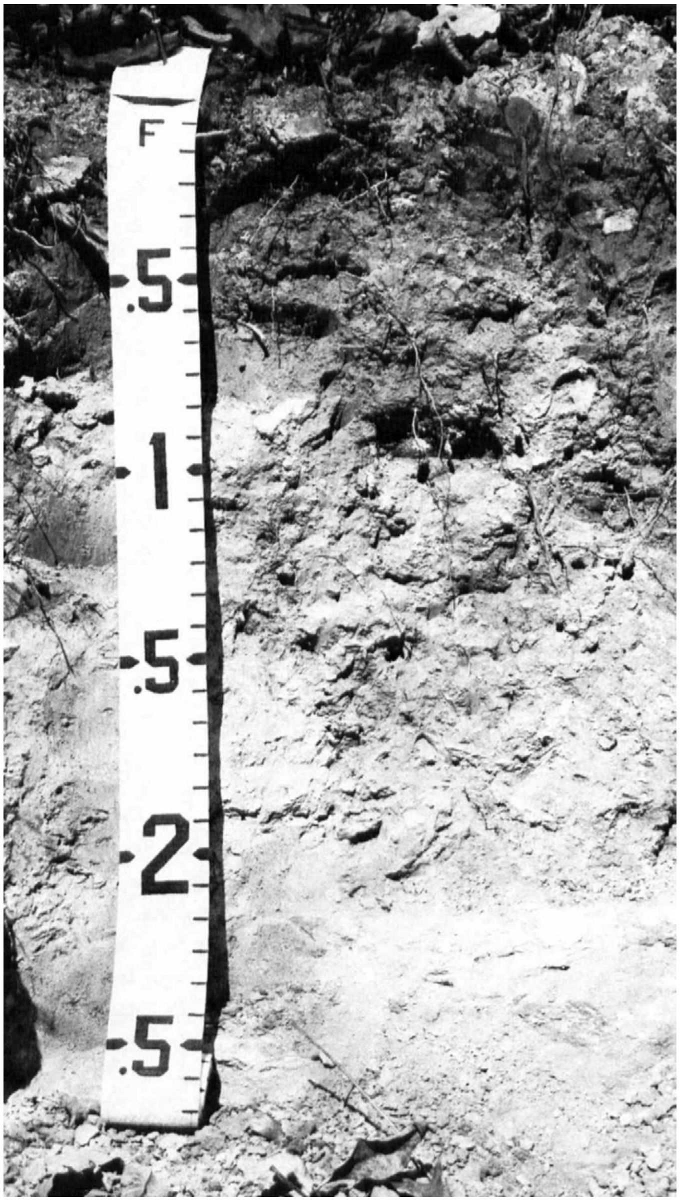

Figure 15.—Marrowbone soils are moderately deep, well drained, and loamy. (Scale is in feet.)

long; very strongly acid; clear smooth boundary.

BC—23 to 28 inches; yellowish brown (10YR 5/6) channery loam; common medium distinct strong brown (7.5YR 5/6) and light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; 20 percent sandstone fragments 0.1 inch to 6 inches long; strongly acid; abrupt wavy boundary.

R—28 inches; olive sandstone.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. Rock fragments from 0.1 inch to 15 inches in length range from 5 to 45 percent in individual horizons; however, they average less than 35 percent in the particle-size control section. Reaction ranges from very strongly acid to slightly acid in the A horizon and from very strongly acid to medium acid in the Bw and BC horizons.

The A horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 3 to 5, and chroma of 2 to 4. Texture is fine sandy loam.

The Bw and BC horizons have hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture is fine sandy loam, sandy loam, loam, or silt loam or their gravelly or channery analogs. Some pedons have mottles in shades of brown, yellow, or red. Mottles in shades of gray are in the lower part of these horizons. Very few to common thin silt coatings or very few clay films are in some pedons.

Some pedons have a C horizon that has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture is sandy loam, loam, silt loam, silty clay loam, or clay loam or their gravelly or channery analogs. Some pedons are mottled in shades of brown, yellow, red, or gray. Very few to common silt coatings and very few or few clay films are in some pedons.

Bedrock is unweathered sandstone or siltstone.

Melvin Series

The Melvin series consists of deep, poorly drained soils that formed in silty alluvium. Permeability is moderate. These soils are in slight depressions on flood plains of major streams and are subject to occasional flooding. A seasonal high water table is within a depth of 12 inches. Slopes range from 0 to 2 percent. Melvin soils are fine-silty, mixed, nonacid, mesic Typic Fluvaquents.

Melvin soils are in similar landscape positions as Nolin, Nelse, Rowdy, Grigsby, Yeager, Combs, and Shelbiana soils, all of which are well drained.

Typical pedon of Melvin silt loam, occasionally flooded; about 0.5 mile south of Gulnare, in an idle field 1.2 miles north of the intersection of Kentucky Highway 1026 and Kentucky Highway 194; Kentucky Coordinate Grid 2,930,050/482,000; Broad Bottom quadrangle.

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

Bg—7 to 22 inches; light brownish gray (2.5Y 6/2) silt loam; many medium distinct strong brown (7.5YR

5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; medium acid; clear smooth boundary.

Cg1—22 to 31 inches; light olive gray (5Y 6/2) silt loam; many medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; few manganese and iron concretions; medium acid; gradual smooth boundary.

Cg2—31 to 60 inches; light olive gray (5Y 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; few soft manganese and iron concretions; medium acid.

The solum is 20 to 40 inches thick. Depth to bedrock ranges from 60 inches to more than 200 inches. Rock fragments, mostly rounded pebbles, range up to 5 percent to a depth of 30 inches and up to 20 percent below that depth. Reaction ranges from medium acid to mildly alkaline.

The Ap horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7, and chroma of 1 to 3. Texture is silt loam.

The Bg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 7, and chroma of 1 or 2; or it is neutral and has value of 4 to 7. Mottles are in shades of brown and red. Texture is silt loam or silty clay loam.

The Cg horizon has the same range in colors as that of the Bg horizon. Texture is silt loam or silty clay loam. Some pedons have stratified layers of loam, clay, sand, or sand and gravel at a depth of more than 30 inches.

Muse Series

The Muse series consists of deep, well drained soils that formed in residuum or colluvium from acid shale and siltstone. Permeability is slow. These soils are on concave lower side slopes and benches at the base of Pine Mountain. Slopes range from 15 to 50 percent. Muse soils are clayey, mixed, mesic Typic Hapludults.

The Muse soils in this survey area are taxadjuncts to the series because the lower part of the subsoil has a more yellow hue than allowed in the series range. This difference does not alter use and management of the soils.

Muse soils are in similar landscape positions as Shelocta soils, but Shelocta soils contain less clay.

Typical pedon of Muse silt loam (40 percent slopes, northwest aspect), in an area of Shelocta-Muse complex, 1 to 50 percent slopes, very stony; about 7 miles west of Elkhorn City and 1,500 yards southeast of the intersection of Baker Hollow and Elkhorn Creek; Kentucky Coordinate Grid 2,939,450/339,200; Jenkins East quadrangle.

O—1 to 0 inches; loose, partly decomposed hardwood leaf litter.

A—0 to 6 inches; brown (10YR 4/3) silt loam; brown weak medium granular structure; friable; common fine and medium roots; 10 percent siltstone fragments 0.1 inch to 6 inches long; strongly acid; abrupt smooth boundary.

BE—6 to 11 inches; brown (10YR 5/3) silty clay loam; moderate medium subangular blocky structure; firm; common fine and medium roots; 10 percent siltstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bt1—11 to 22 inches; yellowish brown (10YR 5/6) channery silty clay; moderate medium angular blocky structure; very firm; few medium roots; few thin discontinuous strong brown (7.5YR 5/6) clay films on faces of peds; 15 percent siltstone and shale fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bt2—22 to 35 inches; yellowish brown (10YR 5/6) channery silty clay; strong medium angular blocky structure; very firm; few thin continuous distinct strong brown (7.5YR 5/6) clay films on faces of peds; 20 percent siltstone and shale fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bt3—35 to 46 inches; yellowish brown (10YR 5/6) channery silty clay; few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure; very firm; few thin continuous distinct strong brown (7.5YR 5/6) clay films on faces of peds; 20 percent siltstone and shale fragments 0.1 inch to 6 inches long; very strongly acid; gradual smooth boundary.

C—46 to 53 inches; variegated light brownish gray (10YR 6/2), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/6) very channery silty clay; massive; very firm; 40 percent shale and siltstone fragments 0.1 inch to 6 inches long; very strongly acid; abrupt smooth boundary.

Cr—53 inches; interbedded olive gray shale and olive sandstone.

The solum is 40 to 60 inches thick, and depth to interbedded shale and sandstone is 40 to 80 inches. Rock fragments of shale and siltstone range up to 35 percent in the solum and up to 60 percent in the C horizon. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 1 to 4. Texture is silt loam.

The BE horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. Texture is silty clay loam or silty clay or their channery analogs.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. Texture is silty clay loam, silty clay, or clay, or their channery analogs. Some pedons have mottles in shades of brown, yellow, or red throughout this horizon and have mottles in shades of gray in the lower part of the horizon.

The C horizon has matrix or mottle colors in shades of red, brown, yellow, or gray. Texture is silty clay or clay or their channery or very channery analogs.

The Cr horizon is soft or hard shale or siltstone that is interbedded with thin layers of sandstone in most pedons.

Muskingum Series

The Muskingum series consists of moderately deep, well drained soils that formed in residuum of siltstone, sandstone, and shale. Permeability is moderate. These soils are on upper side slopes, nose slopes, and ridge crests. Slopes range from 30 to 80 percent. Muskingum soils are fine-loamy, mixed, mesic Typic Dystrochrepts.

Muskingum soils are in similar landscape positions as Dekalb, Marrowbone, Kimper, and Sharondale soils. Dekalb soils are in a loamy-skeletal family, and Marrowbone soils are in a coarse-loamy family. Kimper and Sharondale soils are deep to bedrock.

Typical pedon of Muskingum channery silt loam, in an area of Marrowbone-Dekalb-Muskingum complex, 30 to 80 percent slopes, very rocky; about 7.2 miles east of McVeigh, on Dicks Knob at the head of Johns Creek, 125 yards west of Dicks Knob road; Kentucky Coordinate Grid 3,020,550/411,900; Jamboree quadrangle.

O—1 to 0 inches; loose, partly decomposed hardwood leaf litter.

A—0 to 4 inches; dark grayish brown (10YR 4/2) channery silt loam; moderate medium granular structure; very friable; common fine and medium roots; 20 percent siltstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bw1—4 to 12 inches; yellowish brown (10YR 5/6) channery silt loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 15 percent siltstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

Bw2—12 to 24 inches; yellowish brown (10YR 5/6) channery silt loam; moderate medium subangular blocky structure; friable; common fine to coarse roots; 25 percent siltstone fragments 0.1 inch to 6 inches long; very strongly acid; clear smooth boundary.

C—24 to 30 inches; yellowish brown (10YR 5/4) very channery loam; massive; friable; few medium and fine roots; 35 percent siltstone fragments 0.1 inch to 6 inches long; very strongly acid; abrupt smooth boundary.

R—30 inches; olive sandstone.

The solum is 16 to 36 inches thick, and depth to bedrock is 20 to 40 inches. Rock fragments of siltstone, sandstone, or shale range from 10 to 30 percent in the solum and make up 35 percent or more of the C horizon. Reaction is strongly acid or very strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 6. Texture is channery silt loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Texture is silt loam or channery silt loam.

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

Bedrock is unweathered sandstone, siltstone, or shale.

Myra Series

The Myra series consists of deep, well drained soils on benches and outslopes formed by the reshaping of neutral to calcareous regolith from surface coal mining. Permeability is moderate or moderately slow. These soils are on ridgetops and mountainsides throughout the level-bedded rock strata of Pike County. Slopes range from 0 to 70 percent. Myra soils are loamy-skeletal, mixed, calcareous, mesic Typic Udorthents.

Myra soils are adjacent to Marrowbone, Fedscreek, and Kimper soils. Marrowbone soils are moderately deep and are in a coarse-loamy family. Fedscreek soils are in a coarse-loamy family, and Kimper soils are in a fine-loamy family.

Typical pedon of Myra very channery silt loam, 0 to 6 percent slopes; about 6.5 miles northwest of Pikeville and about 665 yards southwest of the intersection of Right Fork and Big Shoal Creek; Kentucky Coordinate Grid 2,922,200/443,500; Broad Bottom quadrangle.

Ap—0 to 6 inches; 60 percent dark grayish brown (2.5Y 4/2) and 40 percent gray (N 6/0) very channery silt loam; weak fine angular blocky structure; friable; many fine roots; 60 percent siltstone, shale, and sandstone fragments and few coal fragments; mildly alkaline; very slightly effervescent; clear wavy boundary.

C1—6 to 19 inches; 95 percent gray (N 5/0), 5 percent light olive brown (2.5Y 5/6) very channery silt loam; massive; firm; few fine roots; 40 percent siltstone, shale, and sandstone fragments and few coal fragments; moderately alkaline; very slightly effervescent; gradual wavy boundary.

C2—19 to 40 inches; 70 percent gray (N 5/0), 20 percent grayish brown (2.5Y 5/2), and 10 percent light olive brown (2.5Y 5/6) very channery silt loam; massive; firm; few fine roots; 45 percent siltstone, shale, and sandstone fragments and few coal fragments; moderately alkaline; very slightly effervescent; gradual smooth boundary.

C3—40 to 50 inches; 80 percent dark gray (5Y 4/1) and 20 percent dark grayish brown (2.5Y 4/2) extremely channery silt loam; massive; friable; 65 percent siltstone, shale, and sandstone fragments and few coal fragments; moderately alkaline; very slightly effervescent; clear smooth boundary.

C4—50 to 78 inches; olive gray (5Y 4/2) very channery silt loam; massive; friable; 50 percent siltstone, shale, and sandstone fragments and few coal fragments; moderately alkaline; very slightly effervescent.

Depth to bedrock is more than 60 inches. Rock fragments consist of siltstone, shale, sandstone, and coal. Fragments generally range from 0.1 inch to 10 inches in diameter, but stones and boulders can be in the profile. Content of fragments in the control section ranges from 35 to 70 percent and averages about 40 percent. Reaction is slightly acid to moderately alkaline in the Ap horizon and is mildly alkaline or moderately alkaline in the C horizon. These soils are calcareous.

The Ap horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 1 to 8; or it is neutral and has value of 4 to 6. Texture is very channery silt loam.

The C horizon has hue of 5YR to 5Y, value of 2 to 8, and chroma of 1 to 8; or it is neutral and has value of 2 to 8. Texture is silt loam, loam, silty clay loam, clay loam, or sandy clay loam or their gravelly, very gravelly, channery, or very channery analogs.

Nelse Series

The Nelse series consists of deep, well drained soils that formed in loamy alluvium. Permeability is moderately rapid or rapid. These soils are on banks of major streams and rivers and are subject to frequent flooding. Slopes range from 4 to 25 percent. Nelse soils are coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents.

Nelse soils are in similar landscape positions as Combs, Melvin, and Shelbiana soils. Combs and Shelbiana soils do not have strata of coarser textured material in the upper 40 inches of the profile, and Shelbiana soils are in a fine-silty family. Melvin soils are in a fine-silty family and are poorly drained.

Typical pedon of Nelse loam, 4 to 25 percent slopes, frequently flooded; about 5.5 miles northwest of Pikeville on the riverbank of the Levisa Fork; Kentucky Coordinate Grid 2,915,100/454,050; Broad Bottom quadrangle.

A—0 to 12 inches; very dark grayish brown (10YR 3/2) loam; dark yellowish brown (10YR 4/4) loamy fine sand strata 0.2 to 1 inch thick; weak fine granular structure; very friable; few fine roots; 2 percent coal fragments; slightly acid; clear smooth boundary.

C1—12 to 30 inches; dark brown (10YR 3/3) fine sandy loam; massive; very friable; 2 percent coal fragments; common brown (10YR 4/3) sand strata less than 0.2 inch thick; medium acid; clear smooth boundary.

C2—30 to 63 inches; dark yellowish brown (10YR 4/4) loamy fine sand; massive; very friable; slightly acid; clear smooth boundary.

C3—63 to 80 inches; brownish yellow (10YR 6/6) loamy fine sand; single grained; loose; medium acid; clear smooth boundary.

Depth to bedrock is 60 to 80 inches or more. Rounded or subrounded rock fragments from 0.1 inch to 10 inches in diameter range up to 15 percent. Coal fragments from 0.1 inch to 3 inches in diameter range up to 15 percent. Reaction ranges from strongly acid to neutral.

The A horizon has hue of 2.5Y or 10YR, value of 2 to 5, and chroma of 2 to 4. Texture is loam that generally is stratified with very fine to medium sand.

The C horizon has hue of 2.5Y or 10YR, value of 3 to 6, and chroma of 2 to 6. Texture is silt loam, loam, fine sandy loam, sandy loam, loamy fine sand, or loamy sand that generally is stratified with very fine to medium sand.

Nolin Series

The Nolin series consists of deep, well drained soils that formed in silty alluvium. Permeability is moderate.

These soils are on flood plains or low terraces and are occasionally flooded in winter and spring. Slopes range from 0 to 2 percent. Nolin soils are fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts.

Nolin soils are in similar landscape positions as Rowdy, Grigsby, Yeager, and Melvin soils. Rowdy soils are in a fine-loamy family, Grigsby soils are in a coarse-loamy family, and Yeager soils are in a sandy family. Melvin soils are in a fine-silty family and are poorly drained.

Typical pedon of Nolin silt loam, occasionally flooded; about 3.3 miles northwest of Gulnare, 750 feet east of the intersection of Bevins Branch and Johns Creek, in a cornfield; Kentucky Coordinate Grid 2,912,350/500,900; Thomas quadrangle.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; few fine roots; neutral; clear smooth boundary.

Bw1—8 to 15 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; common thin continuous brown (10YR 4/3) silt coatings on faces of peds and in pores; slightly acid; clear smooth boundary.

Bw2—15 to 45 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular structure; friable; common thin continuous brown (10YR 4/3) silt coatings on faces of peds and in pores; medium acid; clear smooth boundary.

C—45 to 65 inches; dark yellowish brown (10YR 4/4) silt loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; massive; friable; medium acid.

The solum is 40 inches or more thick. Depth to bedrock is more than 60 inches. Rock fragments range up to 5 percent in the solum and up to 35 percent in the C horizon. Reaction ranges from medium acid to moderately alkaline, but in some pedons, it is strongly acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Texture is silt loam. Some pedons have a BA horizon 4 to 10 inches thick that has the same color range as that of the Ap horizon.

The Bw horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 3 or 4. Some pedons have mottles in shades of brown throughout this horizon and have mottles in shades of gray below a depth of 30 inches. Texture is silt loam or silty clay loam.

The C horizon has a color range similar to that of the Bw horizon except the chroma ranges from 2 to 4. Texture of the C horizon is silty clay loam, silt loam, loam, fine sandy loam, or sandy loam, or it is stratified with these textures and their gravelly analogs.

Potomac Series

The Potomac series consists of deep, somewhat excessively drained soils that formed in sandy alluvium. Permeability is moderate or moderately rapid in the surface layer and rapid or very rapid in the underlying layers. These soils are on flood plains and are occasionally flooded. Slopes are 2 to 3 percent. Potomac soils are sandy-skeletal, mixed, mesic Typic Udifluvents.

Potomac soils are in similar landscape positions as Hayter and Stokly soils. Hayter soils are on colluvial side slopes and are in a fine-loamy family. Stokly soils are in a coarse-loamy family and are somewhat poorly drained.

Typical pedon of Potomac loam, in an area of Hayter-Potomac-Stokly complex, 2 to 15 percent slopes; about 2.5 miles north of Kimper and about 300 feet southeast of the intersection of Meathouse Fork and Johns Creek; Kentucky Coordinate Grid 2,980,600/453,700; Belfrey quadrangle.

Ap—0 to 7 inches; brown (10YR 4/3) loam; moderate medium granular structure; friable; common fine roots; 5 percent sandstone gravel; slightly acid; clear smooth boundary.

AC—7 to 11 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium granular structure; very friable; common fine roots; 15 percent sandstone gravel; slightly acid; clear smooth boundary.

2C1—11 to 18 inches; dark yellowish brown (10YR 4/4) very cobbly loamy sand; single grained; loose; few fine roots; 55 percent sandstone cobblestones and gravel; medium acid; clear wavy boundary.

2C2—18 to 60 inches; yellowish brown (10YR 5/6) extremely cobbly loamy sand; single grained; loose; 80 percent sandstone cobblestones and gravel; slightly acid.

Depth to bedrock is more than 5 feet. Gravel and cobblestones dominantly of sandstone range up to 50 percent in the Ap and AC horizons and from 35 to 70 percent in the 2C horizon. Subhorizons of the 2C horizon range to 80 percent coarse fragments in some pedons. Reaction ranges from strongly acid to mildly alkaline.

The Ap and AC horizons have hue of 10YR or 7.5YR and value and chroma of 2 to 4. Texture is loam or gravelly sandy loam.

The 2C horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. Texture is loamy sand or sand or their cobbly, very cobbly, extremely cobbly, very gravelly, or extremely gravelly analogs. Subhorizons of sandy loam or gravelly or cobbly sandy loam are in some pedons.

Rowdy Series

The Rowdy series consists of deep, well drained soils that formed in loamy alluvium. Permeability is moderate. These soils are on low stream terraces and alluvial fans and are occasionally flooded in winter and spring. Slopes range from 0 to 4 percent. Rowdy soils are fine-loamy, mixed, mesic Fluventic Dystrochrepts.

Rowdy soils are in similar landscape positions as Grigsby, Yeager, Nolin, Hayter, and Melvin soils. Grigsby soils are in a coarse-loamy family, Yeager soils are in a sandy family, and Nolin soils are in a fine-silty family. Hayter soils are on steeper slopes than Rowdy soils, have more rock fragments, and have an argillic horizon. Melvin soils are poorly drained and are in a fine-silty family.

Typical pedon of Rowdy loam; about 3 miles south of Gulnare, in a pasture on the Pikeville College Farm; Kentucky Coordinate Grid 2,930,600/479,600; Broad Bottom quadrangle.

Ap—0 to 7 inches; brown (10YR 4/3) loam; moderate medium granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

Bw1—7 to 50 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; few fine roots; common continuous brown (10YR 4/3) silt coatings in pores and on faces of peds; medium acid; clear smooth boundary.

BC—50 to 76 inches; dark yellowish brown (10YR 4/4) loam; few fine faint light yellowish brown mottles; weak coarse subangular blocky structure; friable; few sandstone gravel fragments; medium acid; clear smooth boundary.

C—76 to 86 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; friable; few sandstone gravel fragments; strongly acid.

The solum is 40 to 60 inches or more thick. Depth to bedrock is more than 60 inches. Rock fragments from 0.1 inch to about 4 inches range up to 30 percent in the solum, and they range up to 60 percent in the C horizon. Reaction ranges from very strongly acid to medium acid except where lime has been added to the soil.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. Texture is loam.

Some pedons have a BA horizon that has hue of 7.5YR or 10YR, value of 4 or 5, and chroma 3 or 4. Texture is loam, silt loam, or fine sandy loam or their gravelly analogs.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. Texture is loam, silt loam, or sandy clay loam or their gravelly analogs. Some pedons have mottles in shades of brown or gray below a depth of 24 inches.

The BC horizon has colors and textures similar to those of the Bw horizon.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Most pedons have mottles in shades of gray and brown. Texture is loam, fine sandy loam, sandy loam, clay loam, sandy clay loam, or their gravelly or very gravelly analogs. Some pedons are stratified.

Sharondale Series

The Sharondale series consists of deep, well drained soils that formed in loamy colluvium from weathered sandstone, siltstone, and shale. Permeability is moderately rapid. These soils are in coves or on north and east aspects of mountainsides and benches. Slopes range from 30 to 80 percent. Sharondale soils are loamy-skeletal, mixed, mesic Typic Hapludolls.

The soils in map unit KmF, which are mapped only in the Pine Mountain part of the survey area, have siliceous mineralogy and are considered taxadjuncts to the Sharondale series. Use, management, and behavior of these soils are similar to those of other Sharondale soils.

Sharondale soils are in similar landscape positions as Muskingum, Marrowbone, Fedscreek, and Kimper soils. Muskingum and Marrowbone soils are moderately deep. Fedscreek and Kimper soils have less coarse fragments than the Sharondale soils.

Typical pedon of Sharondale channery fine sandy loam, in an area of Kimper-Sharondale-Muskingum complex, 30 to 80 percent slopes, very stony; about 5.7 miles east of Zebulon and about 1,000 yards from the intersection of Opossum Branch and Raccoon Creek; Kentucky Coordinate Grid 2,968,750/431,000; Millard quadrangle.

O—2 to 0 inches; partly decomposed hardwood leaf litter.

A—0 to 13 inches; very dark gray (10YR 3/1) channery fine sandy loam; moderate medium granular structure; very friable; many medium to coarse roots; 25 percent sandstone fragments 0.1 inch to 6 inches long; medium acid; clear smooth boundary.

AB—13 to 18 inches; dark brown (10YR 3/3) channery loam; weak medium subangular blocky structure; very friable; many fine and medium roots; 20 percent sandstone fragments 0.1 inch to 6 inches long; medium acid; clear smooth boundary.

Bw1—18 to 34 inches; dark yellowish brown (10YR 4/4) very channery loam; moderate medium subangular blocky structure; friable; few medium roots; 35 percent sandstone fragments 0.1 inch to 6 inches long; medium acid; clear smooth boundary.

Bw2—34 to 49 inches; brown (10YR 4/3) extremely flaggy sandy loam; weak medium subangular blocky structure parting to moderate medium granular; very friable; few medium roots; 80 percent sandstone fragments 0.1 inch to 15 inches long; medium acid; clear smooth boundary.

Bw3—49 to 63 inches; yellowish brown (10YR, 5/4) very flaggy fine sandy loam; moderate medium subangular blocky structure; friable; common thin discontinuous silt coatings on faces of peds and on rock surfaces; 45 percent sandstone fragments 0.1 inch to 15 inches long; slightly acid; clear smooth boundary.

BC—63 to 75 inches; yellowish brown (10YR 5/4) very flaggy loam; weak medium subangular blocky structure; friable; common thin discontinuous silt coatings on faces of peds and on rock surfaces; 35 percent sandstone fragments 0.1 inch to 15 inches long; medium acid; clear smooth boundary.

C—75 to 86 inches; yellowish brown (10YR 5/4) very flaggy loam; many medium distinct light yellowish brown (2.5Y 6/4) and strong brown (7.5YR 5/6) mottles; massive; firm; many thin discontinuous silt coatings on fracture and rock surfaces; 55 percent sandstone fragments 0.1 inch to 15 inches long; medium acid; clear smooth boundary.

R—86 inches; fractured brown sandstone.

The solum is 40 to 80 inches thick, and depth to bedrock is more than 60 inches. Rock fragments from 0.1 inch to 15 inches in length range from 10 to 85 percent in individual horizons but average 35 percent or more in the 10- to 40-inch particle-size control section. Reaction is strongly acid to neutral.

The A and AB horizons have hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 to 3. Texture is channery fine sandy loam or channery loam.

The Bw and BC horizons have hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 3 to 6. Texture is silt loam, loam, fine sandy loam, or sandy loam or their very channery, very flaggy, or extremely flaggy analogs. Some pedons have mottles in shades of brown, yellow, or red throughout these horizons and have mottles in shades of gray in the lower part of the Bw horizon and in the BC horizon.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 3 to 8. Texture is silt loam, loam, silty clay loam, clay loam, fine sandy loam, or sandy loam or their very channery, very flaggy, or extremely flaggy analogs. Some pedons have mottles in shades of brown, red, yellow, or gray. Thin discontinuous silt coatings or clay films on fracture faces or rock surfaces range from none to common.

Bedrock generally is unweathered sandstone or siltstone, but in some pedons, it is shale.

Shelbiana Series

The Shelbiana series consists of deep, well drained soils that formed in mixed alluvium from sandstone, siltstone, and shale. Permeability is moderate. These soils are on stream terraces. Slopes range from 0 to 2 percent. Shelbiana soils are fine-silty, mixed, mesic Typic Palehumults.

Shelbiana soils are on the same landscape as Combs, Nelse, and Melvin soils. Combs soils have more sand that is coarser than very fine sand. Nelse soils have strata or bedding planes of coarse material and have less clay than the Shelbiana soils. Melvin soils are poorly drained.

Typical pedon of Shelbiana loam, rarely flooded; about 1 mile north of Pikeville in a hay field adjacent to Pauley subdivision; Kentucky Coordinate Grid 2,932,800/439,500; Pikeville quadrangle.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; friable; many fine roots; few sandstone pebbles; medium acid; clear smooth boundary.

AB—10 to 16 inches; dark brown (10YR 3/3) loam; moderate medium subangular blocky structure; friable; many fine roots; common faint very dark grayish brown organic coatings on faces of peds; few sandstone pebbles; medium acid; clear smooth boundary.

Bt1—16 to 32 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; many distinct dark brown organic and clay coatings on faces of peds; few sandstone pebbles; medium acid; gradual smooth boundary.

Bt2—32 to 50 inches; dark yellowish brown (10YR 4/4) loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; friable; few distinct brown (10YR 4/3) organic and clay coatings on faces of peds; few sandstone pebbles; strongly acid; gradual smooth boundary.

BC—50 to 65 inches; dark yellowish brown (10YR 4/4) loam; few fine faint grayish brown mottles; weak medium subangular blocky structure; very friable; few sandstone pebbles; strongly acid; gradual smooth boundary.

C—65 to 80 inches; dark yellowish brown (10YR 4/4) loam; common medium distinct grayish brown (10YR 5/2) mottles; massive; very friable; few sandstone pebbles; strongly acid.

The solum is 40 to 72 inches or more thick, and depth to bedrock is more than 5 feet. Rock fragments, mostly sandstone pebbles, range up to 15 percent in the solum and up to 50 percent in the C horizon. The particle-size control section is 10 to 40 percent sand; however, the weighted average of sand coarser than very fine is less than 15 percent. Reaction is medium acid to neutral in the surface layer and is strongly acid or medium acid in the subsoil and substratum.

The Ap and AB horizons have hue of 7.5YR to 2.5Y, value of 3 or 4, and chroma of 2 to 4. Texture is loam.

The Bt and BC horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8. Texture generally is loam or silt loam, but in some pedons, it is clay loam or silty clay loam. Some pedons have mottles in shades of brown, red, or yellow throughout these horizons and have mottles in shades of gray or olive below the upper 24 inches of the argillic horizon.

The C horizon has hue of 5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8, or it is neutral and has value of 3 to 8. It generally is mottled. Texture is clay loam, silty clay loam, silt loam, loam, sandy loam, or loamy sand.

Shelocta Series

The Shelocta series consists of deep, well drained soils that formed in mixed colluvium from shale, siltstone, and sandstone. Permeability is moderate. These soils are on concave lower side slopes and on benches at the base of Pine Mountain. Slopes range from 15 to 50 percent. Shelocta soils are fine-loamy, mixed, mesic Typic Hapludults.

Shelocta soils are in similar landscape positions as Muse soils but have more clay.

Typical pedon of Shelocta channery silt loam (45 percent slopes, northwest aspect), in an area of Shelocta-Muse complex, 15 to 50 percent slopes, very stony; about 7.2 miles west of Elkhorn City and about 9 miles northeast of the intersection of Vanocer Hollow and Elkhorn Creek; Kentucky Coordinate Grid 2,937,200/340,900; Jenkins East quadrangle.

O—1 to 0 inches; loose, partly decomposed leaf litter.

A—0 to 5 inches; dark grayish brown (10YR 4/2) channery silt loam; moderate medium granular structure; friable; 15 percent shale fragments; many medium roots; very strongly acid; clear smooth boundary.

Bt1—5 to 17 inches; yellowish brown (10YR 5/4) channery silty clay loam; moderate medium subangular blocky structure; firm; common medium and coarse roots; 20 percent shale and siltstone fragments; few strong brown (7.5YR 5/6) clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—17 to 34 inches; yellowish brown (10YR 5/4) channery silty clay loam; moderate medium angular blocky structure; firm; few medium roots; 20 percent shale and siltstone fragments; common strong brown (7.5YR 5/6) clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3—34 to 46 inches; strong brown (7.5YR 5/6) channery silty clay loam; weak medium subangular blocky structure; firm; 30 percent shale and siltstone fragments; common strong brown (7.5YR 4/6) clay films on faces of peds; very strongly acid; clear smooth boundary.

C—46 to 52 inches; yellowish brown (10YR 5/6) very channery silty clay loam; common medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; very firm; 40 percent shale and siltstone fragments; very strongly acid; abrupt wavy boundary.

R—52 inches; interbedded shale and siltstone.

The solum is 40 to 60 inches or more thick, and depth to bedrock is 48 to 120 inches or more. Siltstone, shale, or sandstone fragments from 0.1 inch to 15 inches long range from 5 to 35 percent in the A horizon, from 5 to 45 percent in the B horizon, and from 5 to 70 percent in the C horizon. The weighted average of coarse fragments in the particle-size control section is less than 35 percent. Reaction is very strongly acid or strongly acid.

The A horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. Texture is channery silt loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam or silty clay loam or their gravelly, channery, very gravelly, or very channery analogs. Some pedons have mottles in shades of brown throughout this horizon and have mottles in shades of gray in the lower part of the horizon.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. Texture is loam, silt loam, silty clay loam, or clay loam and or their gravelly, very gravelly, channery, and very channery analogs. Some pedons are mottled in shades of brown, olive, or gray.

Bedrock generally is interbedded siltstone and shale that has some sandstone.

Stokly Series

The Stokly series consists of deep, somewhat poorly drained soils that formed in loamy alluvium. Permeability is moderately rapid. These soils are on flood plains at the base of mountainsides. They are occasionally flooded in winter and early in spring. A seasonal high water table is at a depth of 6 to 12 inches. Slopes are 2 to 3 percent. Stokly soils are coarse-loamy, mixed, acid, mesic Aeric Fluvaquents.

Stokly soils are in similar landscape positions as Hayter and Potomac soils. Hayter soils are well drained, have an argillic horizon, and are in a fine-loamy family. Potomac soils are somewhat excessively drained and are in a sandy-skeletal family.

Typical pedon of Stokly loam, in an area of Hayter-Potomac-Stokly complex, 2 to 15 percent slopes; about 11.2 miles northwest of Pikeville and about 500 feet northwest of the intersection of Spring Branch and Hurricane Creek; Kentucky Coordinate Grid 2,908,950/448,450; Broad Bottom quadrangle.

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam; common fine distinct strong brown (7.5YR 4/6) mottles; moderate medium granular structure; friable; many medium roots; few sandstone pebbles; very strongly acid; clear smooth boundary.

Bw—7 to 23 inches; grayish brown (10YR 5/2) loam; few fine distinct strong brown (7.5YR 4/6) mottles; weak medium and coarse subangular blocky structure; friable; many medium roots; very strongly acid; clear smooth boundary.

Bg—23 to 32 inches; light brownish gray (10YR 6/2) loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium and coarse subangular blocky structure; friable; many medium roots; strongly acid; clear wavy boundary.

Cg—32 to 69 inches; gray (5Y 5/1) loam; many medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; few sandstone pebbles; strongly acid.

The solum is 20 to 40 inches thick, and depth to bedrock is more than 5 feet. Rock fragments, mainly sandstone and siltstone pebbles, range up to 15 percent in the solum and up to 40 percent in the C horizon. Reaction ranges from strongly acid to extremely acid except where lime has been added to the soil.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Most pedons have mottles in shades of brown or gray. Texture is loam.

The Bw horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4, or value of 6 or 7 and chroma of 3 or 4. Mottles are in shades of gray or brown. Texture is fine sandy loam, sandy loam, or loam.

The Bg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 2 or less, or value of 4 or 5 and chroma of 1 or less; or it has hue of 5Y, value of 4 or 5, and chroma of 2 or less. Mottles are in shades of gray or brown. Texture is fine sandy loam, sandy loam, or loam.

The C horizon has the same range in color as the Bg horizon. Texture is fine sandy loam, sandy loam, or loam or their gravelly, very gravelly, channery, or very channery analogs.

Udorthents

Udorthents consist of a mixture of soil and rock material that has been drastically disturbed. In most places the soil material has been transported several hundred yards from the cut area to the fill site. Most areas of Udorthents are near Pikeville along the old Levisa Fork River channel and near South Williamson where valleys have been filled from roadcut material from U.S. Highway 119. Many small areas have been delineated along major streams where mountainsides have been cut and valleys filled for development of residential and small commercial buildings.

Udorthents material is highly variable; therefore, a typical pedon is not given. It generally has bedrock at a depth of 6 to 50 feet or more. Rock fragments make up about 5 to 75 percent and range from a few inches to more than 5 feet. They are mostly sandstone, siltstone, or shale that is randomly oriented. The percent composition varies greatly within depth. In many areas, rock fragments bridge across voids as a result of placement. This leaves discontinuous, irregular pores that are larger than texture porosity. Such voids are variable in size, frequency, and prominence.

The texture of the soil material is highly variable. The content of clay ranges from about 5 to 45 percent, and the content of sand ranges from about 25 to 80 percent. Reaction ranges from very strongly acid to moderately alkaline.

The color range depends upon the parent rock and soil material color. The hue generally is 5YR to 5Y. Mottling generally occurs without regard to depth or spacing of material.

Artifacts, including paper, scrapmetal, wood, and glass, are common.

Yeager Series

The Yeager series consists of deep, well drained soils that formed in recent loamy and sandy alluvium. Permeability is moderately rapid or rapid. These soils are on flood plains of major streams and are frequently flooded. Slopes range from 0 to 2 percent. Yeager soils are sandy, mixed, mesic Typic Udifluvents.

Yeager soils are in similar landscape positions as Grigsby, Rowdy, Nolin, and Melvin soils. Grigsby soils do not have strata of coarser material. Rowdy soils are in a fine-loamy family, and Nolin soils are in a fine-silty family. Melvin soils are poorly drained and are in a fine-silty family.

Typical pedon of Yeager loam, in an area of Yeager loam-sand, frequently flooded; about 14.5 miles north of Pikeville and about 350 feet southeast of Shively Chapel; Kentucky Coordinate Grid 2,926,750/482,800; Broad Bottom quadrangle.

Ap—0 to 9 inches; mixed dark grayish brown (10YR 4/2) and brown (10YR 5/3) loam; moderate fine and medium granular structure; very friable; thin strata 0.1 to 0.2 inch wide of yellowish brown (10YR 5/4) sand; many fine roots; medium acid; abrupt smooth boundary.

C1—9 to 18 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; very friable; common yellowish brown (10YR 5/4) sand bedding planes 0.1 to 0.2 inch wide; few thin faint continuous brown (10YR 4/3) organic coatings; few fine roots; medium acid; clear wavy boundary.

C2—18 to 27 inches; brown (10YR 4/3) loamy sand; single grained; loose; common strata 0.1 to 0.2 inch wide of brownish yellow (10YR 6/6) sand; massive; loose; few fine roots; few fine mica flakes; strongly acid; clear wavy boundary.

C3—27 to 46 inches; dark yellowish brown (10YR 4/6) loamy fine sand; single grained; loose; common strata 0.1 to 0.2 inch wide of brownish yellow (10YR 6/6) sand; prominent bedding planes; few fine mica flakes; strongly acid; clear wavy boundary.

2C—46 to 80 inches; yellowish brown (10YR 5/4) loam; many fine distinct light brownish gray (10YR 6/2) and red (2.5YR 4/8) mottles; massive; friable; few mica flakes; very strongly acid.

Depth to bedrock is more than 60 inches. Rounded or subrounded rock fragments from 0.1 inch to 3 inches in diameter range up to 14 percent to a depth of 40 inches and up to 50 percent below that depth. Flakes of mica or coal range from very few to common. Reaction ranges from very strongly acid to neutral.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. Texture is loam that is commonly stratified with fine sandy loam, sandy loam, loamy fine sand, or sand.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 8. Texture is dominantly loamy sand or loamy fine sand that has thin strata of loam, sandy loam, fine sandy loam, or sand coarser than very fine sand. Most pedons have lenses or bedding planes of sand or loamy sand. Some pedons have mottles in shades of red, yellow, brown, or gray.

Formation of the Soils

This section gives information about the geology, relief, and drainage of Pike County and describes the five major factors of soil formation and their effects on the soils of the survey area.

Geology, Relief, and Drainage

The upland soils of Pike County are underlain by interbedded sandstone, siltstone, shale, and limestone of the Pennsylvanian, Mississippian, and Devonian systems. Soils on flood plains and terraces are formed in quaternary alluvial sediment *(24)*.

The most extensive geology is the level-bedded sedimentary rocks of the Breathitt Formation. These materials are of the Lower and Middle Pennsylvanian system. They have several seams of coal varying in thickness from a few inches to more than 100 inches.

Rock strata consist of sandstone, siltstone, shale, and coal (fig. 16). Sandstone generally is fine to coarse grained and micaceous. It is light to medium dark gray and weathers to yellowish gray. Sandstone is thinly laminated and locally massive. Siltstone generally is medium dark gray and weathers to yellowish gray. It is micaceous in many places and is interlaminated with fine grained sandstone or claystone. Shale generally is medium dark gray and weathers to yellowish gray or olive gray. Siderite nodules are common, and many areas have silty limestone concretions as much as 10 feet thick. The coal in Pike County is largely banded attrital coal that has several partings of shale, clay, or flint *(1)*. Dekalb, Fedscreek, Kimper, Muskingum, Marrowbone, and Sharondale soils are the major soils that formed in material weathered from the Breathitt Formation.

Minor geology includes the Pine Mountain overthrust fault along the Virginia border. Pine Mountain differs from most of Pike County's mountains in that it is a single long mountain ridge resulting from geological events that turned rock layers upward at relatively high angles. This faulting process has exposed rock formations that normally are 2,000 feet or more below the surface. Geologically, Pine Mountain is a long, eventopped, erosion fault scarp that faces the northeast. It is part of a four-sided block of the earth's crust, about 125 miles long and 25 miles wide, known as the Cumberland overthrust block *(25)*.

Exposed rock strata range from Pennsylvanian to Devonian and include conglomerant sandstone, siltstone, limestone, and several types of shale including the Ohio and Sunbury shales.

The landscape of Pike County is very steep mountains; large areas of rock bluffs, ledges, and chimney rock; and small areas of rubbleland. It has dominantly long, very narrow ridgetops and highly dissected mountain slopes and deep coves. Elevation ranges from 600 to 1,400 feet across most of the county and from 1,000 to 2,000 feet along Pine Mountain. About 87 percent of Pike County is very steep mountains, 6 percent is foothills and small mountains, and 7 percent is flood plains and terraces.

The county is dissected by a dendritic pattern of streams that empty north into the Big Sandy River. The major streams are Robinson Creek, Johns Creek, Elkhorn Creek, and Shelby Creek and the Tug, Russell, and Levisa Forks of the Big Sandy River.

Factors of Soil Formation

This section describes the major factors and processes that have affected the formation and morphology of soils in the survey area. The characteristics of a soil depend upon climate, plant and animal life, the chemical and physical properties of the parent material, relief, and time. The relative influence of each factor varies from place to place, and in some places one factor can dominate in the formation of a soil. These factors are all interrelated and interdependent *(12)*.

In the eastern coalfields of Kentucky, the human influence on soils has been great. For example, bulldozers and other earthmoving equipment have been used to create and highly modify large areas of soils.

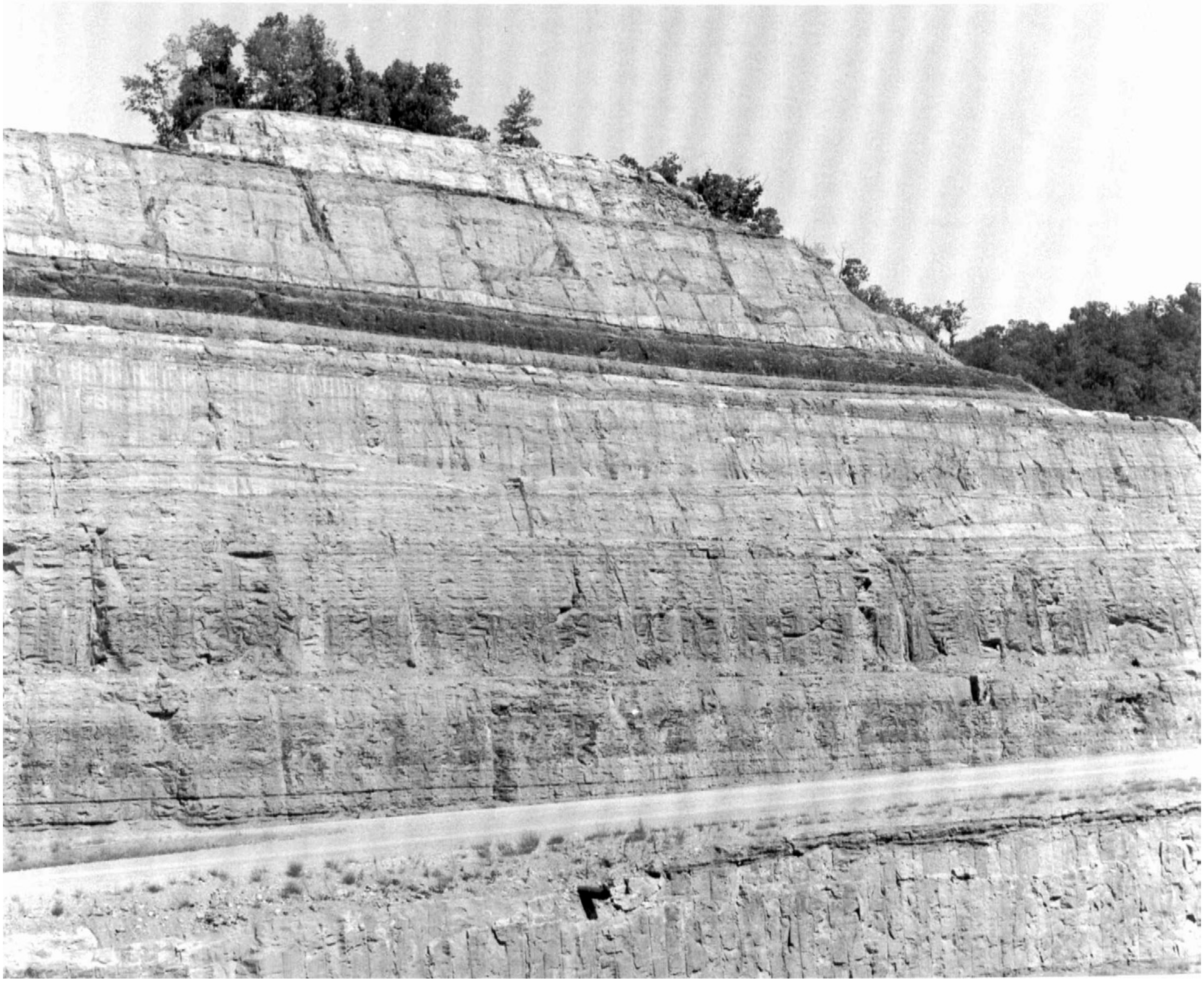

Figure 16.—Interbedded sandstone, siltstone, shale, and coal strata make up the Breathitt Formation.

Climate

Climate has a pronounced effect on soils and vegetation within a relatively small geographic area. Soil development and the physiological activity of plants within the different microclimates have been documented by field and laboratory data gathered in making this soil survey *(16)*.

The soils on uplands are mesic, or medium in soil temperature, and are in a udic or humid moisture regime.

Shallow to deep, loamy, clayey, or sandy soils on ridgetops and side slopes have a high content of rock fragments. Dekalb soils on ridgetops are loamy-skeletal, and Muse soils on mountainsides are clayey. The O and A horizons of these soils are thin, and the B horizon varies in development. South- and west-facing slopes receive more direct radiation from the sun and are hotter and drier than the north- and east-facing slopes. For example, the Gilpin soils on ridges have thin O and A horizons but have a well developed B horizon. The coolest sites are the lower slopes that face east to north and the concave draws in the coves. Sharondale soils in the coves and on concave slopes have an A horizon that is dark in color and is about 18 inches thick. It is underlain by a weakly expressed B horizon.

Surface mining has created a large acreage of young soils, such as the Myra soils. Most of these soils formed from unweathered and unleached parent material. Weathering of the surface reduces small fragments to fine soil material, usually within a few years. Shale and siltstone are especially susceptible to breakdown by weathering.

Plant and Animal Life

All living organisms including vegetation, bacteria and fungi, and animals actively affect the formation of soils. Vegetation generally supplies the organic matter that decomposes to give soils a dark colored surface layer. It also transfers or cycles nutrients from the subsoil to the surface layer. Bacteria and fungi decompose the organic matter and release the minerals into the soil. Mixing of the soil by the action of worms, insects, and burrowing animals affects the soil tilth and porosity.

The physical properties of soils are also affected by tillage and management practices. Soils can be altered chemically by the use of lime, fertilizer, insecticide, and herbicide. The movement of vehicles on the soil surface compacts the soil, which makes it more dense.

Strip mining, has also influenced the formation of new soils. These soils form where sediment from strip mining is deposited on mountainsides and flood plains. They are subject to severe erosion, and their chemical, physical, and mineralogical properties generally are quite variable within a few yards at the surface and within a few inches throughout the profile. Myra soils that formed as a result of surface mining are extensive in the survey area.

Parent Material

Parent material is the unconsolidated geologic material from which soils have formed. It influences the physical and chemical properties of the soil as well as the rate at which soil formation takes place.

In this survey area, soils are formed in four types of parent material: residual material derived mainly from the weathering of rocks of the Pennsylvanian geologic system, colluvial material deposited on mountainsides over long periods of time, recent alluvial deposits on flood plains and on stream terraces, and soil and geologic material disturbed by strip mining and construction.

Residual parent material weathered from rocks is mostly on ridgetops. This residuum is derived chiefly from sandstone, siltstone, and shale that have intermittent coal seams. In places, thin beds and concretions of limestone are in the sedimentary rocks. This is the parent material for the Dekalb, Marrowbone, and Muskingum soils.

Colluvial material deposited by water and gravity covers roughly the lower one-third to two-thirds of the mountains. The material generally is sandy or loamy and has less than 35 percent rock fragments. This material ranges in thickness from about 40 inches on the upper part of the mountainside to more than 60 inches on the lower part and in coves. In places, especially on toe slopes, colluvial material is 30 feet or more thick. Sharondale, Kimper, and Fedscreek soils formed from colluvial material.

Recent alluvial deposits consist of material that has been washed from uplands and deposited by streams. Most of the Grigsby and Yeager soils formed in recent alluvial material. Shelbiana soils also formed in alluvium. They are on stream terraces and are rarely flooded.

Myra soils formed from soil material and fragments of bedrock that were mixed together by mining operations. The mixing of this material in varying proportions can exhibit marked heterogeneity of soils over short distances in regard to parent material, strata, texture, reaction, color and content, and size of washed fragments. Myra soils are classified as Typic Udorthents. They are on benches or cuts and outslopes and in filled hollows and areas where tops of mountains have been removed.

Time

The length of time that parent material has been in place and exposed to the active forces of climate, as well as plant and animal life, strongly influences the nature of the soil.

The soils of Pike County are relatively young. As weathering processes act upon the exposed rocks, mostly on points and ridges, the residue is subjected to the forces of water and gravity. Weathered soil material and rock fragments are carried downslope and deposited as colluvium.

Where the colluvial deposits become thicker, the heavy weight of the colluvium, steep angle of slope, and water seeping along the bedrock tend to move the mass very slowly and irregularly downslope onto the flood plain. Soil is removed from the valleys by the action of the streams. Thus the valleys slowly become wider while the mountains become smaller.

Relatively young soils on ridgetops and side slopes have developed soil structure and a B horizon well defined by color, but they have little illuvial clay accumulation. Marrowbone and Fedscreek soils are classified as Typic Dystrochrepts.

Some soils on less sloping mountainsides have a thick, well defined B horizon that has a significant accumulation of illuvial clay. Examples are Shelocta and Muse soils, which are classified as Typic Hapludults. Soils in coves and on concave slopes of cool aspects have a thick, dark surface layer. An example is the Sharondale soils, which are classified as Typic Hapludolls.

Myra soils, man-deposited residue from coal mining, are essentially unaltered, heterogeneous, geologic material. The C horizon in these soils extends essentially to the surface and is subdivided on the basis of texture, percentage of rock fragments, and reaction. Some Myra soils have an O or A horizon, and some have an indistinct B horizon. The action of earthworms and plants is quite evident in Myra soils that have been in place for several years. These soils are classified as Typic Udorthents.

Soils in valleys are divided into those on flood plains and those on stream terraces. The Yeager soils on flood plains formed in recent alluvial deposits along streams. These soils for the most part are stratified and have little or no developed soil structure in the subsoil. Grigsby soils, however, are recent alluvial deposits that do not have stratification and have structure in the subsoil. Yeager soils are classified as Typic Udifluvents, and Grigsby soils are classified as Dystric Fluventic Eutrochrepts.

The young soils on terraces, such as the Shelbiana soils, formed in water-deposited material but do not now receive a significant amount of deposition. They are leached and weathered, and the content of illuvial clay depends upon their position in relation to the stream. Shelbiana soils are classified as Humic Hapludults.

Relief

Pike County is in the eastern coalfield physiographic region *(6)*. It is within a large dissected plateau of narrow winding ridges, steep valley walls, and narrow elongated bottoms. The level-bedded rocks are part of the Breathitt Formation of the Lower and Middle Pennsylvanian system. Sandstone, siltstone, and shale of various hardness with interbedded coalbeds have weathered to form a benched landscape with a dendritic drainage pattern.

In soil formation, relief controls surface drainage and affects water percolation. Relief can also affect the soil depth and available water capacity, which in turn affects plant and animal life and some soil-forming processes. Soils on ridgetops and points, such as Dekalb soils, generally are less than 40 inches deep to bedrock, have more than 35 percent rock fragments, and have a weakly expressed B horizon. They can also have a noticeable amount of stones on the surface associated with rock outcrops. Soils on mountainsides formed chiefly in colluvial material. They are variable in depth to bedrock because they have complex slopes that are benched and dissected. The Fedscreek soils on mountainsides are more than 40 inches to bedrock and have a weakly defined B horizon.

Natural differences in elevation and shape of landforms account for many differences in the kinds of soils that formed in the survey area. The residual soils formed on higher elevations, ridges, and points. Most soils on mountainsides formed in colluvial material. Soils on flood plains formed in material weathered from sandstone, siltstone, and shale.

Strip mining has complicated relief as a soil-forming factor. Reshaping the land and making new landforms has changed drainage relationships and affected the rate of chemical and physical processes of soil formation.

Processes of Soil Formation

The results of the soil-forming factors are evidenced by the different layers, or soil horizons, in a profile. The soil profile extends from the surface down to material that is little altered by the soil-forming processes.

Most soils have three major horizons—the A, B, and C horizons. Soils under a forest canopy have an O (organic) horizon at the surface. This horizon is an accumulation of organic material, such as twigs and leaves, or of humified organic material that has little mixture of mineral material. Numbers and letters can be used to indicate differences that mark the subdivisions within the major horizons. The Bt horizon, for example, represents the most strongly developed part of a B horizon that has an accumulation of clay from overlying horizons. The Shelocta, Muse, and Gilpin soils have a Bt horizon.

The A horizon is a mineral surface layer. It is darkened by humified organic matter. An Ap horizon commonly is a plow layer also darkened with organic matter. The A horizon is a layer of maximum leaching, or eluviation, of clay and iron. If considerable leaching has taken place and organic matter has not darkened the soil material, an E horizon is formed. This horizon is normally the lightest colored horizon in the profile.

The B horizon normally underlies the A horizon and is called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer.

In some soils, such as the Kimper soils, the B horizon is formed mainly by the alteration of the original material rather than by illuviation. The alteration can be caused by the weathering of the parent material, the releasing of iron to give the rusty color, and the development of soil structure instead of the original rock or sediment structure. The B horizon commonly has blocky structure. This horizon generally is firmer and is lighter in color than the A horizon, but it is darker in color than the C horizon or the E horizon.

The C horizon is below the A or B horizon. It consists of material that is little altered by the soil-forming processes, but it can be modified by weathering.

In young soils, such as those formed in recent alluvium or in man-deposited fill material, the C horizon is near or at the soil surface. In these soils, the B horizon, and in places even the A horizon, is absent.

Several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble constituents, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes often operate simultaneously. They have been going on for thousands of years in old soils.

The accumulation and incorporation of organic matter take place as plant residue and applied organic material decompose and are mixed into the soil. These additions darken the mineral soil material and are responsible for forming the A horizon.

For soils to have a distinct subsoil, they must be leached of lime and more soluble materials. Once leaching has taken place, the clay can be translocated more easily and be moved as part of the percolant. Clay has accumulated in the Bt horizon of the soils classified as Ultisols by being leached from the A horizon and deposited in the B horizon as a result of flocculation and the drying up of the percolating water. Also, clay from dissolved silica and aluminum has accumulated in these horizons. The more inert material, such as silt and sand-sized quartz, is concentrated in the A horizon as the more soluble material and clay are leached into the next horizon.

The naturally well drained soils in the survey area generally have a yellowish brown or strong brown subsoil. These colors come from finely divided iron oxide minerals that coat the sand, silt, or clay particles. These iron oxides formed from iron released during the weathering of silica minerals in the present soil or in the parent material in which the soil developed.

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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.

Aspect. The direction that a slope faces.
Warm aspect. Slopes of more than 15 percent facing an azimuth of 135 to 315 degrees.
Cool aspect. Slopes of more than 15 percent facing an azimuth of 315 to 135 degrees.

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

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

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

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

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

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

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.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

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; i.e., clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

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 tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. 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.

Culmination of mean annual increment (CMAI) [forestry]. The volume for a stand of a particular tree species at the point of highest average annual growth.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth 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 lime (in tables). Excess carbonates in the soil restrict the growth of some plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 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.

Frost action (in tables). Freezing and thawing of soil moisture can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green-manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as 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 capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

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.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves 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.)

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

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 degrees of acidity or alkalinity, expressed as pH value are—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

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.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). 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, gradient. Terms used in this survey to describe the range of slopes are—

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Sloping	6 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 35 percent
Very steep	35 to 50 percent
Extremely steep	50 to 120 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 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, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands 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.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. 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). An otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). An excessive amount of toxic substances in the soil, such as sodium or sulfur, severely hinders the establishment of vegetation or severely restricts plant growth.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited in stream valleys by heavily loaded 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.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. This contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data recorded in the period 1951-78 at Pikeville, Kentucky]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	47.0	27.2	37.1	74	5	125	3.52	1.97	4.88	8	4.6
February---	51.5	29.1	40.3	78	2	144	3.51	1.82	4.98	8	4.8
March------	60.7	36.1	48.4	86	14	302	4.57	2.57	6.34	10	2.1
April------	72.9	44.9	58.9	92	26	567	3.80	2.35	5.10	9	.0
May--------	80.3	53.6	67.0	94	33	837	4.17	2.56	5.62	9	.0
June-------	86.1	61.3	73.7	96	45	1,011	3.99	2.57	5.27	8	.0
July-------	88.8	65.8	77.3	98	53	1,156	4.99	3.26	6.55	9	.0
August-----	88.0	65.1	76.6	97	52	1,135	3.57	1.85	5.07	7	.0
September--	82.8	58.7	70.8	97	41	924	3.70	2.01	5.18	6	.0
October----	72.3	46.2	59.3	90	25	598	2.36	.93	3.55	6	.0
November---	59.9	36.3	48.1	83	16	252	3.02	1.74	4.15	7	.8
December---	50.2	30.0	40.1	75	6	153	3.39	1.83	4.74	8	3.1
Yearly:											
Average--	70.0	46.2	58.1	---	---	---	---	---	---	---	---
Extreme--	---	---	---	100	6	---	---	---	---	---	---
Totals---	---	---	---	---	---	7,204	44.59	38.81	50.39	95	15.4

* 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 substracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data recorded in the period 1951-78 at Pikeville, 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 6	April 15	May 5
2 years in 10 later than--	March 30	April 10	April 30
5 years in 10 later than--	March 17	March 31	April 20
First freezing temperature in fall:			
1 year in 10 earlier than	October 29	October 21	October 11
2 years in 10 earlier than	November 3	October 26	October 16
5 years in 10 earlier than	November 14	November 4	October 26

TABLE 3.--GROWING SEASON

[Data recorded in the period 1951-78 at Pikeville, Kentucky]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	217	197	166
8 years in 10	225	204	173
5 years in 10	241	217	188
2 years in 10	257	230	203
1 year in 10	266	236	211

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BcG	Berks-Caneyville complex, 50 to 120 percent slopes, very rocky	1,533	0.3
BrG	Berks-Rock outcrop-Marrowbone complex, 60 to 120 percent slopes	4,565	0.9
Co	Combs fine sandy loam, rarely flooded	378	0.1
Dm	Dumps, coal	1,296	0.3
FgE	Fedscreek-Gilpin-Marrowbone complex, 20 to 50 percent slopes	5,028	1.0
FmF	Fedscreek-Marrowbone-Dekalb complex, 30 to 80 percent slopes, very stony	125,904	24.9
GmD	Gilpin-Marrowbone complex, 6 to 20 percent slopes	535	0.1
Gy	Grigsby-Yeager complex, occasionally flooded	3,509	0.7
HaC	Hayter loam, 4 to 15 percent slopes	1,217	0.2
HaD	Hayter loam, 15 to 30 percent slopes	2,779	0.6
HpC	Hayter-Potomac-Stokly complex, 2 to 15 percent slopes	15,155	3.0
KmF	Kimper-Sharondale-Muskingum complex, 35 to 80 percent slopes, extremely stony	4,335	0.9
KsF	Kimper-Sharondale-Muskingum complex, 30 to 80 percent slopes, very stony	111,856	22.2
MaF	Marrowbone-Dekalb-Muskingum complex, 30 to 80 percent slopes, very rocky	168,965	33.5
MmF	Marrowbone-Fedscreek-Myra complex, 30 to 80 percent slopes, very stony	21,038	4.2
Mo	Melvin silt loam, occasionally flooded	621	0.1
MyB	Myra very channery silt loam, 0 to 6 percent slopes	1,537	0.3
MyD	Myra very channery silt loam, 6 to 30 percent slopes	752	0.1
MyF	Myra very channery silt loam, 30 to 70 percent slopes, stony	18,920	3.7
NeD	Nelse loam, 4 to 25 percent slopes, frequently flooded	2,154	0.4
No	Nolin silt loam, occasionally flooded	321	0.1
Rc	Rock outcrop	277	0.1
Rd	Rowdy loam, occasionally flooded	526	0.1
Sh	Shelbiana loam, rarely flooded	668	0.1
SmE	Shelocta-Muse complex, 15 to 50 percent slopes, very stony	1,702	0.3
UdB	Udorthents, loamy, 0 to 6 percent slopes	2,709	0.5
UdD	Udorthents, loamy, 6 to 30 percent slopes	273	0.1
Ur	Udorthents-Urban land complex, 0 to 4 percent slopes	1,088	0.2
Ye	Yeager loam-sand, frequently flooded	2,541	0.5
	Water	2,624	0.5
	Total	504,806	100.0

TABLE 5.--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	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Lbs	Tons	AUM*
BcG: Berks-Caneyville	VIIe	---	---	---	---	---
BrG:						
Berks	VIIe	---	---	---	---	---
Rock outcrop	VIIIs	---	---	---	---	---
Marrowbone	VIIe	---	---	---	---	---
Co: Combs	IIw	135	45	3,200	4.5	8.5
Dm: Dumps	VIIIs	---	---	---	---	---
FgE: Fedscreek-Gilpin-Marrowbone	VIIe	---	---	---	---	---
FmF: Fedscreek-Marrowbone-Dekalb	VIIe	---	---	---	---	---
GmD: Gilpin-Marrowbone	IVe	80	30	---	3.0	6.5
Gy: Grigsby-Yeager	IIw	115	35	2,600	4.0	7.5
HaC: Hayter	IIIe	120	40	2,500	3.0	5.0
HaD: Hayter	IVe	110	35	---	2.5	4.0
HpC:						
Hayter	IIIe	---	---	---	3.0	---
Potomac	IVs	---	---	---	---	---
Stokly	IIw	---	---	---	---	---
KmF, KsF: Kimper-Sharondale-Muskingum	VIIe	---	---	---	---	---
MaF: Marrowbone-Dekalb-Muskingum	VIIe	---	---	---	---	---
MmF: Marrowbone-Fedscreek-Myra	VIIe	---	---	---	---	---
Mo: Melvin	IIIw	80	---	---	3.5	7.0

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Wheat	Tobacco	Grass-legume hay	Pasture
		Bu	Bu	Lbs	Tons	AUM*
MyB, MyD------------------ Myra	VIs	---	---	---	---	3.0
MyF----------------------- Myra	VIIe	---	---	---	---	---
NeD----------------------- Nelse	VIe	80	---	---	3.0	5.0
No------------------------ Nolin	IIw	115	41	2,700	4.0	9.0
Rc------------------------ Rock outcrop	VIIIs	---	---	---	---	---
Rd------------------------ Rowdy	IIw	120	45	3,000	3.5	6.5
Sh------------------------ Shelbiana	I	140	50	3,200	4.5	9.0
SmE----------------------- Shelocta-Muse	VIIe	---	---	---	---	---
UdB----------------------- Udorthents	VIs	---	---	---	---	---
UdD----------------------- Udorthents	VIIe	---	---	---	---	---
Ur:						
Udorthents---------------	VIs	---	---	---	---	---
Urban land---------------	VIIIs	---	---	---	---	---
Ye------------------------ Yeager	IIIw	80	20	1,700	3.0	5.5

* 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.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	668	---	---	---
II	7,773	---	7,773	---
III	10,441	7,279	3,162	---
IV	9,376	3,314	---	6,062
V	---	---	---	---
VI	7,946	2,154	---	5,792
VII	462,787	462,787	---	---
VIII	3,191	---	---	3,191

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity*	
BcG:								
Berks----------(cool aspect)	Moderate	Severe	Slight	Moderate	Scarlet oak---------	75	57	Yellow poplar, eastern white pine, shortleaf pine, white oak, northern red oak.
					White oak-----------	70	52	
					Hickory-------------	---	---	
					Yellow poplar-------	98	104	
					Red maple-----------	---	---	
					Black oak-----------	80	62	
Caneyville-----(cool aspect)	Severe	Severe	Slight	Severe	Black oak-----------	71	53	White oak, yellow poplar, white ash, eastern white pine, northern red oak.
					White oak-----------	64	47	
					Sugar maple---------	---	---	
					Hickory-------------	---	---	
					White ash-----------	72	---	
					Eastern redcedar----	46	54	
					Yellow poplar-------	90	90	
BrG:								
Berks----------(cool aspect)	Moderate	Severe	Slight	Moderate	Scarlet oak---------	75	57	Yellow poplar, eastern white pine, shortleaf pine, white oak, northern red oak.
					White oak-----------	70	52	
					Hickory-------------	---	---	
					Yellow poplar-------	98	104	
					Red maple-----------	---	---	
					Black oak-----------	80	62	
Rock outcrop.								
Marrowbone-----(cool aspect)	Severe	Severe	Slight	Moderate	Shortleaf pine------	85	140	Yellow poplar, northern red oak, white oak, eastern white pine, shortleaf pine.
					Sweet birch---------	---	---	
					American beech------	---	---	
					Northern red oak----	---	---	
					Yellow poplar-------	95	98	
Berks----------(warm aspect)	Moderate	Severe	Severe	Moderate	Scarlet oak---------	58	41	Shortleaf pine, Virginia pine, white pine.
					Chestnut oak--------	---	---	
					Virginia pine-------	52	73	
					Shortleaf pine------	---	---	
					Hickory-------------	---	---	
					White oak-----------	63	46	
					Black oak-----------	71	53	
Rock outcrop.								
Marrowbone-----(warm aspect)	Severe	Severe	Severe	Moderate	Shortleaf pine------	75	120	Shortleaf pine, white oak.
					Virginia pine-------	---	---	
					White oak-----------	---	---	
					Black oak-----------	---	---	
					Red maple-----------	---	---	
					Hickory-------------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Productivity*	Trees to plant
Co-------------- Combs	Slight	Slight	Moderate	Severe	Yellow poplar-------	115	132	Yellow poplar, black walnut, white oak, eastern white pine, shortleaf pine, white ash, northern red oak.
					Northern red oak----	90	72	
					White oak-----------	---	---	
					Black walnut--------	---	---	
					American sycamore---	---	---	
FgE:								
Fedscreek------ (cool aspect)	Moderate	Moderate	Slight	Severe	Yellow poplar-------	90	90	Yellow poplar, northern red oak, white oak, white ash, black walnut, eastern white pine.
					White oak-----------	70	52	
					Blackgum------------	---	---	
					Black oak-----------	75	57	
					White basswood------	---	---	
					Black walnut--------	---	---	
Gilpin--------- (cool aspect)	Moderate	Moderate	Slight	Moderate	Black oak-----------	80	62	Eastern white pine, yellow poplar, shortleaf pine, northern red oak, white oak.
					Yellow poplar-------	90	90	
					White oak-----------	75	57	
					Scarlet oak---------	76	58	
					Shortleaf pine------	70	110	
					Virginia pine-------	71	110	
Marrowbone----- (cool aspect)	Moderate	Moderate	Slight	Moderate	Shortleaf pine------	85	140	Yellow poplar, northern red oak, white oak, eastern white pine, shortleaf pine.
					Sweet birch---------	---	---	
					American beech------	---	---	
					Northern red oak----	---	---	
					Yellow poplar-------	95	98	
Fedscreek------ (warm aspect)	Moderate	Moderate	Moderate	Severe	Scarlet oak---------	65	47	Shortleaf pine, white oak.
					White oak-----------	60	47	
					Black oak-----------	65	47	
					American beech------	---	---	
					Pignut hickory------	---	---	
					Yellow poplar-------	---	---	
					Virginia pine-------	---	---	
Gilpin--------- (warm aspect)	Moderate	Moderate	Moderate	Moderate	Black oak-----------	70	52	Shortleaf pine, white oak.
					White oak-----------	61	44	
					Scarlet oak---------	72	54	
					Chestnut oak--------	68	50	
					Shortleaf pine------	60	88	
Marrowbone----- (warm aspect)	Moderate	Moderate	Moderate	Moderate	Shortleaf pine------	75	120	Shortleaf pine, white oak.
					Virginia pine-------	---	---	
					White oak-----------	---	---	
					Black oak-----------	---	---	
					Red maple-----------	---	---	
					Hickory-------------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity*	
FmF:								
Fedscreek (warm aspect)	Severe	Severe	Severe	Severe	Scarlet oak	65	47	Shortleaf pine, white oak.
					White oak	62	45	
					Black oak	66	48	
					American beech	---	---	
					Pignut hickory	---	---	
					Yellow poplar	---	---	
					Virginia pine	---	---	
					Sugar maple	---	---	
Marrowbone (warm aspect)	Severe	Severe	Severe	Moderate	Shortleaf pine	75	120	Shortleaf pine, white oak.
					Virginia pine	---	---	
					White oak	---	---	
					Black oak	---	---	
					Red maple	---	---	
					Hickory	---	---	
Dekalb (warm aspect)	Moderate	Severe	Severe	Moderate	Black oak	62	45	Eastern white pine, Virginia pine, red pine, Austrian pine, Japanese larch, Norway spruce.
					Hickory	---	---	
					White oak	62	45	
					Red maple	---	---	
					Post oak	---	---	
					Scarlet oak	67	49	
					Chestnut oak	59	42	
GmD:								
Gilpin	Slight	Slight	Slight	Moderate	Black oak	80	62	Eastern white pine, yellow poplar, shortleaf pine, northern red oak, white oak.
					Yellow poplar	90	90	
					White oak	75	57	
					Scarlet oak	76	58	
					Chestnut oak	80	62	
					Shortleaf pine	70	110	
Marrowbone	Slight	Slight	Slight	Moderate	Shortleaf pine	75	120	Shortleaf pine, white oak.
					Virginia pine	---	---	
					White oak	---	---	
					Black oak	---	---	
					Red maple	---	---	
					Hickory	---	---	
Gy:								
Grigsby	Slight	Slight	Moderate	Severe	Yellow poplar	110	124	Yellow poplar, black walnut, eastern white pine, shortleaf pine, white oak, northern red oak, white ash.
					Northern red oak	85	67	
					White oak	85	67	
					Black walnut	---	---	
					American sycamore	---	---	
					Sweetgum	---	---	
					Red maple	---	---	
					Hickory	---	---	
Yeager	Slight	Slight	Moderate	Moderate	Yellow poplar	90	90	Yellow poplar, white oak, northern red oak, sweetgum, eastern white pine.
					Sweetgum	90	106	
					Hackberry	---	---	
					Boxelder	---	---	
					Green ash	---	---	
					Sugar maple	---	---	
					American beech	---	---	
					Black cherry	---	---	
					American sycamore	---	---	
					Butternut	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity*	
HaC------------- Hayter	Slight	Slight	Slight	Severe	Northern red oak----	86	68	Yellow poplar, white oak, eastern white pine, black walnut, northern red oak.
					Yellow poplar-------	107	119	
					White oak-----------	---	---	
					Hickory-------------	---	---	
HaD:								
Hayter--------- (cool aspect)	Moderate	Moderate	Slight	Severe	Northern red oak----	86	68	Yellow poplar, white oak, eastern white pine, black walnut.
					Yellow poplar-------	96	100	
Hayter--------- (warm aspect)	Moderate	Moderate	Moderate	Severe	Northern red oak----	76	58	Yellow poplar, eastern white pine, white oak, northern red oak.
					Yellow poplar-------	90	90	
					Eastern white pine--	86	157	
					White oak-----------	---	---	
HpC:								
Hayter---------	Slight	Slight	Slight	Severe	Northern red oak----	86	68	Yellow poplar, northern red oak, eastern white pine, black walnut, white oak.
					Yellow poplar-------	107	119	
					White oak-----------	---	---	
					Hickory-------------	---	---	
Potomac--------	Slight	Slight	Moderate	Moderate	Northern red oak----	70	52	Northern red oak, white oak, American sycamore, black walnut, eastern white pine, yellow poplar.
					White oak-----------	70	52	
					Eastern white pine--	80	144	
					Black walnut--------	---	---	
					American sycamore---	---	---	
					Eastern redcedar----	---	---	
Stokly---------	Slight	Moderate	Moderate	Severe	Yellow poplar-------	90	90	Eastern white pine, American sycamore, sweetgum, yellow poplar, green ash.
					White oak-----------	80	62	
					Black oak-----------	80	62	
					Red maple-----------	---	---	
					American sycamore---	---	---	
					Green ash-----------	---	---	
					River birch---------	---	---	
					Sweetgum------------	---	---	
KmF, KsF:								
Kimper--------- (cool aspect)	Severe	Severe	Slight	Severe	Yellow poplar-------	107	119	Yellow poplar, white ash, northern red oak, white oak, eastern white pine, shortleaf pine, black walnut.
					Sugar maple---------	---	---	
					White basswood------	---	---	
					American beech------	---	---	
					Sweet birch---------	---	---	
					Northern red oak----	75	57	
					Red maple-----------	---	---	
					Black locust--------	---	---	
					White oak-----------	72	54	
Sharondale----- (cool aspect)	Severe	Severe	Slight	Severe	Yellow poplar-------	107	119	Yellow poplar, black walnut, northern red oak, white oak, eastern white pine.
					Black locust--------	---	---	
					White basswood------	---	---	
					Eastern redbud------	---	---	
					Northern red oak----	---	---	
					Cucumbertree--------	---	---	
					Black walnut--------	---	---	
					Sugar maple---------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity*	
KmF, KsF:								
Muskingum------ (cool aspect)	Severe	Severe	Slight	Severe	Yellow poplar-------	89	88	Eastern white pine, yellow poplar, northern red oak, shortleaf pine, white oak.
					Northern red oak----	77	59	
					Virginia pine-------	73	113	
					Shortleaf pine------	80	130	
					White oak-----------	75	57	
					Black oak-----------	81	63	
					Scarlet oak---------	78	60	
MaF:								
Marrowbone----- (cool aspect)	Severe	Severe	Slight	Moderate	Shortleaf pine------	85	140	Yellow poplar, northern red oak, white oak, eastern white pine, shortleaf pine.
					Yellow poplar-------	95	98	
					Sweet birch---------	---	---	
					American beech------	---	---	
					Northern red oak----	---	---	
Dekalb--------- (cool aspect)	Moderate	Severe	Slight	Moderate	Yellow poplar-------	89	88	Eastern white pine, Virginia pine, white spruce, Norway spruce.
					White oak-----------	66	48	
					Hickory-------------	---	---	
					American beech------	---	---	
Muskingum------ (cool aspect)	Severe	Severe	Slight	Severe	Yellow poplar-------	89	88	Eastern white pine, yellow poplar, shortleaf pine, white oak, white ash.
					Northern red oak----	77	59	
					Virginia pine-------	73	113	
					Shortleaf pine------	80	130	
					White oak-----------	75	57	
					Black oak-----------	81	63	
Marrowbone----- (warm aspect)	Severe	Severe	Severe	Moderate	Shortleaf pine------	75	120	Shortleaf pine, white oak.
					Virginia pine-------	---	---	
					White oak-----------	---	---	
					Black oak-----------	---	---	
					Red maple-----------	---	---	
					Hickory-------------	---	---	
Dekalb--------- (warm aspect)	Severe	Severe	Severe	Moderate	Black oak-----------	62	45	White oak, shortleaf pine.
					Hickory-------------	---	---	
					White oak-----------	62	45	
					Red maple-----------	---	---	
					Post oak------------	---	---	
					Scarlet oak---------	67	49	
Muskingum------ (warm aspect)	Severe	Severe	Severe	Severe	Black oak-----------	66	48	Shortleaf pine, white pine.
					Virginia pine-------	65	100	
					Shortleaf pine------	75	120	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Productivity*	Trees to plant
MmF:								
Marrowbone----- (cool aspect)	Severe	Severe	Slight	Moderate	Shortleaf pine------	85	140	Yellow poplar, northern red oak, white oak, eastern white pine, shortleaf pine.
					Yellow poplar-------	95	98	
					Sweet birch---------	---	---	
					American beech------	---	---	
					Northern red oak----	---	---	
Fedscreek------ (cool aspect)	Severe	Severe	Slight	Severe	Yellow poplar-------	90	90	Yellow poplar, northern red white oak, white ash, black walnut, eastern white pine.
					White oak-----------	70	52	
					Blackgum------------	---	---	
					Black oak-----------	75	57	
					White basswood------	---	---	
					Black walnut--------	---	---	
Myra----------- (cool aspect)	Severe	Severe	Moderate	Slight	Loblolly pine-------	68	90	Eastern white pine, white oak, black locust, shortleaf pine.
					Black locust--------	---	---	
					American sycamore---	---	---	
					Sweetgum------------	---	---	
					Shortleaf pine------	---	---	
Marrowbone----- (warm aspect)	Severe	Severe	Moderate	Moderate	Shortleaf pine------	75	120	Shortleaf pine, white oak.
					Virginia pine-------	---	---	
					White oak-----------	---	---	
					Black oak-----------	---	---	
					Red maple-----------	---	---	
					Hickory-------------	---	---	
Fedscreek------ (warm aspect)	Severe	Severe	Moderate	Severe	Scarlet oak---------	65	47	Shortleaf pine, white oak.
					White oak-----------	60	43	
					Black oak-----------	65	47	
					American beech------	---	--	
					Pignut hickory------	---	--	
					Yellow poplar-------	---	--	
					Virginia pine-------	---	--	
					Sugar maple---------	---	--	
Myra----------- (warm aspect)	Severe	Severe	Moderate	Slight	Loblolly pine-------	68	90	Eastern white pine, white oak, black locust, shortleaf pine.
					Black locust--------	---	---	
					American sycamore---	---	---	
					Shortleaf pine------	---	---	
Mo-------------- Melvin	Slight	Moderate	Moderate	Severe	Pin oak-------------	100	98	Pin oak, American sycamore, sweetgum.
					Sweetgum------------	92	112	
					Green ash-----------	---	---	
					Hackberry-----------	---	---	
					Hickory-------------	---	---	
					Red maple-----------	---	---	
					American elm--------	---	---	
					Black willow--------	---	---	
MyB------------- Myra	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	68	90	Eastern white pine, white oak, black locust, shortleaf pine.
					Black locust--------	---	---	
					American sycamore---	---	---	
					Sweetgum------------	---	---	
					Shortleaf pine------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns				Potential productivity			Trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Productivity*	
MyD------------- Myra	Moderate	Moderate	Moderate	Moderate	Loblolly pine-------	68	90	Eastern white pine, white oak, black locust, shortleaf pine.
					Black locust--------	---	---	
					American sycamore---	---	---	
					Sweetgum------------	---	---	
					Shortleaf pine------	---	---	
					Eastern white pine--	---	---	
MyF------------- Myra	Severe	Severe	Moderate	Moderate	Loblolly pine-------	68	90	Eastern white pine, white oak, black locust, shortleaf pine.
					Black locust--------	---	---	
					American sycamore---	---	---	
					Sweetgum------------	---	---	
					Shortleaf pine------	---	---	
					Eastern white pine--	---	---	
NeD------------- Nelse	Slight	Moderate	Moderate	Moderate	Sweetgum------------	98	132	Green ash, American sycamore, sweetgum.
					Boxelder------------	---	---	
					Silver maple--------	---	---	
					Black willow--------	---	---	
					River birch---------	---	---	
					Green ash-----------	---	---	
					American sycamore---	---	---	
No-------------- Nolin	Slight	Slight	Moderate	Severe	Yellow poplar-------	107	119	Yellow poplar, eastern white pine, white oak, sweetgum, black walnut.
					Sweetgum------------	92	112	
					Cherrybark oak------	---	---	
					Eastern cottonwood--	---	---	
					Black walnut--------	---	---	
					American sycamore---	---	---	
					River birch---------	---	---	
					White ash-----------	---	---	
Rd-------------- Rowdy	Slight	Slight	Moderate	Severe	Yellow poplar-------	100	107	Yellow poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					American sycamore---	---	---	
					Black walnut--------	---	---	
					River birch---------	---	---	
					White oak-----------	---	---	
					American elm--------	---	---	
					Sweetgum------------	---	---	
					Boxelder------------	---	---	
Sh-------------- Shelbiana	Slight	Slight	Slight	Severe	Yellow poplar-------	110	124	Yellow poplar, black walnut, eastern white pine, northern red oak, white oak, sweetgum, white ash.
					Northern red oak----	---	---	
					Sweetgum------------	---	---	
					Black walnut--------	---	---	
					Green ash-----------	---	---	
					American sycamore---	---	---	
					Black cherry--------	---	---	
					Boxelder------------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
SmE:								
Shelocta (cool aspect)	Moderate	Moderate	Slight	Severe	Shortleaf pine	77	124	Yellow poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
					Yellow poplar	102	110	
					Cucumbertree	---	---	
					American beech	---	---	
					White oak	72	54	
					Red maple	---	---	
					Black oak	77	59	
					Northern red oak	---	---	
					Hickory	---	---	
Muse (cool aspect)	Moderate	Moderate	Slight	Severe	Shortleaf pine	81	132	Shortleaf pine, white oak, eastern white pine, yellow poplar.
					Hickory	---	---	
					Virginia pine	64	98	
					White oak	62	45	
					Red maple	---	---	
					Yellow poplar	110	124	
					Black oak	---	41	
Ye: Yeager	Slight	Severe	Severe	Moderate	Yellow poplar	90	90	Yellow poplar, white oak, northern red oak, sweetgum, eastern white pine.
					Sweetgum	90	106	
					Hackberry	---	---	
					Boxelder	---	---	
					Green ash	---	---	
					Sugar maple	---	---	
					American beech	---	---	
					Black cherry	---	---	
					American sycamore	---	---	
					Butternut	---	---	

* Productivity class is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BcG:					
Berks	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Caneyville	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, depth to rock.
BrG:					
Berks	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.					
Marrowbone	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty.
Co: Combs	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight	Moderate: flooding.
Dm. Dumps					
FgE:					
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
FmF:					
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Marrowbone	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
GmD:					
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
Marrowbone	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope, depth to rock.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Gy:					
Grigsby	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: flooding.
Yeager	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight	Moderate: droughty, flooding.
HaC Hayter	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
HaD Hayter	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
HpC:					
Hayter	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
Potomac	Severe: flooding.	Moderate: large stones, small stones, too sandy.	Severe: large stones, small stones.	Moderate: too sandy.	Moderate: large stones, droughty, flooding.
Stokly	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
KmF, KsF:					
Kimper	Severe: slope, small stones, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: slope, small stones.	Severe: small stones, slope.
Sharondale	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, large stones, slope.
Muskingum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MaF:					
Marrowbone	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty.
Dekalb	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, small stones.
Muskingum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MmF:					
Marrowbone	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Myra	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Mo: Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MyB: Myra	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
MyD: Myra	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
MyF: Myra	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
NeD: Nelse	Severe: flooding.	Moderate: slope, flooding.	Severe: slope, flooding.	Moderate: flooding.	Severe: flooding.
No: Nolin	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Rc. Rock outcrop					
Rd: Rowdy	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight	Moderate: flooding.
Sh: Shelbiana	Severe: flooding.	Slight	Slight	Slight	Slight.
SmE:					
Shelocta	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Muse	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope, erodes easily.	Severe: slope.
Ur:					
Udorthents.					
Urban land.					
Ye: Yeager	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

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
BcG:										
Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Caneyville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
BrG:										
Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
Marrowbone	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Co Combs	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
Dm. Dumps										
FgE:										
Fedscreek	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Marrowbone	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
FmF:										
Fedscreek	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Marrowbone	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GmD:										
Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Marrowbone	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Gy:										
Grigsby	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Yeager	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

TABLE 9.--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
HaC-----Hayter	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HaD-----Hayter	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HpC:										
Hayter-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Potomac-----	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Stokly-----	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
KmF, KsF:										
Kimper-----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Sharondale-----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Muskingum-----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very pcor.
MaF:										
Marrowbone-----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Dekalb-----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Muskingum-----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
MmF:										
Marrowbone-----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Fedscreek-----	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Myra-----	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Mo-----Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
MyB-----Myra	Very poor.	Very poor.	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
MyD, MyF-----Myra	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
NeD-----Nelse	Fair	Good	Good	Good	Fair	Very poor.	Very poor.	Good	Good	Very poor.
No-----Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Rc. Rock outcrop										
Rd: Rowdy	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sh: Shelbiana	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SmE:										
Shelocta	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Muse	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ur:										
Udorthents.										
Urban land.										
Ye: Yeager	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it 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
BcG:						
Berks	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Caneyville	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: low strength, slope, depth to rock.	Severe: slope, depth to rock.
BrG:						
Berks	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.						
Marrowbone	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope.	Moderate: small stones, droughty.
Co: Combs	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Dm. Dumps						
FgE:						
Fedscreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Gilpin	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
FmF:						
Fedscreek	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Marrowbone	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.

TABLE 10.--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
GmD:						
Gilpin	Severe: depth to rock.	Moderate: slope.	Severe: depth to rock.	Severe: slope.	Moderate: slope.	Moderate: slope, depth to rock.
Marrowbone	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: small stones, slope, depth to rock.
Gy:						
Grigsby	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Yeager	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
HaC: Hayter	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope, depth to rock.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: large stones, slope.
HaD: Hayter	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HpC:						
Hayter	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope, depth to rock.	Severe: slope.	Moderate: slope, shrink-swell.	Moderate: large stones, slope.
Potomac	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: large stones, droughty, flooding.
Stokly	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
KmF, KsF:						
Kimper	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Sharondale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
Muskingum	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 10.--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
MaF:						
Marrowbone-----	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope.	Moderate: small stones, droughty.
Dekalb---------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Muskingum------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MmF:						
Marrowbone-----	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fedscreek------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Myra-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Mo-------------- Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
MyB------------- Myra	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Severe: small stones.
MyD, MyF-------- Myra	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
NeD------------- Nelse	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Severe: flooding.	Severe: flooding.
No-------------- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Moderate: flooding.
Rc. Rock outcrop						
Rd-------------- Rowdy	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Sh-------------- Shelbiana	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding.	Slight.

TABLE 10.--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
SmE:						
Shelocta-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Muse-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
UdB, UdD. Udorthents						
Ur:						
Udorthents.						
Urban land.						
Ye-------------- Yeager	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it 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
BcG:					
Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
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: depth to rock, too clayey, slope.
BrG:					
Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
Rock outcrop.					
Marrowbone	Severe: depth to rock, percs slowly.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Co: Combs	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
Dm. Dumps					
FgE:					
Fedscreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, depth to rock, thin layer.
Marrowbone	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.

TABLE 11.--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
FmF:					
Fedscreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: too sandy, small stones, slope.
Marrowbone	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
GmD:					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, thin layer.
Marrowbone	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock.
Gy:					
Grigsby	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good.
Yeager	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage.
HaC Hayter	Moderate: depth to rock, slope, large stones.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: large stones.
HaD Hayter	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, slope, seepage.	Severe: slope, seepage.	Poor: slope.
HpC:					
Hayter	Moderate: depth to rock, slope, large stones.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: large stones.
Potomac	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, small stones.
Stokly	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.

TABLE 11.--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
KmF, KsF:					
Kimper	Severe: percs slowly, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Sharondale	Severe: slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: small stones, slope.
Muskingum	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
MaF:					
Marrowbone	Severe: depth to rock, percs slowly.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Dekalb	Severe: slope, depth to rock, poor filter.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
Muskingum	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
MmF:					
Marrowbone	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Fedscreek	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: too sandy, small stones, slope.
Myra	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Mo: Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
MyB: Myra	Severe: percs slowly.	Moderate: seepage, slope, large stones.	Moderate: too clayey, large stones.	Slight	Poor: small stones.
MyD, MyF: Myra	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.

TABLE 11.--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
NeD----------------- Nelse	Severe: flooding, poor filter.	Severe: seepage, flooding, slope.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: too sandy.
No------------------ Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey.
Rc. Rock outcrop					
Rd------------------ Rowdy	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: small stones.
Sh------------------ Shelbiana	Moderate: flooding, percs slowly.	Moderate: seepage.	Severe: seepage.	Moderate: flooding.	Fair: too clayey.
SmE: Shelocta-----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: small stones, slope.
Muse---------------	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, wetness, slope.	Severe: slope.	Poor: too clayey, hard to pack, slope.
UdB, UdD. Udorthents					
Ur: Udorthents.					
Urban land.					
Ye------------------ Yeager	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
BcG:				
Berks	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Caneyville	Poor: depth to rock, low strength, slope.	Improbable: excess fines, depth to rock.	Improbable: excess fines, depth to rock.	Poor: too clayey, slope.
BrG:				
Berks	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Rock outcrop.				
Marrowbone	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Co Combs	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Dm. Dumps				
FgE:				
Fedscreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Gilpin	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Marrowbone	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
FmF:				
Fedscreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Marrowbone	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Dekalb	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
GmD:				
Gilpin	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Marrowbone	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Gy:				
Grigsby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Yeager	Good	Probable	Probable	Fair: small stones, area reclaim, too sandy.
HaC Hayter	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, area reclaim.
HaD Hayter	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HpC:				
Hayter	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: large stones, area reclaim.
Potomac	Fair: large stones.	Improbable: small stones.	Probable	Poor: large stones, area reclaim, small stones.
Stokly	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
KmF, KsF:				
Kimper	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Sharondale	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Muskingum	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
MaF:				
Marrowbone	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Dekalb	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Muskingum	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
MmF:				
Marrowbone	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Fedscreek	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Myra	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Mo: Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MyB: Myra	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
MyD: Myra	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
MyF: Myra	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
NeD: Nelse	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, too sandy, slope.
No: Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Rc. Rock outcrop				
Rd: Rowdy	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Sh: Shelbiana	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
SmE:				
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Muse	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
UdB, UdD. Udorthents				
Ur: Udorthents.				
Urban land.				
Ye----- Yeager	Good-----	Probable-----	Probable-----	Fair: small stones, area reclaim, too sandy.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
BcG:					
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
Caneyville	Severe: slope, depth to rock.	Severe: thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
BrG:					
Berks	Severe: seepage, slope.	Severe: seepage.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
Rock outcrop.					
Marrowbone	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Co Combs	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Dm. Dumps					
FgE:					
Fedscreek	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Marrowbone	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
FmF:					
Fedscreek	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, too sandy.	Slope.
Marrowbone	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
GmD:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Marrowbone	Severe: slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Gy:					
Grigsby	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Yeager	Severe: seepage.	Severe: seepage, piping.	Deep to water	Favorable	Droughty.
HaC, HaD Hayter	Severe: seepage, slope.	Moderate: piping, large stones.	Deep to water	Slope, large stones.	Large stones, slope.
HpC:					
Hayter	Severe: seepage, slope.	Moderate: thin layer, piping, large stones.	Deep to water	Slope, large stones.	Large stones, slope.
Potomac	Severe: seepage.	Severe: seepage.	Deep to water	Large stones, too sandy.	Large stones, droughty.
Stokly	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave.	Wetness	Wetness.
KmF, KsF:					
Kimper	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, large stones, percs slowly.	Large stones, slope.
Sharondale	Severe: seepage, slope.	Severe: large stones.	Deep to water	Slope, large stones.	Large stones, slope.
Muskingum	Severe: slope.	Severe: piping.	Deep to water	Slope, piping.	Slope, erodes easily.
MaF:					
Marrowbone	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock, percs slowly.	Slope, droughty, depth to rock.
Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, droughty.
Muskingum	Severe: slope.	Severe: piping.	Deep to water	Slope, piping.	Slope, erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
MmF:					
Marrowbone	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Fedscreek	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, too sandy.	Slope.
Myra	Severe: slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Mo: Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
MyB: Myra	Moderate: seepage, slope.	Moderate: large stones.	Deep to water	Large stones	Large stones, droughty.
MyD, MyF: Myra	Severe: slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
NeD: Nelse	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, too sandy.	Slope, droughty.
No: Nolin	Severe: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.
Rc. Rock outcrop					
Rd: Rowdy	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Sh: Shelbiana	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
SmE:					
Shelocta	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
Muse	Severe: slope.	Moderate: hard to pack, thin layer.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
UdB, UdD. Udorthents					
Ur:					
Udorthents.					
Urban land.					

TABLE 13.--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
Ye---------------- Yeager	Severe: seepage.	Severe: seepage, piping.	Deep to water----	Favorable--------	Droughty.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
BcG:											
Berks----------	0-3	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	3-17	Channery loam, very channery silt loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	17-27	Channery loam, very channery silt loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
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
	5-22	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BrG:											
Berks----------	0-3	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	3-17	Channery loam, very channery silt loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	17-27	Channery loam, very channery silt loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Marrowbone-----	0-5	Fine sandy loam	SM-SC, SM, SC, GM	A-4	0-5	70-95	65-90	55-85	35-49	16-25	2-10
	5-28	Channery loam, loam, fine sandy loam.	SM-SC, SM, SC, GM-GC	A-4, A-2-4	0-15	50-95	50-90	40-85	25-49	16-30	2-10
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Co-------------- Combs	0-18	Fine sandy loam--	SM, SM-SC, ML, CL-ML	A-2, A-4	0	90-100	90-100	80-100	30-80	<25	NP-5
	18-80	Loam, fine sandy loam, silt loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	90-100	90-100	80-100	30-80	<25	NP-5
Dm. Dumps											

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FgE:											
Fedscreek------	0-4	Channery loam----	SM-SC, SM, SC	A-4, A-2-4	0-10	50-85	50-80	40-70	25-49	16-30	2-10
	4-48	Channery loam, channery sandy loam, channery silt loam.	SM-SC, SM, SC	A-4, A-2-4	0-10	50-95	50-90	40-85	25-49	16-30	2-10
	48-65	Channery loam, very channery loam, channery silt loam.	SM-SC, SM, SC, GM-GC	A-1, A-4, A-2-4	5-20	30-80	35-75	25-65	25-40	16-30	2-10
	65	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gilpin---------	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	7-25	Channery loam, channery silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	25-31	Channery loam, very channery silt loam, very channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Marrowbone-----	0-5	Fine sandy loam	SM-SC, SM, SC, GM	A-4	0-5	70-95	65-90	55-85	35-49	16-25	2-10
	5-28	Channery loam, loam, fine sandy loam.	SM-SC, SM, SC, GM-GC	A-4, A-2-4	0-15	50-95	50-90	40-85	25-49	16-30	2-10
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
FmF:											
Fedscreek------	0-4	Channery loam----	SM-SC, SM, SC, GM	A-4, A-2-4, A-1-b	15-30	60-95	55-90	45-80	20-49	16-25	2-10
	4-48	Channery loam, channery sandy loam, channery silt loam.	SM-SC, SM, SC, GM	A-4, A-2-4	0-10	50-95	50-90	40-85	25-49	16-30	2-10
	48-65	Very channery loam, channery loam, channery sandy loam.	GM, SM-SC, SC, GM-GC	A-4, A-2	5-20	35-80	35-75	25-65	25-40	16-30	2-10
	65	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Marrowbone-----	0-5	Fine sandy loam	SM-SC, SM, SC, GM	A-4, A-1-b, A-2-4	3-15	60-95	55-90	45-80	20-49	16-25	2-10
	5-28	Channery loam, loam, fine sandy loam.	SM-SC, SM, SC, GM-GC	A-1, A-4, A-2-4	5-20	55-95	55-90	40-80	20-45	16-30	2-10
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FmF:											
Dekalb	0-7	Channery fine sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	7-21	Channery sandy loam, channery loam, very channery fine sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	21-28	Channery sandy loam, very flaggy sandy loam, extremely flaggy fine sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GmD:											
Gilpin	0-7	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	7-25	Channery loam, channery silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	25-31	Channery loam, very channery silt loam, very channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Marrowbone	0-5	Fine sandy loam	SM-SC, SM, SC, GM	A-4	0-5	70-95	65-90	55-85	35-49	16-25	2-10
	5-28	Channery loam, loam, fine sandy loam.	SM-SC, SM, SC, GM-GC	A-4, A-2-4	0-15	50-95	50-90	40-85	25-49	16-30	2-10
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gy:											
Grigsby	0-6	Sandy loam	SM, SM-SC	A-2, A-4	0-5	80-100	80-100	50-95	25-50	<20	NP-5
	6-47	Loam, sandy loam, silt loam.	ML, SM, SC, CL	A-2, A-4	0-5	80-100	80-100	70-100	30-70	<25	NP-10
	47-70	Sandy loam, loam, gravelly sandy loam.	SM, SM-SC, ML, GM-GC	A-2, A-1, A-4	0-30	40-100	30-100	25-100	20-70	<20	NP-5
Yeager	0-9	Loam	SM, SM-SC	A-2-4, A-4	0	95-100	95-100	60-90	20-45	<25	NP-5
	9-46	Stratified loamy fine sand, fine sandy loam.	SP-SM, SM	A-2-4, A-3	0	95-100	75-100	55-80	5-35	<20	NP
	46-80	Loam, sandy loam, gravelly loamy sand.	SP-SM, SM	A-2-4, A-1, A-3	0-5	85-100	40-100	40-80	5-35	<20	NP
HaC, HaD: Hayter	0-7	Loam	SM, SC, ML, CL	A-4, A-6	0-15	90-100	80-100	55-85	36-70	<40	NP-15
	7-55	Clay loam, sandy clay loam, gravelly loam.	CL, SC	A-6, A-7, A-2	0-25	85-100	80-100	60-95	30-70	30-45	11-20
	55-65	Cobbly loam, very cobbly loam, cobbly clay loam	SM, SC, ML, CL	A-4, A-6, A-2	25-80	75-100	55-95	45-90	30-60	<40	NP-15

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HpC:											
Hayter---------	0-7	Loam-------------	SM, SC, ML, CL	A-4, A-6	0-15	90-100	80-100	55-85	36-70	<40	NP-15
	7-55	Clay loam, sandy clay loam, gravelly loam.	CL, SC	A-6, A-7, A-2	0-25	85-100	80-100	60-95	30-70	30-45	11-20
	55-65	Cobbly loam, very cobbly loam, cobbly clay loam.	SM, SC, ML, CL	A-4, A-6, A-2	25-80	75-100	55-95	45-90	30-60	<40	NP-15
Potomac--------	0-11	Loam, gravelly sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	85-100	80-100	50-85	30-60	<20	NP-5
	11-60	Very cobbly loamy sand, very gravelly loamy sand, very gravelly sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	15-50	50-80	35-70	20-50	5-25	<15	NP-3
Stokly---------	0-32	Loam-------------	CL, ML, CL-ML, SM	A-4	0	85-100	80-100	65-90	35-65	<30	NP-10
	32-69	Gravelly sandy loam, gravelly loam, loam.	SM, SC, GM, GC	A-1-b, A-2-4, A-4	0	65-100	60-100	45-70	15-45	<30	NP-10
KmF, KsF:											
Kimper---------	0-8	Very channery loam.	ML, CL-ML, GM, SM	A-2-4, A-1-b, A-4	5-25	35-80	30-75	25-65	20-65	22-30	4-10
	8-52	Channery loam, channery silt loam, very channery loam.	ML, CL-ML, GM, CL	A-2-4, A-4	0-20	40-85	35-75	30-70	20-65	27-41	6-18
	52-75	Very channery loam, very channery silt loam, very channery fine sandy loam.	ML, CL-ML, GM, CL	A-2-4, A-1-b, A-4	5-25	40-85	35-75	30-70	20-65	23-30	3-10
	75	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sharondale-----	0-18	Channery fine sandy loam, channery loam.	SM-SC, SC, GM, SM	A-1, A-2-4, A-4	15-35	35-80	30-75	25-65	20-40	16-25	2-10
	18-34	Very channery loam, very flaggy loam, very flaggy fine sandy loam.	SM-SC, SC, GM, SM	A-1, A-2-4, A-4	10-40	30-70	25-65	20-60	10-40	16-25	2-10
	34-86	Very flaggy fine sandy loam, very flaggy loam, extremely flaggy sandy loam.	SM-SC, SC, GM, SM	A-1, A-2-4, A-4	10-40	30-70	25-65	20-60	10-40	16-26	2-10
	86	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
KmF, KsF:											
Muskingum------	0-4	Channery silt loam.	GM, SM, ML, CL	A-1, A-2, A-4	0-10	60-80	55-70	40-70	20-65	20-35	2-10
	4-24	Silt loam, channery silt loam, channery loam.	GM, SM, ML, CL	A-2, A-4	0-15	70-90	55-85	50-80	40-75	20-35	2-10
	24-30	Very channery silt loam, very channery loam, channery loam.	GM, SM, ML	A-1, A-2, A-4	0-15	20-80	10-65	10-65	10-60	20-35	2-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MaF:											
Marrowbone-----	0-5	Fine sandy loam	SM-SC, SM, SC, GM	A-4	0-5	70-95	65-90	55-85	35-49	16-25	2-10
	5-28	Channery loam, loam, fine sandy loam.	SM-SC, SM, SC, GM-GC	A-4, A-2-4	0-15	50-95	50-90	40-85	25-49	16-30	2-10
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Dekalb---------	0-7	Channery fine sandy loam.	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	7-21	Channery sandy loam, channery loam, very channery fine sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	21-28	Channery sandy loam, very flaggy sandy loam, extremely flaggy fine sandy loam.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Muskingum------	0-4	Channery silt loam.	GM, SM, ML, CL	A-1, A-2, A-4	0-10	60-80	55-70	40-70	20-65	20-35	2-10
	4-24	Silt loam, channery silt loam, channery loam.	GM, SM, ML, CL	A-2, A-4	0-15	70-90	55-85	50-80	40-75	20-35	2-10
	24-30	Very channery silt loam, very channery loam, channery loam.	GM, SM, ML	A-1, A-2, A-4	0-15	20-80	10-65	10-65	10-60	20-35	2-10
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MmF:											
Marrowbone-----	0-5	Fine sandy loam	SM-SC, SM, SC, GM	A-4, A-1-b, A-2-4	3-15	60-95	55-90	45-80	20-49	16-25	2-10
	5-28	Channery loam, loam, fine sandy loam.	SM-SC, SM, SC, GM-GC	A-1, A-4, A-2-4	5-20	55-95	55-90	40-80	20-45	16-30	2-10
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Fedscreek------	0-4	Channery loam----	SM-SC, SM, SC, GM	A-4, A-2-4, A-1-b	15-30	60-95	55-90	45-80	20-49	16-25	2-10
	4-48	Channery loam, channery sandy loam, channery silt loam.	SM-SC, SM, SC, GM	A-4, A-2-4	0-10	50-95	50-90	40-85	25-49	16-30	2-10
	48-65	Very channery loam, channery loam, channery silt loam.	GM, SM-SC, SC, GM-GC	A-4, A-2	5-20	35-80	35-75	25-65	25-40	16-30	2-10
	65	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Myra-----------	0-6	Very channery silt loam.	GC, GM-GC	A-2, A-4, A-6, A-1-b	5-30	40-65	30-50	25-45	20-40	25-40	5-15
	6-78	Very channery silt loam, very channery loam, very channery silty clay loam.	GC, GM-GC	A-2, A-4, A-6, A-1-b	5-30	40-60	30-50	25-45	20-45	25-40	5-15
Mo-------------- Melvin	0-7	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	7-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-98	25-40	5-20
MyB, MyD, MyF--- Myra	0-6	Very channery silt loam.	GC, GM-GC	A-2, A-4, A-6, A-1-b	5-30	40-65	30-50	25-45	20-40	25-40	5-15
	6-78	Very channery silt loam, very channery loam, very channery silty clay loam.	GC, GM-GC	A-2, A-4, A-6, A-1-b	5-30	40-60	30-50	25-45	20-45	25-40	5-15
NeD------------- Nelse	0-12	Loam-------------	SM-SC, SM, CL-ML, ML	A-2-4, A-4	0-5	95-100	95-100	65-90	30-65	<25	NP-5
	12-30	Fine sandy loam, loam, loamy fine sand.	SM, SM-SC	A-2-4, A-4	0-5	95-100	90-100	60-85	25-45	<20	NP-5
	30-80	Loamy fine sand, fine sandy loam.	SM	A-2-4	0-5	95-100	90-100	60-85	15-30	<20	NP
No-------------- Nolin	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	8-65	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Rc. Rock outcrop											
Rd-------------- Rowdy	0-7	Loam-------------	ML, SC, CL, SM	A-4	0	80-100	80-100	70-100	40-75	<30	NP-10
	7-76	Loam, gravelly loam, sandy clay loam.	ML, CL, GM, SC	A-4, A-6, A-2	0-5	60-100	60-100	50-100	25-75	<30	NP-15
	76-86	Loam, clay loam, gravelly sandy loam.	ML, GM-GC, SM-SC, CL	A-4, A-2, A-6, A-1-b	0-25	30-100	30-100	25-100	20-75	<30	NP-15
Sh-------------- Shelbiana	0-16	Loam-------------	ML, CL, CL-ML	A-4	0	95-100	90-100	75-100	70-95	16-35	NP-10
	16-65	Loam, silt loam, clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	75-100	65-95	16-40	3-15
	65-80	Sandy loam, loam, clay loam.	SM, ML, CL-ML, CL	A-4, A-6	0-5	95-100	40-100	40-100	35-95	16-35	NP-15
SmE: Shelocta-------	0-5	Channery silt loam.	ML, GM, SM	A-4	0-10	55-95	50-80	40-70	36-65	<35	NP-10
	5-46	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-90	25-40	4-15
	46-52	Channery silt loam, channery silty clay loam, very channery silty clay loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-b	0-15	40-85	35-70	25-70	20-65	20-40	3-20
	52	Unweathered bedrock.									
Muse-----------	0-6	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	80-100	70-100	60-100	55-95	20-40	2-20
	6-46	Silty clay loam, clay, channery silty clay.	CL, CH	A-7, A-6	0	70-100	65-100	60-100	55-100	35-65	15-35
	46-53	Channery silty clay, very channery silty clay, channery clay.	MH, CH, CL, GC	A-7, A-2	0	50-100	40-95	35-95	30-95	40-75	20-40
	53	Weathered bedrock	---	---	---	---	---	---	---	---	---
UdB, UdD. Udorthents											
Ur: Udorthents.											
Urban land.											
Ye-------------- Yeager	0-9	Loam-------------	SM, SM-SC	A-2-4, A-4	0	95-100	95-100	60-100	20-45	<25	NP-5
	9-46	Stratified loamy fine sand, fine sandy loam.	SP-SM, SM	A-2-4, A-3	0	95-100	75-100	55-100	5-35	<20	NP
	46-80	Loam, sandy loam, gravelly loamy sand.	SP-SM, SM	A-2-4, A-1, A-3	0-5	85-100	40-100	40-80	5-35	<20	NP

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

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
BcG:										
Berks-----------	0-3	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low-----------	0.17	3	.5-3
	3-17	5-27	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17		
	17-27	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17		
	27	---	---	---	---	---	-------------	----		
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
	5-22	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28		
	22	---	---	---	---	---	-------------	----		
BrG:										
Berks-----------	0-3	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low-----------	0.17	3	.5-3
	3-17	5-27	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17		
	17-27	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17		
	27	---	---	---	---	---	-------------	----		
Rock outcrop.										
Marrowbone------	0-5	5-18	1.20-1.60	0.6-6.0	0.10-0.20	4.5-6.5	Low-----------	0.24	2	.5-5
	5-28	5-27	1.20-1.70	0.6-6.0	0.08-0.16	4.5-6.0	Low-----------	0.17		
	28	---	---	---	---	---	-------------	----		
Co--------------- Combs	0-18	5-18	1.20-1.50	0.6-6.0	0.12-0.21	5.6-7.3	Low-----------	0.28	5	2-5
	18-80	5-18	1.20-1.50	0.6-6.0	0.12-0.20	5.6-7.3	Low-----------	0.28		
Dm. Dumps										
FgE:										
Fedscreek-------	0-4	5-27	1.00-1.60	2.0-6.0	0.10-0.18	4.5-6.5	Low-----------	0.20	4	.5-5
	4-48	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low-----------	0.17		
	48-65	5-27	1.20-1.70	0.6-6.0	0.10-0.18	4.5-6.0	Low-----------	0.17		
	65	---	---	---	---	---	-------------	----		
Gilpin----------	0-7	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.32	3	.5-4
	7-25	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	25-31	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	31	---	---	---	---	---	-------------	----		
Marrowbone------	0-5	5-18	1.20-1.60	0.6-6.0	0.10-0.18	4.5-6.5	Low-----------	0.24	2	.5-5
	5-28	5-27	1.20-1.70	0.6-6.0	0.08-0.16	4.5-6.0	Low-----------	0.17		
	28	---	---	---	---	---	-------------	----		
FmF:										
Fedscreek-------	0-4	5-27	1.00-1.60	2.0-6.0	0.10-0.18	4.5-6.5	Low-----------	0.17	4	.5-5
	4-48	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low-----------	0.17		
	48-65	5-27	1.20-1.70	0.6-6.0	0.10-0.18	4.5-6.0	Low-----------	0.17		
	65	---	---	---	---	---	-------------	----		
Marrowbone------	0-5	5-18	1.20-1.60	0.6-6.0	0.10-0.20	4.5-6.5	Low-----------	0.20	2	.5-5
	5-28	5-27	1.20-1.70	0.6-6.0	0.08-0.16	4.5-6.0	Low-----------	0.17		
	28	---	---	---	---	---	-------------	----		
Dekalb----------	0-7	10-20	1.20-1.50	2.0-20	0.08-0.12	3.6-6.5	Low-----------	0.17	2	2-4
	7-21	7-18	1.20-1.50	2.0-20	0.06-0.12	3.6-5.5	Low-----------	0.17		
	21-28	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low-----------	0.17		
	28	---	---	---	---	---	-------------	----		

TABLE 15.--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 K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
GmD:										
Gilpin----------	0-7	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	7-25	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	25-31	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	31	---	---	---	---	---	-------------	----		
Marrowbone------	0-5	5-18	1.20-1.60	0.6-6.0	0.10-0.18	4.5-6.5	Low----------	0.24	2	.5-5
	5-28	5-27	1.20-1.70	0.6-6.0	0.08-0.16	4.5-6.0	Low----------	0.17		
	28	---	---	---	---	---	-------------	----		
Gy:										
Grigsby---------	0-6	5-10	1.20-1.50	2.0-6.0	0.08-0.14	5.6-7.3	Low----------	0.28	5	1-4
	6-47	5-18	1.20-1.50	0.6-6.0	0.10-0.20	5.6-7.3	Low----------	0.28		
	47-70	5-10	1.20-1.50	2.0-6.0	0.03-0.16	5.1-7.3	Low----------	0.28		
Yeager----------	0-9	3-12	1.40-1.60	2.0-6.0	0.08-0.14	4.5-7.3	Low----------	0.17	5	2-5
	9-46	2-10	1.40-1.70	2.0-20	0.05-0.10	4.5-7.3	Low----------	0.15		
	46-80	2-18	1.40-1.70	2.0-20	0.05-0.10	4.5-7.3	Low----------	0.15		
HaC, HaD--------- Hayter	0-7	10-25	1.25-1.55	2.0-6.0	0.10-0.16	5.1-6.5	Low----------	0.28	4	1-3
	7-55	20-35	1.30-1.60	2.0-6.0	0.11-0.19	5.1-6.5	Moderate-----	0.28		
	55-65	15-27	1.30-1.60	2.0-6.0	0.06-0.10	5.1-6.5	Low----------	0.17		
HpC:										
Hayter----------	0-7	10-25	1.25-1.55	2.0-6.0	0.10-0.16	5.1-6.5	Low----------	0.28	4	1-3
	7-55	20-35	1.30-1.60	2.0-6.0	0.11-0.19	5.1-6.5	Moderate-----	0.28		
	55-65	15-27	1.30-1.60	2.0-6.0	0.06-0.10	5.1-6.5	Low----------	0.17		
Potomac---------	0-11	5-15	1.20-1.40	0.6-6.0	0.10-0.14	5.1-7.8	Low----------	0.24	3	0-2
	11-60	4-10	1.30-1.60	>6.0	0.03-0.06	5.1-7.8	Low----------	0.17		
Stokly----------	0-32	7-18	1.30-1.65	2.0-6.0	0.10-0.18	3.6-7.3	Low----------	0.28	3	1-4
	32-69	7-18	1.35-1.65	2.0-6.0	0.08-0.18	3.6-5.5	Low----------	0.17		
KmF, KsF:										
Kimper----------	0-8	12-27	1.00-1.40	0.6-6.0	0.15-0.22	5.1-7.3	Low----------	0.15	4	2-15
	8-52	18-30	1.20-1.70	0.6-6.0	0.15-0.20	4.5-6.0	Low----------	0.17		
	52-75	12-30	1.20-1.70	0.6-6.0	0.15-0.20	4.5-6.0	Low----------	0.17		
	75	---	---	---	---	---	-------------	----		
Sharondale------	0-18	8-26	1.00-1.40	2.0-6.0	0.12-0.22	5.1-7.3	Low----------	0.10	4	2-12
	18-34	8-26	1.20-1.70	2.0-6.0	0.12-0.20	5.1-7.3	Low----------	0.17		
	34-86	8-26	1.20-1.70	2.0-6.0	0.08-0.18	5.1-7.3	Low----------	0.17		
	86	---	---	---	---	---	-------------	----		
Muskingum-------	0-4	10-25	1.20-1.40	2.0-6.0	0.12-0.18	4.5-5.5	Low----------	0.24	3	1-3
	4-24	18-27	1.20-1.50	0.6-2.0	0.08-0.14	4.5-5.5	Low----------	0.28		
	24-30	15-25	1.20-1.50	0.6-2.0	0.02-0.12	4.5-5.5	Low----------	0.24		
	30	---	---	---	---	---	-------------	----		
MaF:										
Marrowbone------	0-5	5-18	1.20-1.60	0.6-6.0	0.10-0.20	4.5-6.5	Low----------	0.24	2	.5-5
	5-28	5-27	1.20-1.70	0.6-6.0	0.08-0.16	4.5-6.0	Low----------	0.17		
	28	---	---	---	---	---	-------------	----		
Dekalb----------	0-7	10-20	1.20-1.50	2.0-20	0.08-0.12	3.6-6.5	Low----------	0.17	2	2-4
	7-21	7-18	1.20-1.50	2.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	21-28	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	28	---	---	---	---	---	-------------	----		
Muskingum-------	0-4	10-25	1.20-1.40	2.0-6.0	0.12-0.18	4.5-5.5	Low----------	0.24	3	1-3
	4-24	18-27	1.20-1.50	0.6-2.0	0.08-0.14	4.5-5.5	Low----------	0.28		
	24-30	15-25	1.20-1.50	0.6-2.0	0.02-0.12	4.5-5.5	Low----------	0.24		
	30	---	---	---	---	---	-------------	----		

TABLE 15.--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 K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
MmF:										
Marrowbone	0-5	5-18	1.20-1.60	0.6-6.0	0.10-0.20	4.5-6.5	Low	0.20	2	.5-5
	5-28	5-27	1.20-1.70	0.6-6.0	0.08-0.16	4.5-6.0	Low	0.17		
	28	---	---	---	---	---	---	---		
Fedscreek	0-4	5-27	1.00-1.60	2.0-6.0	0.10-0.18	4.5-6.5	Low	0.17	4	.5-5
	4-48	5-27	1.20-1.70	2.0-6.0	0.10-0.18	4.5-6.0	Low	0.17		
	48-65	5-27	1.20-1.70	0.6-6.0	0.10-0.18	4.5-6.0	Low	0.17		
	65	---	---	---	---	---	---	---		
Myra	0-6	12-30	1.40-1.65	0.2-2.0	0.06-0.14	6.1-8.4	Low	0.32	5	<1
	6-78	12-30	1.40-1.80	0.2-2.0	0.05-0.16	7.4-8.4	Low	0.32		
Mo Melvin	0-7	12-17	1.20-1.60	0.6-2.0	0.18-0.23	5.6-7.8	Low	0.43	5	.5-3
	7-60	12-35	1.30-1.60	0.6-2.0	0.18-0.23	5.6-7.8	Low	0.43		
MyB, MyD, MyF Myra	0-6	12-30	1.40-1.65	0.2-2.0	0.06-0.14	6.1-8.4	Low	0.32	5	<1
	6-78	12-30	1.40-1.80	0.2-2.0	0.05-0.16	7.4-8.4	Low	0.32		
NeD Nelse	0-12	5-25	1.20-1.60	2.0-6.0	0.09-0.14	5.1-7.3	Low	0.17	5	2-10
	12-30	2-18	1.40-1.80	2.0-20	0.09-0.14	5.1-7.3	Low	0.15		
	30-80	2-12	1.40-1.80	2.0-20	0.05-0.10	5.1-7.3	Low	0.15		
No Nolin	0-8	12-35	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low	0.43	5	2-4
	8-65	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.1-8.4	Low	0.43		
Rc. Rock outcrop										
Rd Rowdy	0-7	10-25	1.20-1.40	0.6-2.0	0.11-0.21	4.5-7.3	Low	0.32	5	1-3
	7-76	18-30	1.20-1.50	0.6-2.0	0.09-0.21	4.5-6.0	Low	0.28		
	76-86	10-30	1.20-1.50	0.6-6.0	0.07-0.18	4.5-6.0	Low	0.28		
Sh Shelbiana	0-16	10-27	1.20-1.40	0.6-2.0	0.12-0.22	5.1-6.0	Low	0.28	5	2-6
	16-65	18-34	1.20-1.50	0.6-2.0	0.12-0.22	4.5-6.0	Low	0.32		
	65-80	5-34	1.20-1.80	0.6-6.0	0.10-0.22	4.5-6.0	Low	0.32		
SmE:										
Shelocta	0-5	10-25	1.15-1.30	0.6-2.0	0.10-0.18	4.5-5.5	Low	0.28	4	.5-5
	5-46	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low	0.28		
	46-52	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low	0.17		
	52	---	---	---	---	---	---	---		
Muse	0-6	7-27	1.20-1.40	0.6-2.0	0.16-0.22	4.5-5.5	Low	0.37	3	1-3
	6-46	28-60	1.20-1.65	0.06-0.2	0.10-0.16	4.5-5.5	Moderate	0.28		
	46-53	40-60	1.40-1.65	0.06-0.2	0.08-0.14	4.5-5.5	Moderate	0.28		
	53	---	---	---	---	---	---	---		
UdB, UdD. Udorthents										
Ur: Udorthents.										
Urban land.										
Ye Yeager	0-9	3-12	1.40-1.60	2.0-6.0	0.08-0.14	4.5-7.3	Low	0.17	5	2-5
	9-46	2-10	1.40-1.70	2.0-20	0.05-0.10	4.5-7.3	Low	0.15		
	46-80	2-18	1.40-1.70	2.0-20	0.05-0.10	4.5-7.3	Low	0.15		

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

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			
BcG:											
Berks	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Caneyville	C	None	---	---	>6.0	---	---	20-40	Hard	High	Moderate.
BrG:											
Berks	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Rock outcrop.											
Marrowbone	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate.
Co: Combs	B	Rare	Brief	Dec-May	>6.0	---	---	>60	---	Low	Low.
Dm. Dumps											
FgE:											
Fedscreek	B	None	---	---	>6.0	---	---	>40	Hard	Low	Moderate.
Gilpin	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Marrowbone	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate.
FmF:											
Fedscreek	B	None	---	---	>6.0	---	---	>40	Hard	Low	Moderate.
Marrowbone	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate.
Dekalb	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
GmD:											
Gilpin	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Marrowbone	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate.
Gy:											
Grigsby	B	Occasional	Very brief to brief.	Dec-May	3.5-6.0	Apparent	Jan-Apr	>60	---	Low	Low.
Yeager	A	Occasional	Brief	Dec-Jun	4.0-6.0	Apparent	Dec-May	>60	---	Low	High.
HaC, HaD: Hayter	B	None	---	---	>6.0	---	---	>48	Hard	Moderate	Moderate.
HpC:											
Hayter	B	None	---	---	>6.0	---	---	>48	Hard	Moderate	Moderate.
Potomac	A	Occasional	---	---	4.0-6.0	Apparent	---	>60	---	Low	Moderate.
Stokly	B	Occasional	Very brief	Dec-May	0.5-1.0	Apparent	Dec-May	>60	---	Moderat	High.

TABLE 16.--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			
KmF, KsF:											
Kimper	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
Sharondale	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
Muskingum	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
MaF:											
Marrowbone	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate.
Dekalb	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Muskingum	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
MmF:											
Marrowbone	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate.
Fedscreek	B	None	---	---	>6.0	---	---	>40	Hard	Low	Moderate.
Myra	C	None	---	---	>6.0	---	---	>60	---	Low	Low.
Mo Melvin	D	Occasional	Brief	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High	Low.
MyB, MyD, MyF Myra	C	None	---	---	>6.0	---	---	>60	---	Low	Low.
NeD Nelse	B	Frequent	Brief to long.	Jan-Dec	>6.0	---	---	>60	---	Low	Moderate.
No Nolin	B	Occasional	Brief to long.	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	Low	Moderate.
Rc. Rock outcrop											
Rd Rowdy	B	Occasional	Brief	Jan-Apr	>6.0	---	---	>60	---	Moderat	Moderate.
Sh Shelbiana	B	Rare	---	---	>6.0	---	---	>60	---	Low	Moderate.
SmE:											
Shelocta	B	None	---	---	>6.0	---	---	>60	---	Low	High.
Muse	C	None	---	---	>4.0	Apparent	Jan-Apr	>40	Soft	High	High.
UdB, UdD. Udorthents											
Ur:											
Udorthents.											
Urban land.											
Ye Yeager	A	Frequent	Brief	Dec-Jun	4.0-6.0	Apparent	Dec-May	>60	---	Low	High.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS

[Absence of an entry indicates material was not detected. ND indicates no determination was made. Soils sampled are the typical pedons for the series. See the section "Soil Series and Their Morphology" for location of pedon sample]

Soil name, report number, horizon, and depth in inches		Total: Sand (2-0.05 mm)	Total: Silt (0.05-0.002) mm)	Total: Clay (< 0.002 mm)	Particle-size distribution: Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand coarser than very fine (2-0.1 mm)	Very fine sand plus silt (0.1-0.002 mm)	Textural class	Coarse fragments: <2 mm	Coarse fragments: 2-20 mm	Coarse fragments: 20-75 mm
		Pct <2 mm											Pct	Pct	Pct
Berks channery silt loam: 1/ (83KY-195-9)															
A	0-3	---	---	---	---	---	---	---	---	---	---	---	---	---	---
BA	3-7	24.1	56.9	19.0	3.9	4.5	4.5	4.2	7.0	17.1	63.9	sil	48	26	22
Bw1	7-17	24.7	56.1	19.2	5.6	5.2	4.0	4.0	5.9	18.8	62.0	sil	54	25	29
Bw2	17-27	30.4	52.8	16.8	5.0	4.8	5.8	6.7	8.1	22.3	60.9	sil	59	26	33
R	27	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Dekalb channery fine sandy loam: 1/ (83KY-195-15)															
A	0-3	68.4	23.7	7.9	1.4	6.7	18.9	34.2	7.2	61.2	30.9	fsl	29	17	12
BA	3-7	67.2	23.9	8.9	2.3	6.0	17.9	33.4	7.6	59.6	31.5	fsl	18	7	11
Bw	7-21	67.0	25.0	8.0	2.5	7.2	19.1	31.5	6.7	60.3	31.7	fsl	23	10	13
C	21-28	61.5	29.1	9.4	2.2	8.3	19.2	26.0	5.8	55.7	34.9	fsl	47	14	33
R	28	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Fedscreek channery loam: 1/ (83KY-195-18)															
A	0-4	38.0	48.5	13.5	6.5	3.7	7.5	11.9	8.4	29.6	56.9	l	33	20	13
BA	4-8	33.8	52.2	14.0	4.8	2.8	6.6	11.0	8.6	25.2	60.8	sil	24	16	8
Bw1	8-16	40.4	45.5	14.1	4.9	3.0	8.7	14.2	9.6	30.8	55.1	l	25	17	8
Bw2	16-30	43.6	41.7	14.7	4.4	3.7	10.1	15.6	9.8	33.8	51.5	l	26	17	9
Bw3	30-40	43.9	39.4	16.7	6.7	5.5	9.9	13.9	7.9	36.0	47.3	l	34	14	20
Bw4	40-48	40.5	39.6	19.9	11.6	5.1	7.4	10.1	6.3	34.2	45.9	l	34	20	14
C1	48-60	36.8	45.8	17.4	6.3	5.2	8.2	10.5	6.6	30.2	52.4	l	47	17	30
C2	60-65	27.4	55.9	16.7	5.0	5.0	5.1	6.4	5.9	21.5	61.8	sil	39	32	7
R	65	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth in inches	Total: Sand (2-0.05 mm)	Total: Silt (0.05-0.002) mm)	Total: Clay (< 0.002 mm)	Particle-size distribution, Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand coarser than very fine (2-0.1 mm)	Very fine sand plus silt (0.1-0.002 mm)	Textural class	Coarse fragments: <2 mm	Coarse fragments: 2-20 mm	Coarse fragments: 20-75 mm
	Pct <2 mm											Pct	Pct	Pct
Kimper channery loam: 1/ (83KY-195-12)														
A-------------- 0-8	44.3	37.9	17.8	8.2	7.8	8.8	10.2	9.3	35.0	47.2	l	64	57	7
BA------------- 8-13	41.7	40.2	18.1	6.4	6.6	8.9	10.0	9.8	31.9	50.0	l	49	42	7
Bw1------------ 13-27	36.8	46.7	16.5	7.1	4.6	7.5	8.7	8.9	27.9	55.6	l	34	21	13
Bw2------------ 27-41	34.8	45.1	20.1	5.8	5.7	6.8	7.5	9.0	25.8	54.1	l	36	24	12
Bw3------------ 41-52	46.1	40.2	13.7	8.6	7.0	8.8	10.9	10.8	35.3	51.0	l	56	26	30
C1------------- 52-64	52.4	37.2	10.4	6.3	8.3	12.6	14.0	11.2	41.2	48.4	fsl	55	41	14
C2------------- 64-75	48.8	39.6	11.6	6.5	6.2	11.8	13.3	11.0	37.8	50.6	l	42	27	15
R-------------- 75	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Marrowbone fine sandy loam: 1/ (83KY-195-17)														
A-------------- 0-5	53.3	33.0	13.7	2.8	4.8	17.3	20.9	7.5	45.8	40.5	fsl	19	15	4
Bw1------------ 5-10	51.4	34.8	13.8	1.9	3.9	17.0	21.3	7.3	44.1	42.1	l	6	6	---
Bw2------------ 10-17	52.6	32.8	14.6	5.7	5.9	16.5	18.3	6.2	46.4	39.0	fsl	13	6	7
Bw3------------ 17-23	49.6	35.7	14.7	4.7	5.2	14.7	17.1	7.9	41.7	43.6	l	19	11	8
BC------------- 23-28	49.1	37.1	13.8	11.1	6.7	10.9	11.8	8.6	40.5	45.7	l	28	12	16
R-------------- 28	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Muse silt loam: 1/ (83KY-195-7)														
A-------------- 0-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---
BE------------- 6-11	7.2	60.2	32.6	1.0	1.2	1.6	1.7	1.7	5.5	61.9	sicl	18	5	13
Bt1------------ 11-22	6.0	48.0	46.0	1.3	1.4	1.4	1.3	0.6	5.4	48.6	sic	26	7	19
Bt2------------ 22-35	7.0	45.8	47.2	1.8	1.7	1.4	1.1	1.0	6.0	46.8	sic	29	5	24
Bt3------------ 35-46	---	---	---	---	---	---	---	---	---	---	---	---	---	---
C-------------- 46-53	12.0	43.6	44.4	1.3	1.8	1.9	3.0	4.0	8.0	47.6	sic	52	8	44
Cr------------- 53	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Muskingum channery silt loam: 1/ (83KY-195-16)														
A-------------- 0-4	3.3	75.8	20.9	0.0	0.0	0.1	0.2	3.0	0.3	78.8	sil	32	16	16
Bw1------------ 4-12	28.1	49.8	22.1	3.0	3.8	6.0	8.1	7.2	20.9	57.0	sil	23	7	16
Bw2------------ 12-24	25.1	51.6	23.3	2.3	3.7	4.8	6.9	7.4	17.7	59.0	sil	41	19	22
C-------------- 24-30	34.8	46.8	18.4	9.4	4.7	3.5	5.8	11.4	23.4	58.2	l	50	21	29
R-------------- 30	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth in inches		Total: Sand (2-0.05 mm)	Total: Silt (0.05-0.002) mm)	Total: Clay (< 0.002 mm)	Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand coarser than very fine (2-0.1 mm)	Very fine sand plus silt (0.1-0.002 mm)	Textural class	Coarse fragments: <2 mm	Coarse fragments: 2-20 mm	Coarse fragments: 20-75 mm
		Pct <2 mm											Pct	Pct	Pct
Myra very channery silt loam: 1/ 3/ (82KY-195-1)															
Ap-------------	0-6	26.0	55.9	18.1	5.6	4.1	3.5	5.5	7.3	18.7	63.2	sil	75	28	47
C1-------------	6-19	23.4	59.4	17.2	7.0	4.2	2.6	3.7	5.9	17.5	65.3	sil	57	39	18
C2-------------	19-30	28.2	51.5	20.3	9.8	4.9	3.0	4.2	6.3	21.9	57.8	sil	48	38	10
C2-------------	30-40	27.7	53.4	18.9	6.1	5.0	3.2	6.0	7.4	20.3	60.8	sil	70	34	36
C3-------------	40-50	29.9	52.9	17.2	8.7	5.7	3.6	5.2	6.7	23.2	59.6	sil	79	47	32
C4-------------	50-57	32.9	50.8	16.3	12.4	5.4	3.2	4.4	7.5	25.4	58.3	sil	67	35	32
C4-------------	57-78	31.1	52.9	16.0	9.9	6.0	3.5	4.4	7.3	23.8	60.2	sil	61	39	22
Nelse loam: 2/ (84KY-195-1)															
A--------------	0-12	41.0	44.9	14.1	0.3	0.8	2.4	13.9	23.6	17.4	68.5	l	---	---	---
C1-------------	12-30	66.3	21.6	12.1	0.3	1.4	7.9	32.5	24.2	42.1	45.8	fsl	---	---	---
C2-------------	30-63	83.3	8.5	8.2	0.1	0.4	6.1	56.0	20.7	62.6	29.2	lfs	---	---	---
C3-------------	63-80	81.4	11.1	7.5	0.1	0.2	3.2	48.4	29.5	51.9	40.6	lfs	---	---	---
Sharondale channery fine sandy loam: 1/ (83KY-195-10)															
A--------------	0-13	53.1	31.7	15.2	9.4	6.4	13.1	16.1	8.1	45.0	39.8	fsl	43	25	18
BA-------------	13-18	50.3	33.5	16.2	4.7	6.4	13.9	16.9	8.4	41.9	41.9	l	39	24	15
Bw1------------	18-34	49.8	34.5	15.7	3.9	5.9	15.4	17.3	7.3	42.5	41.8	l	53	28	25
Bw2------------	34-49	56.4	29.0	14.6	8.1	8.5	16.4	16.7	6.7	49.7	35.7	sl	69	18	51
Bw3------------	49-63	56.4	34.0	9.6	7.7	7.8	12.7	19.2	9.0	47.4	43.0	fsl	47	10	37
Bw4------------	63-75	51.8	36.6	11.6	9.6	6.8	10.1	15.3	10.0	41.8	46.6	l	56	18	38
C--------------	75-86	48.7	38.6	12.7	8.2	6.2	9.6	15.2	9.5	39.2	48.1	l	63	17	46
R--------------	86	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Shelbiana loam: 2/ (84KY-195-2)															
Ap-------------	0-10	44.1	36.9	19.0	0.1	0.5	2.2	18.5	22.8	21.3	59.7	l	---	---	---
AB-------------	10-16	38.4	37.4	24.2	0.1	0.2	0.9	16.0	21.2	17.2	58.6	l	---	---	---
Bt1------------	16-32	28.3	45.7	26.0	0.1	0.2	0.2	5.8	22.0	6.3	67.7	l	---	---	---
Bt2------------	32-50	31.8	42.8	25.4	0.1	0.2	0.2	5.2	26.1	5.7	68.9	l	---	---	---
BC-------------	50-65	35.6	40.8	23.6	0.0	0.1	0.2	6.4	28.9	6.7	69.7	l	---	---	---
C--------------	65-80	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 17.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil name, report number, horizon, and depth in inches		Total: Sand (2-0.05 mm)	Total: Silt (0.05-0.002) mm)	Total: Clay (< 0.002 mm)	Sand: Very coarse (2-1 mm)	Sand: Coarse (1-0.5 mm)	Sand: Medium (0.5-0.25 mm)	Sand: Fine (0.25-0.1 mm)	Sand: Very fine (0.1-0.05 mm)	Sand coarser than very fine (2-0.1 mm)	Very fine sand plus silt (0.1-0.002 mm)	Textural class	Coarse fragments: <2 mm	Coarse fragments: 2-20 mm	Coarse fragments: 20-75 mm
		Pct <2 mm											Pct	Pct	Pct
Stokly loam: 1/ (82KY-195-5)															
A	0-7	39.9	45.0	15.1	0.6	2.0	10.0	15.5	11.8	28.1	56.8	1	2	2	---
Bw	7-23	42.8	41.5	15.7	0.3	2.2	11.1	17.3	11.9	30.9	53.4	1	2	2	---
Bg	23-32	40.7	40.6	18.7	1.1	2.8	11.3	15.3	10.2	30.5	50.8	1	6	5	1
Cg	32-69	48.8	33.4	17.8	0.6	3.7	15.4	18.5	10.6	38.2	44.0	1	4	4	---
Yeager loam: 1/ (82KY-195-6)															
Ap	0-9	44.2	44.6	11.2	0.0	0.2	2.5	23.4	18.1	26.1	62.7	1	---	---	---
C1	9-18	69.0	23.6	7.4	0.2	0.7	22.5	33.8	11.8	57.2	35.4	fsl	---	---	---
C2	18-27	76.3	18.4	5.3	0.0	0.7	26.4	37.5	11.7	64.6	30.1	ls	---	---	---
C3	27-46	82.7	13.2	4.1	0.0	0.0	9.3	53.5	19.9	62.8	33.1	lfs	---	---	---
C4	46-80	41.2	46.2	12.6	0.0	0.0	0.6	15.8	24.8	16.4	71.0	1	---	---	---

1/ Analyses by the National Soil Survey Laboratory.
2/ Analyses by the Kentucky Agricultural Experiment Station.
3/ The C2 and C4 horizons of Myra very channery silt loam were subdivided for sampling.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS

[Absence of an entry indicates analysis was not conducted. A dash indicates the element was not detected. TR indicates trace. Soils sampled are the typcial pedons for the soil series. See the section "Soil Series and Their Morphology" for location of pedon sample]

Soil name, report number, horizon, and depth in inches	Reaction			Extractable cations					Cation-exchange capacity		Ex-trac-table acid-ity	Ex-trac-table alum-inum	Base saturation		Or-gan-ic mat-ter	Cal-cium car-bonate equiv-alent
	$CaCl_2$ (1:2)	H_2O (1:1)	KCl 1N (1:1)	Ca	Mg	K	Na	Total	Ammo-nium ace-tate	Sum of cat-ions			Ammo-nium ace-tate	Sum of cat-ions		
	pH	pH	pH	-----Milliequivalents per 100 grams of soil------									Pct	Pct	Pct	Pct
Berks channery silt loam: 1/ (83KY-195-9)																
A-------- 0-3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
BA------- 3-7	4.3	4.9	---	2.6	1.4	0.3	0.1	4.4	11.5	16.2	11.8	1.8	38	27	1.8	---
Bw1------ 7-17	4.1	4.8	---	1.1	1.4	0.1	TR	2.6	9.5	12.4	9.8	2.3	27	21	0.9	---
Bw2------ 17-27	4.2	5.0	---	1.3	2.0	0.2	0.1	3.6	9.2	11.8	8.2	1.2	39	31	0.9	---
R-------- 27	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Dekalb channery fine sandy loam: 1/ (83KY-195-15)																
A-------- 0-3	4.5	5.2	---	3.0	0.5	0.2	TR	3.7	8.4	13.9	10.2	0.5	44	27	4.3	---
BA------- 3-7	4.3	4.7	---	0.3	0.1	0.2	TR	0.6	4.1	7.8	7.2	1.0	15	8	1.5	---
Bw------- 7-21	4.3	4.7	---	TR	0.1	0.1	TR	0.2	2.8	6.2	6.0	1.0	7	3	0.5	---
C-------- 21-28	4.3	4.7	---	0.1	0.2	0.3	TR	0.6	2.9	6.2	5.6	1.0	21	10	0.5	---
R-------- 28	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Fedscreek channery loam: 1/ (83KY-195-18)																
A-------- 0-4	4.5	5.0	---	2.2	1.0	0.4	0.1	3.7	10.1	15.3	11.6	1.3	37	24	3.7	---
BA------- 4-8	4.4	4.8	---	0.4	0.7	0.2	TR	1.3	5.5	11.4	10.1	1.7	24	11	1.3	---
Bw1------ 8-16	4.5	4.9	---	0.3	0.5	0.2	TR	1.0	4.3	7.6	6.6	1.5	23	13	0.6	---
Bw2------ 16-30	4.4	4.8	---	0.2	0.5	0.2	0.1	1.0	5.0	7.2	6.2	1.4	20	14	0.3	---
Bw3------ 30-40	4.6	5.0	---	0.1	1.3	0.3	0.1	1.8	5.3	8.2	6.4	1.1	34	22	0.2	---
Bw4------ 40-48	4.5	5.0	---	---	2.1	0.3	0.2	2.6	6.8	9.4	6.8	1.4	38	28	0.2	---
C1------- 48-60	4.4	4.9	---	---	1.9	0.2	0.1	2.2	7.2	10.6	8.4	1.8	31	21	0.7	---
C2------- 60-65	4.2	4.8	---	0.2	1.9	0.6	0.1	2.8	9.8	12.0	9.2	2.7	29	23	1.4	---
R-------- 65	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Kimper channery loam: 1/ (83KY-195-12)																
A-------- 0-8	5.9	6.2	---	22.7	2.5	0.5	0.1	25.8	28.5	34.7	13.9	---	91	65	11.1	---
BA------- 8-13	4.9	5.5	---	5.0	0.9	0.3	0.1	6.3	12.2	19.3	13.0	0.1	52	33	3.4	---
Bw1------ 13-27	4.7	5.3	---	2.4	0.9	0.2	0.1	3.6	7.2	10.4	6.8	0.5	50	35	0.9	---
Bw2------ 27-41	4.9	5.7	---	3.9	1.4	0.1	TR	5.4	9.1	13.0	7.6	---	59	42	1.2	---
Bw3------ 41-52	4.9	5.7	---	4.3	1.7	0.2	0.1	6.3	9.5	14.6	8.3	---	66	43	1.7	---
C1------- 52-64	4.9	5.7	---	4.3	1.8	0.1	0.1	6.3	10.2	14.7	8.4	---	62	43	2.7	---
C2------- 64-75	4.8	5.7	---	5.2	2.3	0.2	TR	7.7	14.0	17.2	9.5	---	55	45	3.6	---
R-------- 75	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Marrowbone fine sandy loam: 1/ (83KY-195-17)																
A-------- 0-5	5.0	5.6	---	2.6	0.8	0.2	TR	3.6	5.9	9.9	6.3	0.4	61	36	1.6	---
Bw1------ 5-10	4.6	5.3	---	1.5	0.6	0.1	TR	2.2	4.3	7.7	5.5	0.5	51	29	0.6	---
Bw2------ 10-17	4.5	4.9	---	0.9	0.6	0.1	TR	1.6	4.3	7.6	6.0	1.1	37	21	0.3	---
Bw3------ 17-23	4.5	5.0	---	1.0	1.2	0.1	TR	2.3	4.6	8.2	5.9	0.9	50	28	0.3	---
BC------- 23-28	4.6	5.1	---	1.1	1.8	0.1	TR	3.0	5.1	8.9	5.9	---	59	34	0.3	---
R-------- 28	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS--CONTINUED

Soil name, report number, horizon, and depth in inches	Reaction: $CaCl_2$ (1:2)	Reaction: H_2O (1:1)	Reaction: KCl 1N (1:1)	Extractable cations: Ca	Extractable cations: Mg	Extractable cations: K	Extractable cations: Na	Extractable cations: Total	Cation-exchange capacity: Ammonium acetate	Cation-exchange capacity: Sum of cations	Extractable acidity	Extractable aluminum	Base saturation: Ammonium acetate	Base saturation: Sum of cations	Organic matter	Calcium carbonate equivalent
	pH	pH	pH	-----Milliequivalents per 100 grams of soil------									Pct	Pct	Pct	Pct
Muse silt loam: 1/ (83KY-195-7)																
A-------- 0-6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
BE------- 6-11	3.9	4.4	---	1.0	0.5	0.3	TR	1.8	15.1	17.6	15.8	0.7	15.1	17.6	2.9	---
Bt1------ 11-22	3.7	4.4	---	0.5	0.5	0.3	TR	1.3	13.0	16.7	15.4	1.4	13.0	16.7	0.6	---
Bt2------ 22-35	3.7	4.4	---	0.4	0.6	0.3	TR	1.3	12.7	16.1	14.8	1.0	12.7	16.1	0.5	---
Bt3------ 35-46	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
C-------- 46-53	3.7	4.5	---	0.1	0.8	0.3	TR	1.2	12.5	15.1	13.9	1.3	12.5	15.1	0.3	---
Cr------- 53	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Muskingum channery silt loam: 1/ (83KY-195-16)																
A-------- 0-4	3.9	4.5	---	2.0	0.6	0.3	TR	2.9	17.7	25.1	22.2	5.3	16	12	8.2	---
Bw1------ 4-12	4.2	4.6	---	TR	0.9	0.2	0.1	1.2	9.6	13.6	12.4	4.1	12	9	1.8	---
Bw2------ 12-24	4.2	4.7	---	0.1	1.4	0.3	TR	1.8	7.9	11.5	9.7	3.0	23	16	1.0	---
C-------- 24-30	4.1	4.7	---	---	1.6	0.3	0.1	2.0	8.1	11.2	9.2	3.0	25	18	0.7	---
R-------- 30	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Myra very channery silt loam: 1/ 4/ (82KY-195-1)																
Ap------- 0-6	7.4	7.7	---	9.6	4.8	0.2	0.1	14.7	8.0	17.3	2.6	---	100	85	2.5	TR
C1------- 6-19	7.6	8.0	---	11.2	5.8	0.2	0.2	17.4	7.2	19.3	1.9	---	100	90	1.6	TR
C2------- 19-30	7.5	7.9	---	7.7	4.9	---	---	12.6	6.9	14.1	1.5	---	100	89	1.7	TR
C2------- 30-40	7.7	8.0	---	10.2	5.3	0.2	0.1	15.8	7.0	17.2	1.4	---	100	92	1.3	TR
C3------- 40-50	7.8	8.2	---	9.4	5.5	0.2	TR	15.1	5.7	16.4	1.3	---	100	92	1.5	TR
C4------- 50-57	7.7	8.1	---	12.0	6.0	0.2	0.1	18.3	5.6	19.6	1.3	---	100	93	1.4	TR
C4------- 57-78	7.8	8.2	---	10.1	5.5	0.2	0.1	15.9	5.8	18.4	2.5	---	100	86	1.4	TR
Nelse loam: 2/ (84KY-195-1)																
A-------- 0-12	---	6.1	5.5	5.6	1.9	0.2	TR	7.7	8.5	12.7	5.0	---	90.6	60.6	---	---
C1------- 12-30	---	5.7	4.7	3.4	1.4	0.1	TR	4.9	5.8	9.3	4.4	---	84.5	52.7	---	---
C2------- 30-63	---	6.2	5.1	2.2	0.7	0.2	TR	3.1	3.8	8.6	5.5	---	81.6	36.0	---	---
C3------- 63-80	---	6.0	4.5	2.3	0.8	0.2	TR	3.3	3.4	5.3	2.0	---	97.1	62.3	---	---
Sharondale channery fine sandy loam: 1/ (83KY-195-10)																
A-------- 0-13	5.4	5.9	---	10.0	1.2	0.2	TR	11.4	14.1	21.8	10.4	---	81	52	4.1	---
BA------- 13-18	4.9	5.6	---	5.2	0.6	0.3	0.1	6.2	8.9	15.6	9.4	---	70	40	2.0	---
Bw1------ 18-34	5.0	5.8	---	3.0	0.4	TR	0.1	3.5	6.1	10.0	6.5	---	57	35	0.9	---
Bw2------ 34-49	5.2	5.9	---	3.7	0.9	0.1	TR	4.7	6.0	10.8	6.1	---	78	44	0.8	---
Bw3------ 49-63	5.3	6.1	---	3.3	1.6	0.1	0.2	5.2	6.4	10.0	4.8	---	81	52	0.5	---
Bw4------ 63-75	5.2	6.0	---	3.4	2.2	TR	0.1	5.7	6.2	10.8	5.1	---	92	53	0.4	---
C-------- 75-86	5.0	5.8	---	3.4	2.2	0.1	TR	5.7	6.2	10.7	5.0	---	92	53	0.3	---
R-------- 86	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Shelbiana loam: 1/ (84KY-195-2)																
Ap------- 0-10	---	6.0	---	3.5	1.0	0.1	0.1	4.7	10.3	---	---	---	46	---	3.0	---
AB------- 10-16	---	5.9	---	2.8	0.6	0.1	0.1	3.6	9.4	---	---	---	28	---	2.2	---
Bt1------ 16-32	---	5.6	---	1.8	0.2	0.1	0.1	2.2	8.3	---	---	---	27	---	1.0	---
Bt2------ 32-50	---	5.3	---	1.3	0.4	0.1	0.1	1.9	8.4	---	---	---	23	---	1.0	---
BC------- 50-65	---	5.3	---	1.5	0.8	0.1	0.1	2.5	7.8	---	---	---	32	---	0.9	---
C-------- 65-80	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

See footnotes at end of table.

TABLE 18.--CHEMICAL ANALYSES OF SELECTED SOILS--CONTINUED

Soil name, report number, horizon, and depth in inches	Reaction			Extractable cations					Cation-exchange capacity		Extractable acidity	Extractable aluminum	Base saturation		Organic matter	Calcium carbonate equivalent
	$CaCl_2$ (1:2)	H_2O (1:1)	KCl 1N (1:1)	Ca	Mg	K	Na	Total	Ammonium acetate	Sum of cations			Ammonium acetate	Sum of cations		
	pH	pH	pH	-----Milliequivalents per 100 grams of soil------									Pct	Pct	Pct	Pct
Stokly loam: 1/ 3/ (82KY-195-5)																
A-------- 0-7	4.2	4.7	---	1.8	0.9	0.1	0.2	3.0	7.8	11.6	8.6	1.0	38	26	1.9	---
Bw------- 7-23	4.4	5.0	---	1.5	0.8	0.1	0.1	2.5	6.9	9.9	7.4	0.9	36	25	0.9	---
Bg------- 23-32	4.7	5.2	---	1.9	1.4	0.1	TR	3.4	7.8	10.6	7.2	0.5	44	32	0.7	---
Cg------- 32-69	5.0	5.8	---	2.6	1.6	0.1	0.2	4.5	7.1	10.7	6.2	0.1	63	42	0.8	---
Yeager loam: 2/ (82KY-195-6)																
Ap------- 0-9	5.1	5.7	---	5.0	1.4	0.2	0.2	6.8	9.2	13.5	6.7	TR	74	50	3.6	---
C1------- 9-18	4.9	5.7	---	2.3	0.7	0.1	0.2	3.3	4.5	7.9	4.6	TR	73	42	1.2	---
C2------- 18-27	4.8	5.6	---	1.6	0.5	TR	0.2	2.3	3.5	6.0	3.7	TR	66	38	0.8	---
C3------- 27-46	4.7	5.3	---	1.2	0.4	TR	0.1	1.7	2.9	4.7	3.0	0.2	59	36	0.6	---
C4------- 46-80	4.5	5.1	---	2.6	0.7	0.1	0.1	3.5	7.0	11.1	7.6	0.5	60	32	1.3	---

1/ Analyses by the National Soil Survey Laboratory.

2/ Analyses by the Kentucky Agricultural Experiment Station.

3/ The Cg horizon of Stokly loam has slightly higher pH value in a 1:1 water dilution than allowed for the acid reaction class; however, this value is within the normal range of laboratory error and field observation. This soil is not considered a taxadjunct.

4/ The C2 and C4 horizons of Myra very channery silt loam were subdivided for sampling.

TABLE 19.--MINERALOGY OF SELECTED SOILS

[A dash indicates the mineral was not detected. TR indicates trace]

Soil name, sample number, horizon, and depth in inches	Resistant minerals: Quartz	Resistant minerals: Opaques	Resistant minerals: Resistant aggregates	Resistant minerals: Other* resistant minerals	Resistant minerals: Total resistant minerals	Weatherable minerals: Biotite	Weatherable minerals: Calcite	Weatherable minerals: Chlorite	Weatherable minerals: Coal	Weatherable minerals: Muscovite	Weatherable minerals: Plagioclase feldspar	Weatherable minerals: Potassium feldspar	Weatherable minerals: Sericite	Weatherable minerals: Weatherable aggregates	Fraction analyzed
	Pct					Pct									
Dekalb channery fine sandy loam: (83KY-195-15)															
Bw------------ 7-21	85	1	---	---	86	---	---	---	---	1	1	11	1	---	fs
Fedscreek channery loam: (83KY-195-18)															
Bw2----------- 16-30	80	3	---	---	83	1	---	---	---	1	---	13	1	1	fs
C2------------ 60-65	60	1	---	---	62	12	---	TR	---	10	---	10	4	2	vfs
Kimper channery loam: (83KY-195-12)															
Bw2----------- 27-41	71	1	3	---	75	1	---	---	---	6	7	8	3	---	vfs
C2------------ 64-75	67	---	---	---	67	6	---	TR	---	6	TR	14	6	1	vfs
Marrowbone fine sandy loam: (83KY-195-17)															
Bw2----------- 10-17	79	2	1	---	82	---	---	---	---	1	---	16	1	---	fs
Muskingum channery silt loam: (83KY-195-16)															
Bw2----------- 12-24	54	1	---	---	55	12	---	---	10	---	---	5	9	9	vfs
Myra very channery silt loam: (82KY-195-1)															
C2------------ 19-30	57	---	6	---	63	3	1	---	14	9	6	4	---	---	vfs
C4------------ 57-78	59	---	6	---	65	1	2	1	7	16	4	4	---	---	vfs
Sharondale channery fine sandy loam: (83KY-195-10)															
Bw1----------- 18-34	82	1	---	TR	83	1	---	---	---	---	7	9	---	---	fs
C------------- 75-86	72	1	4	---	77	3	---	---	---	4	11	2	3	---	fs
Stokly loam: (82KY-195-5)															
Bw------------ 7-23	70	---	3	TR	73	2	---	---	1	6	9	9	---	---	vfs

See footnote at end of table.

TABLE 19.--MINERALOGY OF SELECTED SOILS--Continued

Soil name, sample number, horizon, and depth in inches	Resistant minerals					Weatherable minerals									Fraction analyzed
	Quartz	Opaques	Resistant aggregates	Other* resistant minerals	Total resistant minerals	Biotite	Calcite	Chlorite	Coal	Muscovite	Plagioclase feldspar	Potassium feldspar	Sericite	Weatherable aggregates	
	Pct					Pct									
Yeager loam:															
(82KY-195-6)															
C2------------ 18-27	63	---	4	TR	67	3	---	---	---	7	14	9	---	---	vfs
C3------------ 27-46	81	---	4	---	85	1	---	---	---	2	5	7	---	---	fs
C4------------ 46-80	65	---	4	TR	69	5	---	---	TR	7	13	6	---	---	vfs

* Includes plant opal, tourmaline, and zircon.

TABLE 20.--ENGINEERING INDEX TEST DATA

[The symbol > means larger than. Dashes indicate data were not available. NP means nonplastic]

Soil name, sample number, horizon, and depth (in inches)	Classification: AASHTO	Classification: Unified	Grain-size distribution: Percent >3 inches	Percentage passing sieve--: 2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: .02 mm	.005 mm	.002 mm	Liquid limit	Plasticity index	Moisture density: Maximum dry density	Optimum moisture	Specific gravity
														Pct		Lb/ft³	Pct	
Hayter loam: *																		
(82KY-195-3)																		
BA---------- 8-24	A-6 (00)	SC	0	100	98	93	83	65	60	47	35	22	12	36	13	111	17	2.68
Bt2 & Bt3--- 35-57	A-4 (00)	SC	3	99	94	90	84	72	65	45	30	15	9	25	8	119	13	2.73
Myra very channery silt loam: **																		
(82KY-195-1)																		
C2---------- 19-40	A-2-4(00)	GC	23	98	82	66	53	40	36	31	27	16	8	31	10	121	12	2.68
C4---------- 50-78	A-2-4(00)	GC	25	98	81	66	53	40	35	30	22	11	5	29	8	124	11	2.69
Yeager loam: **																		
(82KY-195-6)																		
C3---------- 27-46	A-2-4(00)	SM	0	100	100	100	100	100	100	30	12	2	0	---	NP	109	14	2.67

* Hayter loam: Location of pedon sample is about 7.4 miles northwest of Pikeville, 0.8 mile south of Boldman Bridge, 75 feet south of Kentucky Highway 1384. In the BA horizon, data indicate that the percentage passing number 4 and 10 sieves are slightly below the minimum allowed for the series. In the Bt horizon, the percentage passing the number 4 sieve and the liquid limit and plasticity index are also slightly below the minimum values. These differences are outside the series range; however, they are within the range of laboratory error, and the soil is not considered to be a taxadjunct.

** Soils sampled are the typical pedons for the soil series. See the section "Soil Series and Their Morphology" for location of pedon sample.

TABLE 21.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Caneyville	Fine, mixed, mesic Typic Hapludalfs
*Combs	Coarse-loamy, mixed, mesic Fluventic Hapludolls
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Fedscreek	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Grigsby	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Hayter	Fine-loamy, mixed, mesic Ultic Hapludalfs
Kimper	Fine-loamy, mixed, mesic Umbric Dystrochrepts
Marrowbone	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
*Muse	Clayey, mixed, mesic Typic Hapludults
Muskingum	Fine-loamy, mixed, mesic Typic Dystrochrepts
Myra	Loamy-skeletal, mixed, calcareous, mesic Typic Udorthents
Nelse	Coarse-loamy, mixed, nonacid, mesic Mollic Udifluvents
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Potomac	Sandy-skeletal, mixed, mesic Typic Udifluvents
Rowdy	Fine-loamy, mixed, mesic Fluventic Dystrochrepts
*Sharondale	Loamy-skeletal, mixed, mesic Typic Hapludolls
Shelbiana	Fine-silty, mixed, mesic Typic Palehumults
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
Stokly	Coarse-loamy, mixed, acid, mesic Aeric Fluvaquents
Udorthents	Udorthents
Yeager	Sandy, mixed, mesic Typic Udifluvents

* 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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