SOIL SURVEY OF

Pulaski County, Kentucky

United States Department of Agriculture
Soil Conservation Service and Forest Service
In cooperation with
Kentucky Agricultural Experiment Station

Issued December 1974

Major fieldwork for this soil survey was done in the period 1961–69. Soil names and descriptions were approved in 1969. Unless otherwise indicated, statements in this survey refer to conditions in the county in 1969. This survey was made cooperatively by the Soil Conservation Service and Forest Service and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Pulaski County Soil Conservation District.

Copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Pulaski County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification and woodland suitability group of each. It also shows the page where each soil is described and the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units.

Foresters and others can refer to the section "Use of the Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and recreation areas in the section "Use of the Soils for Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of Soils."

Newcomers in Pulaski County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "General Nature of the County."

Cover: **Typical landscape in soil association 2.**

Contents

	Page
How this survey was made	1
General soil map	2
1. Garmon-Frankstown-Trimble association	2
2. Frederick-Mountview association	3
3. Cumberland-Pembroke association	4
4. Hartsells-Garmon-Mountview association	5
5. Bedford-Lawrence-Hartsells association	5
6. Frederick-Fredonia-Talbott association	6
7. Fredonia-Talbott-Brookside association	7
8. Jefferson-Shelocta-Muse association	8
9. Whitley-Hartsells-Muse association	8
Descriptions of the soils	8
Allegheny series	9
Ashton series	9
Bedford series	11
Brookside series	12
Chagrin series	12
Colyer series	13
Cumberland series	13
Dekalb series	15
Etowah series	16
Frankstown series	17
Frederick series	18
Fredonia seris	20
Garmon series	22
Gilpin series	22
Hartsells series	23
Huntington series	24
Jefferson series	25
Lawrence series	26
Lindside series	27
Melvin series	27
Monongahela series	28
Mountview series	28
Muse series	29
Needmore series	31
Newark series	33
Nolichucky series	34
Nolin series	34
Pembroke series	35
Pope series	36
Robertsville series	36
Rockcastle series	37
Descriptions of the soils—Continued	
Rock outcrop	37
Shelocta series	37
Stendal series	39
Strip mines	39
Talbott series	40
Tarklin series	41
Tilsit series	41
Trimble series	42
Waynesboro series	43
Whitley series	44
Use and management of the soils	45
Use of the soils for crops and pasture	45
General principles of soil management	45
Capability grouping	46
Use and management by capability units	46
Estimated yields	53
Use of the soils as woodland	56
Woodland suitability grouping of soils	56
Use of the soils for wildlife	58
Engineering uses of the soils	70
Engineering soil classification systems	71
Estimated soil properties significant to engineering	90
Interpretations of engineering properties	91
Engineering test data	92
Use of the soils for town and country planning	92
Formation and classification of soils	93
Formation of soils	93
Parent material	93
Climate	93
Plant and animal life	93
Relief	114
Time	114
Classification of the soils	114
General nature of the county	116
Geology, relief, and drainage	117
Farming	117
Industry, transportation, and markets	117
Climate	118
Literature cited	118
Glossary	119
Guide to mapping units Following	121

Issued December 1974

SOIL SURVEY OF PULASKI COUNTY, KENTUCKY

BY JAMES C. ROSS, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY JAMES C. ROSS, ALBERT S. JOHNSON, JUNIUS G. STAPP, DAVID T. CARROLL, THOMAS G. SPARKS, AND FRED S. ARMS, SOIL CONSERVATION SERVICE, AND PETER E. AVERS, GEORGE D. BOTTRELL, LEWIS G. MANHART, AND JOHN K. LONG, JR., FOREST SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND FOREST SERVICE, IN COOPERATION WITH KENTUCKY AGRICULTURAL EXPERIMENT STATION

PULASKI COUNTY is in the south-central part of Kentucky (fig. 1). It has a land area of about 418,180 acres, or 653.4 square miles. Somerset, the county seat, is near the center of the county.

Most soils in the county are acid, and crops grown on them respond well to applications of lime and fertilizer. The soils in the central and western parts of the county are undulating to hilly and of limestone origin. In the eastern part, soils are mostly sandstone and shale in origin and are steep. Elevation in the county ranges from about 700 feet to about 1,700 feet above sea level. Lake Cumberland, built by the U.S. Army Corps of Engineers, covers about 8,500 acres of the county at normal pool stage, which is 723 feet above sea level. The climate is temperate, and the growing season averages about 179 days.

Farming is diversified in Pulaski County. About 2,800 farms are in the county, and they average about 85 acres in size. Growing crops and raising livestock are the main enterprises. About one-half of the farm income is from the sale of crops, principally tobacco. Production of timber products also provides a major source of income and employment. A charcoal briquette plant, a flooring mill, and several sawmills operate in the county. About 210,000 acres of the county is woodland, and about 24,000 acres of this is in the Daniel Boone National Forest and is administered by the Forest Service.

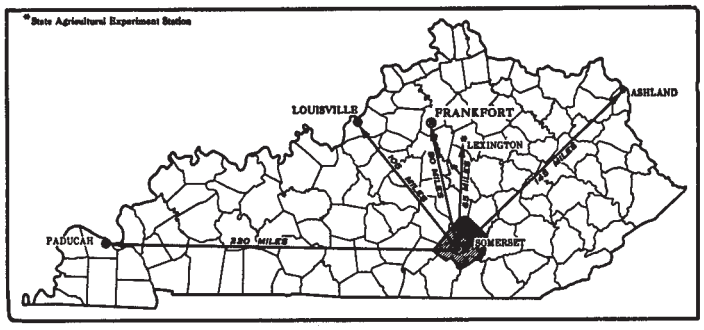

Figure 1.—**Location of Pulaski County in Kentucky.**

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Pulaski County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Frederick and Mountview, for example, are the names of two soil series. All the soils in the United States that have the same series names are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Frederick silt loam, 2 to 6 percent slopes, is one of several phases within the Frederick series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries

accurately. The soil map at the back of this publication was prepared from aerial photographs.

The area shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Pulaski County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Frederick-Jefferson complex, 20 to 50 percent slopes, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. Whitley and Tilsit silt loams, 2 to 6 percent slopes, is an undifferentiated soil group in this country.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Strip mines is a land type in this county.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Pulaski County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations of Pulaski County do not necessarily join those of McCreary County, Kentucky, because it has been necessary to rename some soil series since McCreary County was surveyed. Also, some of the associations shown in McCreary County are of such minor extent in Pulaski County that they do not justify delineation on the general soil map.

The soil associations in Pulaski County are described in the following pages.

1. Garmon-Frankstown-Trimble association

Gently sloping to very steep, moderately deep and deep, well-drained soils on deeply dissected uplands

One area of this association is in the extreme southwestern part of the county, and another extends north from Nancy. These areas are deeply dissected by streams. The convex ridgetops are comparatively narrow. The side slopes are plane, long, and steep to very steep and descend to narrow, concave valleys (fig. 2). The difference between the elevation of the ridgetops and that of the valley floors ranges from 200 to 300 feet.

This association makes up about 10 percent of the county. Garmon soils make up about 47 percent of it; Frankstown soils about 24 percent; Trimble soils about 12 percent; and minor soils the remaining 17 percent.

Garmon soils are steep and very steep and are on rugged side slopes. These soils are moderately deep over shaly limestone. They are well drained and have a subsoil of yellowish-brown shaly silt loam.

Frankstown soils are on comparatively narrow, convex ridgetops. These soils are gently sloping to moderately

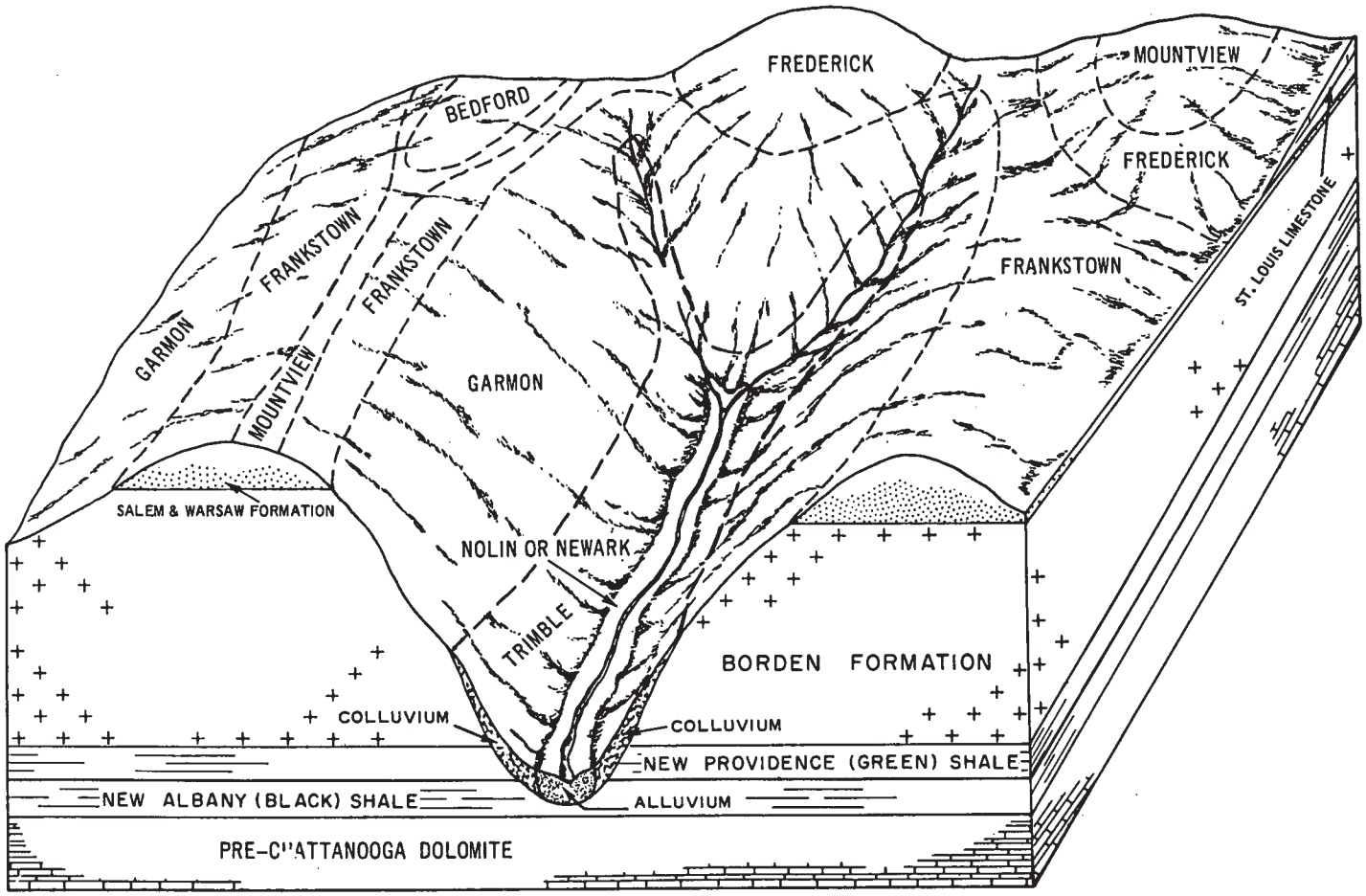

***Figure 2.*—Pattern of soils and underlying material in association 1.**

steep, moderately deep to deep, and well drained. They have a subsoil of brownish cherty silty clay loam.

Some areas of Trimble soils are on foot slopes, and they are gently sloping to moderately steep. Others are on side slopes, and they are steep and very steep. Trimble soils are deep and well drained. They have a subsoil of brownish cherty silt loam.

Minor soils in this association are the Frederick, Mountview, and Bedford soils on uplands; the Tarklin soils on foot slopes; and the Nolin and Newark soils on flood plains.

The average farm in this association is about 100 acres and is operated by the owner. The main enterprise is beef production, but there are a few medium-sized dairies. Most farms have a tobacco allotment of less than 1 acre.

Most of the areas of this association that are on side slopes are wooded. The areas on ridgetops and foot slopes are used mostly for pasture and hay, but a small acreage is used for tobacco and corn. About 70 percent of the acreage is wooded; 25 percent is in pasture and hay crops; and about 5 percent is in row crops, mainly corn and tobacco.

The main limitations to use of these soils for row crops are the hazard of erosion and the difficulty of using farm machinery.

2. *Frederick-Mountview association*

Gently sloping to moderately steep, deep, well-drained soils on ridgetops and side slopes

This association extends in a band from the western part of the county through the central and northeastern parts. The landscape generally consists of narrow ridgetops that gradually break to short, straight side slopes that descend to narrow valleys (fig. 3). In places, however, karst topography is dominant. The difference between the elevation of the ridgetops and that of the valley floors is about 100 feet.

This association makes up about 34 percent of the county. Frederick soils make up about 39 percent of it; Mountview soils about 12 percent; and minor soils the remaining 49 percent.

Frederick soils are gently sloping to moderately steep. They have a red, clayey subsoil.

Mountview soils are gently sloping to strongly sloping and are deep and well drained. The upper part of the subsoil is yellowish-brown silty clay loam that reaches to a depth of about 30 inches. Below that depth the soil is mottled and clayey.

Minor soils in this association are the Bedford, Frankstown, Garmon, Trimble, Cumberland, Waynesboro, Pem-

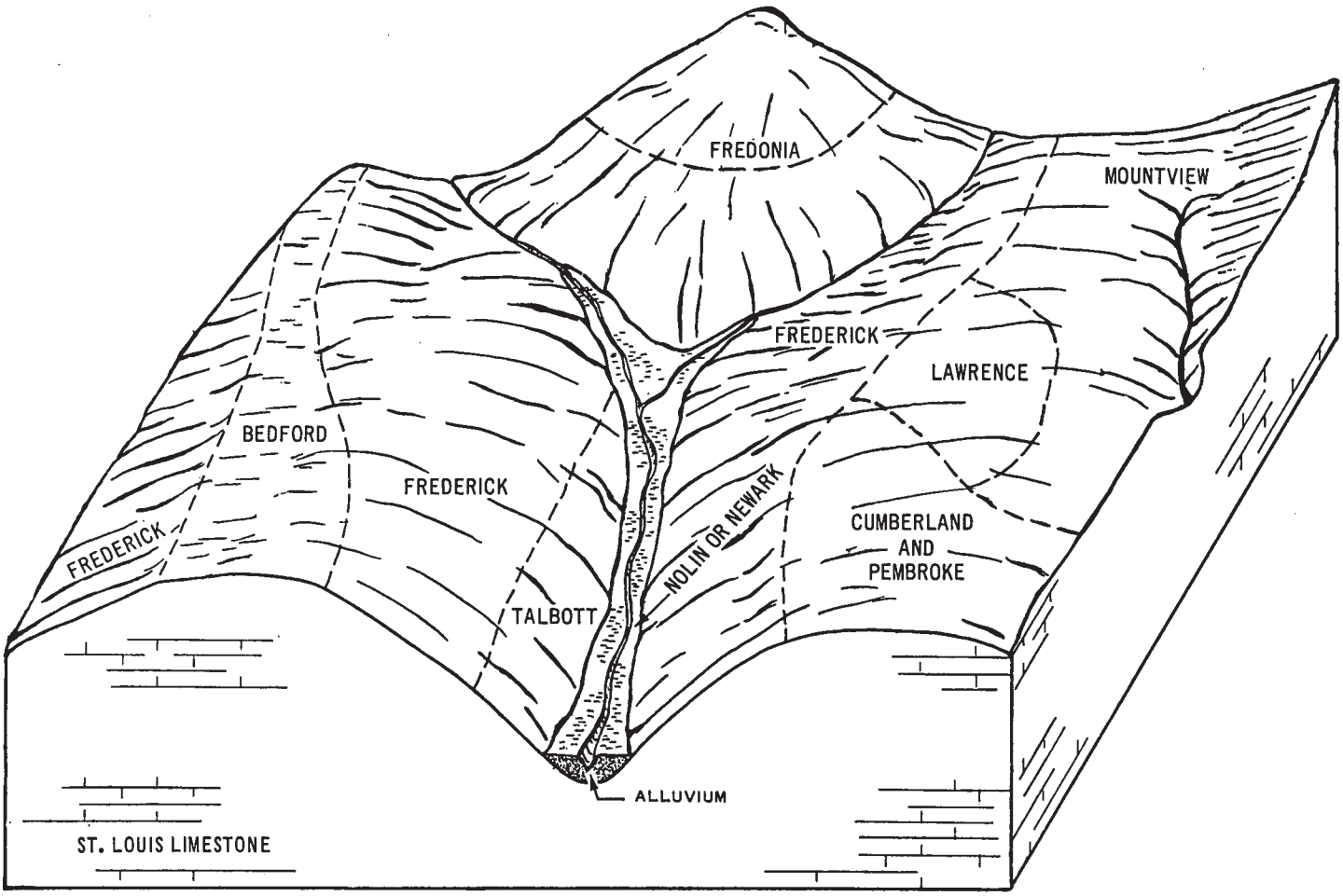

***Figure 3.*—Pattern of soils and underlying material in association 2.**

broke, Hartsells, Fredonia, Talbott, and Lawrence soils on uplands and the Nolin and Newark soils on flood plains.

The average farm in this association is about 80 acres and is operated by the owner. The main enterprise is beef production, but there are a few medium-sized dairies. Most farms have a tobacco allotment of less than 1 acre.

Most of this association is used for general farming. About 60 percent of the acreage is in pasture and hay crops; about 25 percent is in row crops, mainly corn and tobacco; and about 15 percent is wooded.

The main limitation to use of these soils for row crops is the hazard of erosion.

3. *Cumberland-Pembroke association*

Gently sloping to strongly sloping, deep, well-drained soils on uplands having an irregular pattern of dissection and, in many areas, karst topography

This association extends south from Somerset to Burnside and east and west about 2 miles from U.S. Highway No. 27. The landscape is mostly irregular, and there are many areas of karst topography. Sinkholes and depressions are common, and streams terminate in both (fig. 4).

This association makes up about 3 percent of the county. Cumberland soils make up about 47 percent of it; Pembroke soils about 29 percent; and minor soils the remaining 24 percent.

Cumberland soils are gently sloping to strongly sloping and have a dark-brown surface layer and a dark-red, clayey subsoil. In many areas the soil is cherty.

Pembroke soils are gently sloping or sloping and have a dark-brown surface layer. The subsoil is dominantly yellowish-red silty clay loam.

Minor soils in this association are the Etowah, Frederick, Fredonia, Waynesboro, and Mountview soils on uplands and the Huntington and Newark soils in dedepressions

The average farm in this association is about 100 acres and is operated by the owner. The main enterprise is beef production. Most farms have a tobacco allotment of less than 1 acre.

Most of this association is used for general farming, but residential subdivisions are rapidly increasing along the main roads. About 65 percent of the acreage is in pasture and hay crops; about 25 percent is in row crops, mainly corn and tobacco; about 8 percent is wooded; and about 2 percent is in residential subdivisions.

The main limitation to use of these soils for row crops is the hazard of erosion.

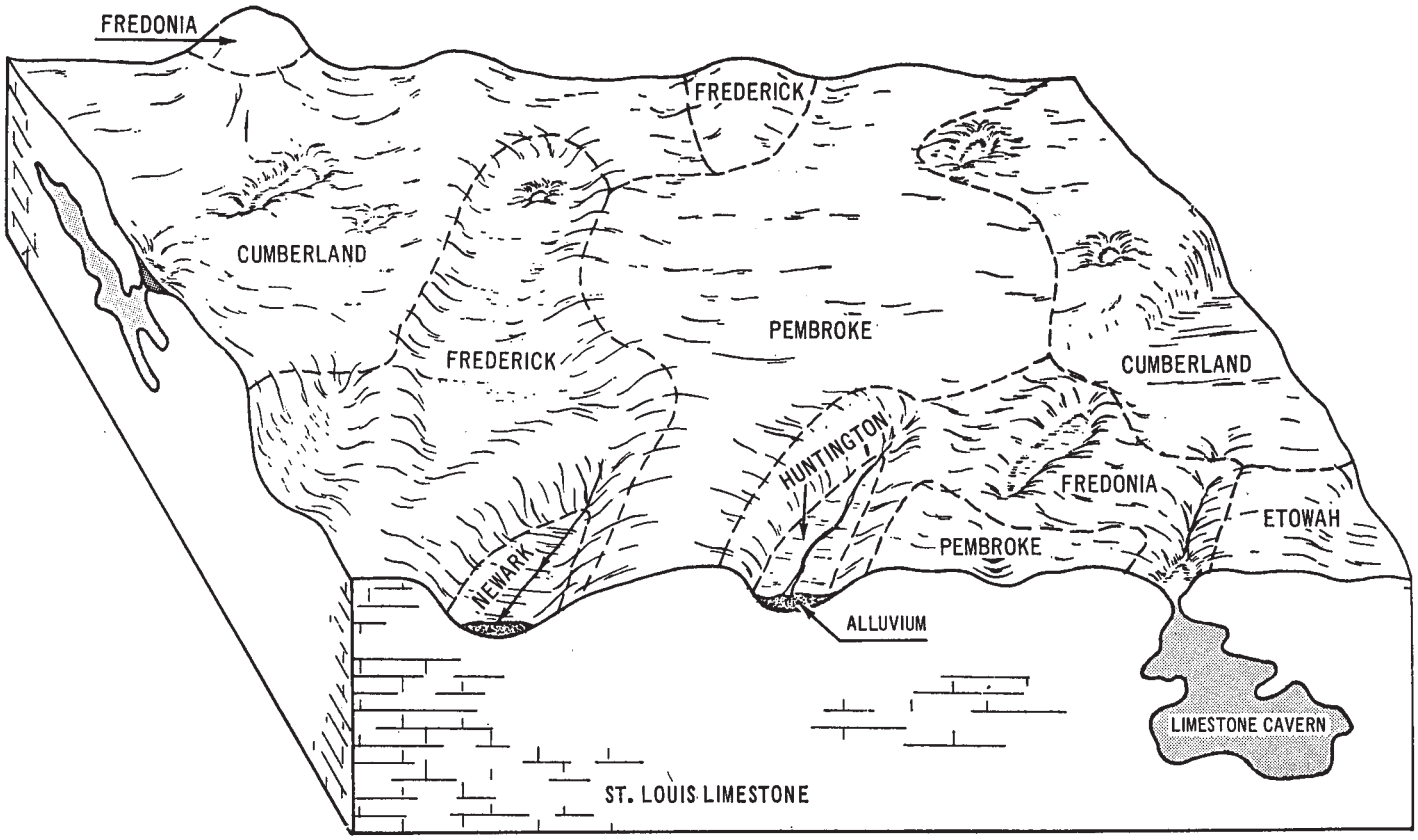

***Figure 4.*—Pattern of soils and underlying material in association 3.**

4. *Hartsells-Garmon-Mountview association*

Gently sloping to moderately steep, moderately deep and deep, well-drained soils on ridges and upper side slopes and steep to very steep, moderately deep, well-drained soils on lower side slopes

This association is in the extreme north-central part of the county. The landscape consists of a series of gently sloping to moderately steep ridges that, in places, descend steeply or very steeply to narrow valleys (fig. 5). The difference between the elevation of the ridgetops and that of the valley floors ranges from about 150 to 250 feet.

This association makes up about 5 percent of the county. Hartsells soils make up about 38 percent of it; Garmon soils about 18 percent; Mountview soils about 12 percent; and minor soils the remaining 32 percent.

Hartsells soils are gently sloping to moderately steep and are on the upper sides of ridges. These soils are moderately deep over sandstone and have a brown, loamy subsoil.

Garmon soils are steep to very steep. These soils are moderately deep over shaly limestone and have a subsoil of yellowish-brown shaly silt loam.

Mountview soils are deep and gently sloping to strongly sloping. They are on ridgetops and upper sides of ridges. The upper part of the subsoil, to a depth of about 30 inches, is yellowish-brown silty clay loam. Below this depth the subsoil is mottled and clayey.

Minor soils in this association are the Bedford, Lawrence, Frankstown, Robertsville, Trimble, Tarklin, and Frederick soils on uplands and the Nolin and Newark soils on flood plains.

The average farm in this association is about 80 acres and is operated by the owner. The main enterprise is beef production. Most farms have a tobacco allotment of less than 1 acre.

Most of this association is used for general farming. About 65 percent of the acreage is in pasture and hay crops; about 15 percent is in row crops, mainly corn and tobacco; and about 20 percent is wooded.

The main limitation to use of these soils for row crops is the hazard of erosion.

5. *Bedford-Lawrence-Hartsells association*

Nearly level and gently sloping, deep, moderately well drained and somewhat poorly drained soils on broad ridgetops, and sloping, moderately deep, well-drained soils on side slopes.

This association extends from Woodstock north to Lincoln and Rockcastle Counties. It is dissected by State Roads Nos. 39 and 70. The landscape consists of broad, nearly level and gently sloping ridges. These ridges break to short, sloping, plane side slopes that descend to narrow valleys (fig. 6). The difference between the elevation of the ridgetops and that of the valley floors ranges from about 50 to 150 feet.

This association makes up about 4 percent of the county. Bedford soils make up about 31 percent of it;

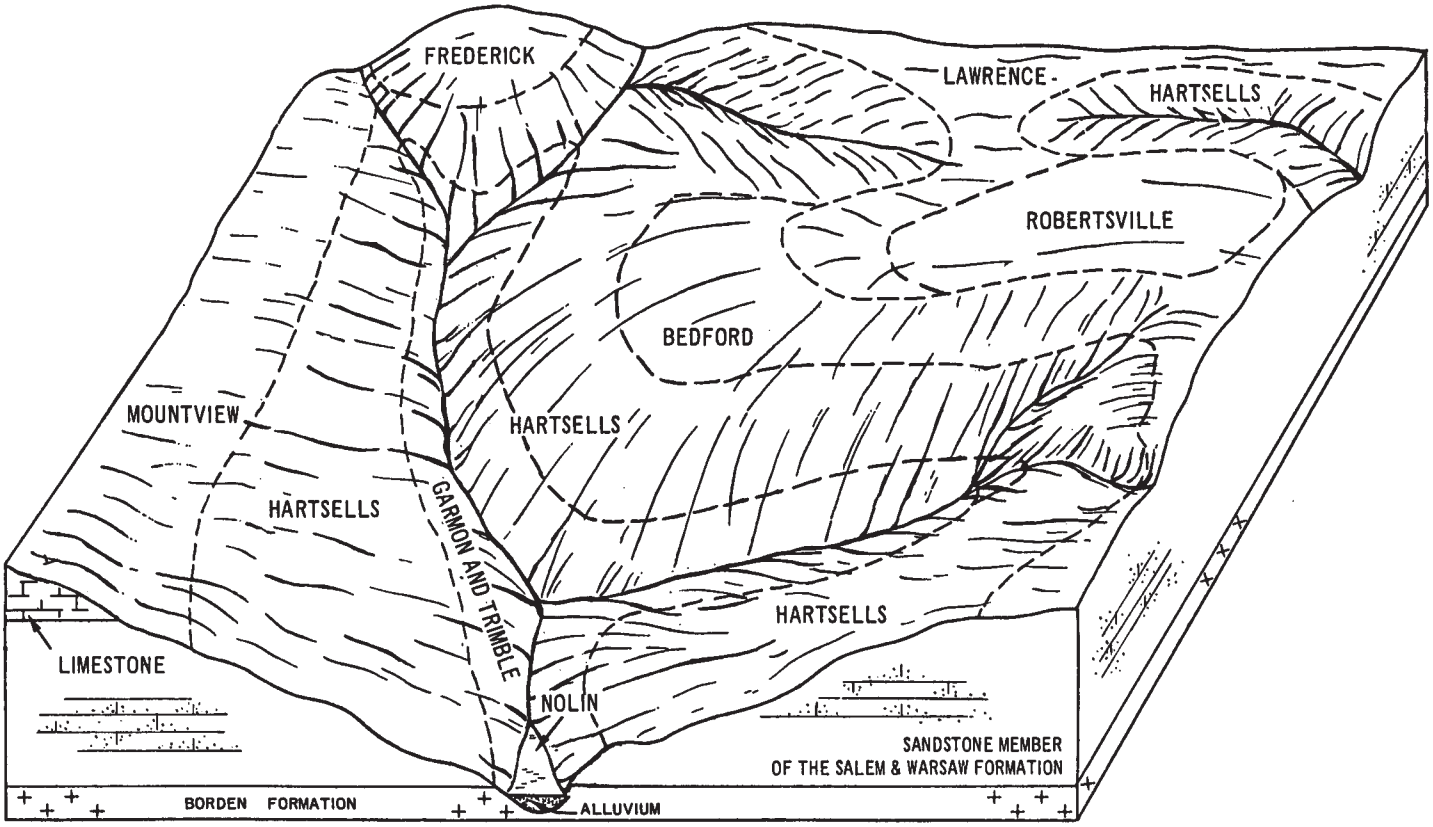

***Figure 5.*—Pattern of soils and underlying material in association 4.**

Lawrence soils about 24 percent; Hartsells soils about 18 percent; and minor soils the remaining 27 percent.

Bedford soils are dominantly gently sloping and are mostly on ridgetops. They have a fragipan that restricts root growth. These soils are moderately well drained and have a subsoil of yellowish-brown silt loam or silty clay loam.

Lawrence soils are nearly level to gently sloping and are on broad ridgetops and stream terraces. These soils have a fragipan, and they are somewhat poorly drained. They have a subsoil of light yellowish-brown to gray silt loam.

Hartsells soils are dominantly sloping and are on side slopes. These soils are moderately deep over sandstone and are well drained. They have a brown, loamy subsoil.

Minor soils in this association are the Mountview, Frederick, Frankstown, and Robertsville soils on uplands and the Nolin and Newark soils on flood plains.

The average farm in this association is about 70 acres and is operated by the owner. The main enterprise is beef production. Most farms have a tobacco allotment of less than 1 acre.

Most of this association is used for general farming. About 60 percent of the acreage is in pasture and hay crops; about 30 percent is in row crops, mainly corn and tobacco; and about 10 percent is wooded.

The main limitations to use of these soils for crops are the hazard of erosion, wetness, restricted rooting depth, and slow permeability.

6. *Frederick-Fredonia-Talbott association*

Gently sloping to steep, deep, well-drained soils mostly in valleylike positions, and sloping to moderately steep, moderately deep, well-drained, rocky soils on hilly uplands.

This association extends in a narrow band from Burnside northeast to Rockcastle County. The landscape consists of knoblike hills that descend to valleylike landscapes. The difference between the elevation of the tops of the knobs and that of the flood plains of the valleys ranges from 300 to 400 feet.

This association makes up about 8 percent of the county. Frederick soils make up about 46 percent of it; Fredonia soils about 27 percent; Talbott soils about 10 percent; and minor soils the remaining 17 percent.

Frederick soils are gently sloping to steep and are on lower slopes of knoblike hills and in valleys. These soils are deep and well drained. They have a light-colored surface layer and a red, clayey subsoil.

Fredonia soils are sloping to moderately steep and are generally on the middle and lower sides of knoblike hills. These soils are moderately deep over limestone and are well drained. They have a dark surface layer and a red, clayey subsoil. Outcrops of rock are common.

Talbott soils are sloping and strongly sloping and generally are associated with Fredonia soils on the sides of knoblike hills. These soils are moderately deep over limestone and are well drained. They have a light-colored

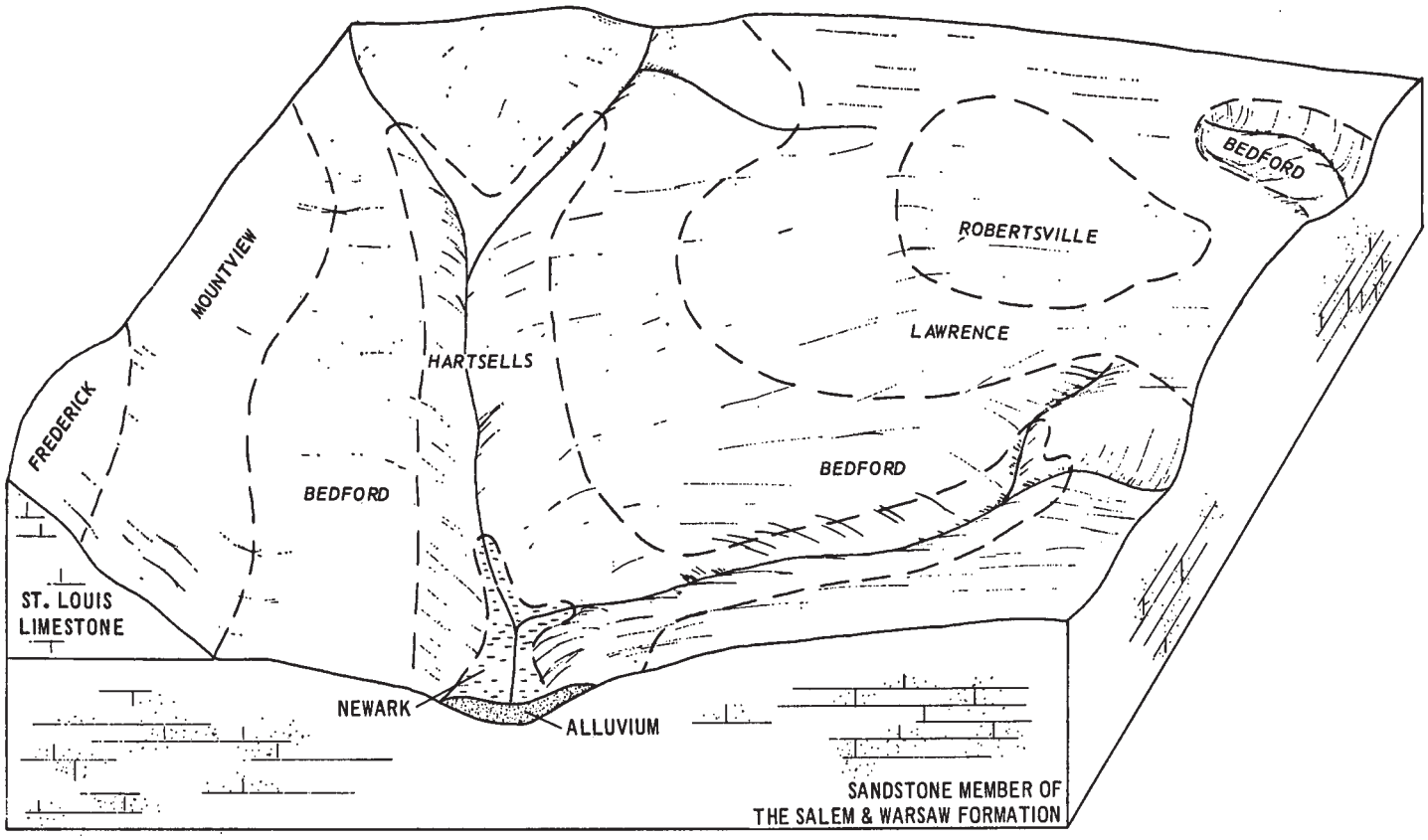

***Figure 6.*—Pattern of soils and underlying material in association 5.**

surface layer and a red, clayey subsoil, Rock outcrops are common.

Minor soils in this association are the Muse, Shelocta, Jefferson, Whitley, and Mountview soils on uplands and the Nolin and Newark soils on flood plains.

The average farm in this association is about 70 acres and is operated by the owner. The main enterprise is beef production. Most farms have a tobacco allotment of less than 1 acre.

Most of this association is used for general farming and as woodland. About 50 percent of the acreage is wooded; about 40 percent is in pasture and hay crops; and about 10 percent is in row crops, mainly corn and tobacco.

The main limitations to use of these soils for row crops are the hazard of erosion, steep slopes, and rockiness.

7. *Fredonia-Talbott-Brookside association*

Sloping to moderately steep, moderately deep, rocky soils in valleys, and steep to very steep, deep soils on adjacent hilly uplands

One area of this association is around Stab, and another is adjacent to Lake Cumberland. The landscape consists of high, sharp ridges that break to sloping to very steep, rocky side slopes. The difference between the elevation of the ridgetops and that of the valley floors ranges from 300 to 400 feet.

This association makes up about 10 percent of the county. Fredonia soils make up about 38 percent of it; Talbott soils about 9 percent; Brookside soils about 9 percent; and minor soils the remaining 44 percent.

Fredonia soils are sloping to moderately steep and are in the valleys between high hills. These soils are moderately deep over limestone and are well drained. They have a dark surface layer and a red, clayey subsoil. Limestone outcrops are common.

Talbott soils are sloping and strongly sloping. They are closely associated wtih Fredonia soils in valleys. Talbott soils are moderately deep over limestone and are well drained. They have a light-colored surface layer and a red, clayey subsoil. Rock outcrops are on the surface.

Brookside soils are steep to very steep. They are on the lower sides of hills and are intermingled with areas of Rock outcrop, dominantly of limestone. Brookside soils are deep and are well drained. They have a brownish, clayey subsoil.

Minor soils in this association are the Muse, Shelocta, Jefferson, Whitley, and Frederick soils on uplands; the Nolin and Newark soils on flood plains; and Rock outcrop. Some of the minor soils, including the Whitley, Muse, Shelocta, and Jefferson soils, generally are on upper slopes above Brookside soils.

The average farm in this association is about 70 acres and is operated by the owner. Some of the acreage is in the Daniel Boone National Forest, which is administered by the Forest Service.

Most of this association is steep or rocky and is wooded. The less steep and nonrocky areas are generally used for hay and pasture, but a small acreage is used for tobacco

and corn. About 90 percent of the acreage is wooded; about 8 percent is in pasture; and about 2 percent is in row crops, mainly corn and tobacco.

The main limitations to use of these soils for farming are rockiness, the hazard of erosion, and steep slopes. The rugged topography and the rockiness of the soils make special care necessary in locating dwellings, especially those that have septic tanks.

8. *Jefferson-Shelocta-Muse association*

Sloping to very steep, deep, well-drained soils on very deeply dissected mountainous uplands

This association is in the eastern and southeastern parts of the county and is very deeply dissected by streams. Narrow, convex ridgetops blend into long, plane side slopes that descend to narrow, concave valleys. The difference between the elevation of the ridgetops and that of the valley floors ranges from 200 to 400 feet.

This association makes up about 24 percent of the county. Jefferson soils make up about 29 percent of it; Shelocta soils about 25 percent; Muse soils about 18 percent; and minor soils the remaining 28 percent.

Jefferson soils are sloping to very steep, deep, and well drained. They have a yellowish-brown, loamy subsoil that formed in colluvium on side slopes and toe slopes. Some areas are stony, especially below the sandstone cliffs.

Shelocta soils are sloping to steep, deep, and well drained. These soils have a brown, silty subsoil that formed in colluvium on side slopes and toe slopes.

Muse soils are sloping to steep and are on narrow, convex ridgetops, noses, and upper side slopes. These soils are deep and well drained. They have a yellowish-brown to strong-brown, clayey subsoil that formed mainly in residual material.

Minor soils in this association are the Dekalb, Hartsells, Gilpin, and Fredonia soils on uplands and Chagrin, Stendal, and Pope soils on flood plains.

The average farm in this association is about 125 acres in size and is operated by the owner. About 20 percent of the acreage is administered by the Forest Service.

Most areas of this association that are on side slopes are covered with woods or brush. Areas on the narrow ridgetops and in valleys are used mostly for pasture and hay, but a small acreage is used for tobacco and corn. About 80 percent of the acreage is covered with woods or brush; about 15 percent is in pasture and hay crops; and about 5 percent is in row crops, mainly corn and tobacco.

The main limitations to use of these soils for row crops are the hazard of erosion and steep slopes.

9. *Whitley-Hartsells-Muse association*

Gently sloping to strongly sloping, moderately deep and deep, well-drained soils on moderately broad ridges of the mountainous uplands

This association extends north and south from Mount Victory in the eastern part of the county. The landscape generally consists of moderately broad, convex ridgetops and smooth side slopes (fig. 7).

This association makes up about 2 percent of the county. The Whitley soils make up about 40 percent of it; Hartsells soils about 30 percent; Muse soils about 20 percent; and minor soils the remaining 10 percent.

Whitley soils are gently sloping to sloping and are on ridgetops. They are deep and have a subsoil of brown silty clay loam.

Hartsells soils are sloping to strongly sloping and are on ridgetops and side slopes. They are moderately deep and have a brown, loamy subsoil.

Muse soils are sloping to strongly sloping and are on the higher hills. They are deep and well drained and have a yellowish-brown to strong-brown, clayey subsoil.

Minor soils in this association are the Tilsit and Dekalb soils.

The average farm in this association is about 125 acres and is operated by the owner. Part of the acreage is administered by the Forest Service.

Most of the areas administered by the Forest Service are wooded. The part of this association that is privately owned is used for general farming. About 55 percent of the acreage is wooded; about 35 percent is in pasture and hay crops; mainly corn and tobacco.

The main limitation to use of these soils for row crops is the hazard of erosion.

Descriptions of the Soils

This section describes the soil series and mapping units of Pulaski County. The approximate acreage and proportionate extent of each mapping unit are given in table 1.

A detailed description of each soil series is given, followed by brief descriptions of the mapping units in that series. For full information on any one mapping unit, it is necessary to read the descriptions of the soil series as well as the description of the mapping unit.

An essential part of each soil series is the description of the soil profile, the sequence of layers beginning at the surface and continuing downward to the depths beyond which roots of most plants do not penetrate. Each soil series contains both a brief nontechnical description and a detailed technical description of the soil profile. The nontechnical description is useful to most readers. The detailed technical description is included for soil scientists, engineers, and others who need to make thorough and precise studies of soils.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of the description of each mapping unit are the capability unit and the woodland suitability group in which the mapping unit has been placed. The page on which each capability unit is described can be found readily by referring to the "Guide to Mapping Units" at the back of this publication.

Soil scientists, engineers, students, and others who are interested in how the soils formed and want to know about their classification in the nationwide system of soil classification should refer to the section "Formation and Classification of Soils."

Many terms used in the soil descriptions and other sections are defined in the Glossary at the back of this survey and in the "Soil Survey Manual" (*16*).[1] Unless otherwise stated, the colors given in each representative profile are for moist soil.

[1] Italic numbers in parentheses refer to Literature Cited, page 118.

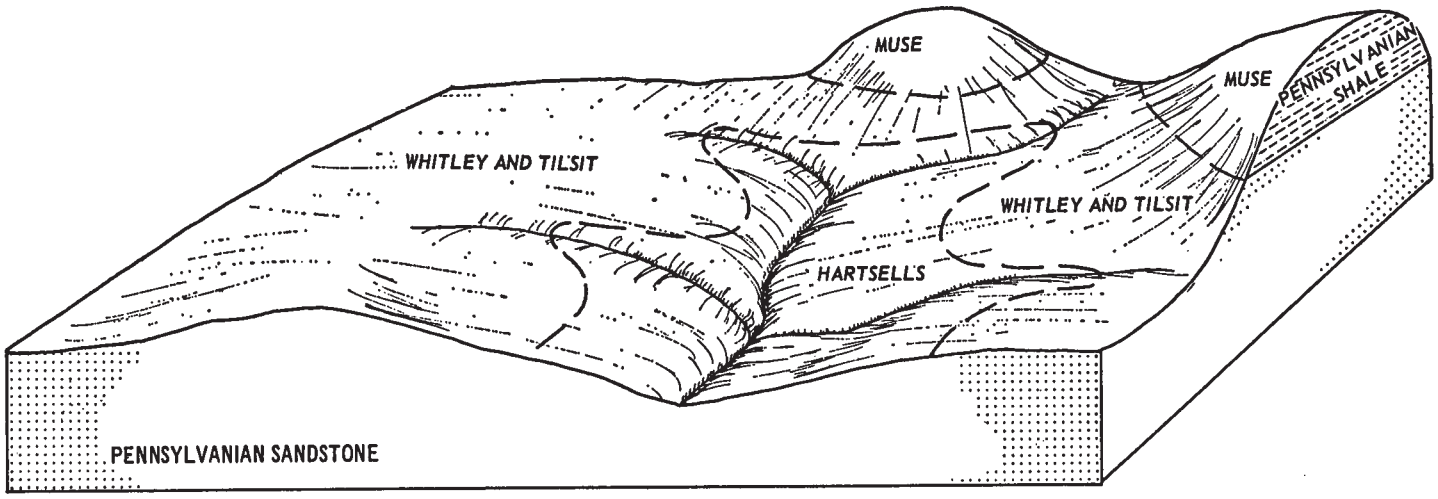

Figure 7.—**Pattern of soils and underlying material in association 9.**

Allegheny Series

The Allegheny series consists of deep, well-drained soils that formed in alluvium or colluvium derived mainly from sandstone and shale. These soils are on stream terraces and toe slopes, mostly in the eastern part of the county. They have slopes of 2 to 12 percent.

In a representative profile, the surface layer is dark-brown loam about 8 inches thick. The subsoil extends to a depth of about 40 inches and is dark-brown, friable clay loam. The substratum is dark yellowish-brown, friable gravelly clay loam.

Allegheny soils have high available moisture capacity, moderate permeability, moderate natural fertility, and low organic-matter content.

Representative profile of Allegheny loam, 6 to 12 percent slopes, located 1¾ miles north-northeast of Drum:

Ap—0 to 8 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B2t—8 to 40 inches, dark-brown (7.5YR 4/4) light clay loam; moderate, fine and very fine, subangular blocky structure; friable; few thin clay films; strongly acid; gradual, wavy boundary.

C—40 to 55 inches, dark yellowish-brown (10YR 4/4) gravelly light clay loam; weak, fine, subangular blocky structure; friable; very strongly acid.

The solum ranges from 30 to 40 inches in thickness. Depth to bedrock is more than 5 feet. Gravel makes up 0 to 5 percent, by volume, of the solum and 0 to 35 percent of the C horizon. The Ap horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3). The B2t horizon is dark-brown (7.5YR 4/4), brown (7.5YR 5/4), or strong-brown (7.5YR 5/6) heavy loam or light clay loam. The B horizon is strongly acid or very strongly acid. The C horizon is yellowish-brown (10YR 5/6), dark yellowish-brown (10YR 4/4), or strong-brown (7.5YR 5/6) loam, gravelly loam, light clay loam, or gravelly light clay loam.

Allegheny soils are near Chagrin, Shelocta, and Ashton soils. They are more acid than Chagrin soils and are on stream terraces and toe slopes instead of flood plains. They contain more sand and less coarse fragments than Shelocta soils. They have a lighter colored surface layer and a more acid and more sandy subsoil than Ashton soils.

Allegheny loam, 2 to 6 percent slopes (AlB).—This soil is on narrow stream terraces and toe slopes.

Included with this soil in mapping were small areas of Chagrin, Shelocta, and Ashton soils. Also included were areas of a soil that is similar to this Allegheny soil but is less acid in the subsoil and, in a few areas, has karst topography.

This Allegheny soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe-2; woodland suitability group 2o1.

Allegheny loam, 6 to 12 percent slopes (AlC).—This soil is on narrow stream terraces and toe slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Shelocta soils. Also included were areas of a soil that is similar to this Allegheny soil but less acid in the subsoil and, in a few areas, has karst topography.

This Allegheny soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe-2; woodland suitability group 2o1.

Ashton Series

The Ashton series consists of deep, well-drained soils that formed in alluvium derived mainly from sandstone and shale, but in some places the alluvium is derived partly from limestone. These soils are on low stream terraces and around sinkholes in the eastern part of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is dark-brown silt loam about 7 inches thick. The subsoil extends to a depth of about 48 inches and is dark-brown, friable or very friable silt loam. The substratum is dark yellowish-brown, friable silt loam.

Ashton soils have high available moisture capacity, moderate permeability, high natural fertility, and medium organic-matter content.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Allegheny loam, 2 to 6 percent slopes	1, 130	0. 3
Allegheny loam, 6 to 12 percent slopes	1, 050	. 3
Ashton silt loam	290	(1)
Bedford silt loam, 0 to 2 percent slopes	550	. 1
Bedford silt loam, 2 to 6 percent slopes	19, 550	4. 7
Brookside-Rock outcrop complex, 30 to 75 percent slopes	5, 550	1. 3
Chagrin loam	1, 070	. 3
Chagrin gravelly silt loam	2, 880	. 7
Colyer silt loam, 20 to 50 percent slopes	260	(1)
Cumberland silt loam, 2 to 6 percent slopes	1, 140	. 3
Cumberland silt loam, 6 to 12 percent slopes	2, 970	. 7
Cumberland cherty silt loam, 2 to 6 percent slopes	430	. 1
Cumberland cherty silt loam, 6 to 12 percent slopes	2, 910	. 7
Cumberland cherty silt loam, 12 to 20 percent slopes	1, 770	. 4
Cumberland cherty silty clay loam, 12 to 20 percent slopes, severely eroded	1, 020	. 2
Dekalb sandy loam, 6 to 12 percent slopes	260	(1)
Dekalb-Rock outcrop complex, 12 to 20 percent slopes	330	(1)
Dekalb-Rock outcrop complex, 20 to 50 percent slopes	6, 070	1. 5
Etowah cherty silt loam, 2 to 6 percent slopes	740	. 2
Etowah cherty silt loam, 6 to 12 percent slopes	1, 190	. 3
Frankstown cherty silt loam, 2 to 6 percent slopes	770	. 2
Frankstown cherty silt loam, 6 to 12 percent slopes	3, 680	. 9
Frankstown cherty silt loam, 12 to 20 percent slopes	12, 180	2. 9
Frankstown cherty silt loam, 20 to 30 percent slopes	3, 940	. 9
Frederick silt loam, 2 to 6 percent slopes	5, 420	1. 3
Frederick silt loam, 6 to 12 percent slopes	32, 190	7. 7
Frederick silt loam, 12 to 20 percent slopes	15, 960	3. 8
Frederick silt loam, 20 to 30 percent slopes	2, 310	. 6
Frederick silty clay loam, 6 to 12 percent slopes, severely eroded	1, 420	. 3
Frederick silty clay loam, 12 to 20 percent slopes, severely eroded	11, 900	2. 9
Frederick-Jefferson complex, 20 to 50 percent slopes	11, 790	2. 8
Fredonia-Frederick rocky silt loams, 6 to 20 percent slopes	8, 720	2. 1
Fredonia-Frederick rocky silty clay loams, 6 to 20 percent slopes, severely eroded	1, 950	. 5
Fredonia very rocky soils, 6 to 30 percent slopes	25, 275	6. 0
Garmon-Trimble complex, 30 to 80 percent slopes	25, 325	6. 1
Gilpin silt loam, 12 to 20 percent slopes	350	. 1
Hartsells fine sandy loam, 6 to 12 percent slopes	8, 440	2. 0
Hartsells fine sandy loam, 12 to 20 percent slopes	8, 600	2. 1
Hartsells fine sandy loam, 20 to 30 percent slopes	990	. 2
Hartsells loam, 2 to 6 percent slopes	330	(1)
Huntington silt loam	630	. 2
Jefferson sandy loam, 20 to 40 percent slopes	1, 540	. 4
Jefferson gravelly loam, 6 to 12 percent slopes	260	(1)
Jefferson gravelly loam, 12 to 20 percent slopes	1, 050	. 3
Jefferson stony loam, 20 to 30 percent slopes	3, 310	. 8
Jefferson stony loam, 30 to 65 percent slopes	17, 660	4. 2
Lawrence silt loam	11, 120	2. 7
Lindside silt loam	510	. 1
Melvin silt loam	540	. 1
Monongahela loam, 2 to 6 percent slopes	520	0. 1
Mountview silt loam, 2 to 6 percent slopes	10, 620	2. 5
Mountview silt loam, 6 to 12 percent slopes	14, 560	3. 5
Mountview silt loam, 12 to 20 percent slopes	610	. 2
Muse silt loam, 6 to 12 percent slopes	3, 060	. 7
Muse silt loam, 12 to 20 percent slopes	4, 880	1. 2
Muse silty clay loam, 6 to 12 percent slopes, severely eroded	170	(1)
Muse silty clay loam, 12 to 20 percent slopes, severely eroded	460	. 1
Muse-Hartsells complex, 12 to 20 percent slopes	1, 450	. 4
Muse-Shelocta complex, 12 to 20 percent slopes	1, 060	. 3
Muse-Shelocta complex, 20 to 30 percent slopes	4, 930	1. 2
Muse-Shelocta complex, 20 to 30 percent slopes, severely eroded	1, 190	. 3
Muse-Shelocta complex, 30 to 50 percent slopes	15, 100	3. 6
Needmore silty clay loam, 6 to 12 percent slopes, eroded	500	. 1
Needmore complex, 12 to 25 percent slopes	2, 320	. 6
Newark silt loam	3, 950	. 9
Newark gravelly silt loam	1, 470	. 4
Nolichucky loam, 6 to 12 percent slopes	660	. 2
Nolichucky loam, 12 to 20 percent slopes	460	. 1
Nolin silt loam	2, 330	. 6
Pembroke silt loam, 2 to 6 percent slopes	3, 800	. 9
Pembroke silt loam, 6 to 12 percent slopes	1, 430	. 3
Pope fine sandy loam	740	. 2
Robertsville silt loam	2, 730	. 7
Rockcastle silt loam, 20 to 30 percent slopes	780	. 2
Shelocta gravelly silt loam, 6 to 12 percent slopes	150	(1)
Shelocta gravelly silt loam, 12 to 20 percent slopes	260	(1)
Shelocta-Jefferson complex, 12 to 20 percent slopes	2, 770	. 7
Shelocta-Jefferson complex, 20 to 30 percent slopes	15, 250	3. 7
Shelocta-Jefferson complex, 30 to 50 percent slopes	15, 630	3. 7
Stendal loam	480	. 1
Strip mines	760	. 2
Talbott silty clay loam, 6 to 12 percent slopes, eroded	200	(1)
Talbott rocky silt loam, 6 to 20 percent slopes	4, 410	1. 1
Talbott rocky silt loam, 20 to 30 percent slopes	340	(1)
Talbott rocky silty clay loam, 6 to 20 percent slopes, severely eroded	3, 340	. 8
Tarklin cherty silt loam, 2 to 6 percent slopes	1, 150	. 3
Tarklin cherty silt loam, 6 to 12 percent slopes	360	. 1
Trimble cherty silt loam, 2 to 6 percent slopes	640	. 2
Trimble cherty silt loam, 6 to 12 percent slopes	1, 680	. 4
Trimble cherty silt loam, 12 to 20 percent slopes	1, 320	. 3
Trimble cherty silt loam, 20 to 30 percent slopes	2, 150	. 5
Waynesboro loam, 2 to 6 percent slopes	120	(1)
Waynesboro loam, 6 to 12 percent slopes	2, 050	. 5
Waynesboro loam, 12 to 20 percent slopes	1, 560	. 4
Waynesboro loam, 20 to 30 percent slopes	610	. 1
Waynesboro clay loam, 12 to 30 percent slopes, severely eroded	1, 640	. 4
Whitley silt loam, 6 to 12 percent slopes	6, 310	1. 5
Whitley silt loam, terrace, 0 to 2 percent slopes	590	. 1
Whitley silt loam, terrace, 2 to 6 percent slopes	1, 430	. 3
Whitley silt loam, terrace, 6 to 12 percent slopes	300	(1)
Whitley and Tilsit silt loams, 2 to 6 percent slopes	3, 580	. 9
Total	418, 180	100. 0

[1] Less than 0.1 percent.

Representative profile of Ashton silt loam, located 30 yards west of State Road No. 192, about 4½ miles northeast of Mount Victory:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate, medium, granular structure; very friable; 3 percent gravel, by volume; common roots; slightly acid; clear, smooth boundary.

B1—7 to 14 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; very friable; 3 percent gravel, by volume; few roots; neutral; gradual, wavy boundary.

B2t—14 to 33 inches, dark-brown (7.5YR 4/4) heavy silt loam; moderate, fine and medium, subangular blocky structure; friable; faint, patchy clay films on peds; 3 percent gravel, by volume; few roots; neutral; gradual, wavy boundary.

B3—33 to 48 inches, dark-brown (7.5YR 4/4) heavy silt loam; weak, fine, subangular blocky structure; friable; 3 percent gravel, by volume; neutral; gradual, wavy boundary.

C—48 to 64 inches, dark yellowish-brown (10YR 4/4) silt loam; common, fine, faint, yellowish-brown (10YR 5/4) mottles; weak, coarse, granular structure; friable; 3 percent gravel, by volume; slightly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is more than 60 inches. Gravel makes up 1 to 5 percent, by volume, of the profile. The Ap horizon has a hue of 10YR or 7.5YR, a value of 3 when moist and of 6 when dry, and a chroma of 2 or 3. The Bt horizon has a hue of 7.5YR or 10YR, a value of 4, and a chroma of 3 or 4. It is light silty clay loam in some profiles. The B horizon ranges from medium acid to neutral.

Ashton soils in Pulaski County have a higher color value in the Ap horizon when dry than is in the range defined for the series, but this difference does not alter their usefulness and behavior.

Ashton soils are near Whitley soils on stream terraces. They have a darker colored surface layer and are not so acid as Whitley soils.

Ashton silt loam (0 to 2 percent slopes) (As).—This soil is on narrow to moderately wide, low stream terraces and around sinkholes.

Included with this soil in mapping were areas of Whitley soils on terraces and small areas of a soil that is similar to this Ashton soil but has a coarser textured solum. Also included were a few areas where slopes are 2 to 6 percent.

This Ashton soil has an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is good. This soil is subject to flooding, mostly late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit I–4; woodland suitability group 1o1.

Bedford Series

The Bedford series consists of deep, moderately well drained soils that have a fragipan. These soils formed in residuum derived from Mississippian limestone, sandstone, or alluvial sediment. They are on uplands and stream terraces, mainly in the western and central parts of the county. They have slopes of 0 to 6 percent.

In a representative profile, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of 65 inches or more. To a depth of about 24 inches, it is yellowish-brown, friable silty clay loam. The fragipan, between depths of about 24 and 59 inches, is yellowish-brown, firm, compact and brittle heavy silt loam that has light-gray mottles. Below a depth of about 59 inches, the subsoil is mottled strong-brown, light yellowish-brown, and light-gray, firm silty clay.

Bedford soils have moderate available moisture capacity, slow permeability in the fragipan, moderate natural fertility, and low organic-matter content.

Representative profile of Bedford silt loam, 2 to 6 percent slopes, located 3,300 feet due west of Ingle:

Ap—0 to 8 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; very friable; strongly acid; clear, smooth boundary.

B21t—8 to 20 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; few faint clay films; very strongly acid; gradual, smooth boundary.

B22t—20 to 24 inches, yellowish-brown (10YR 5/6) light silty clay loam; few, fine, distinct, light-gray (10YR 6/1) mottles; moderate, fine and medium, subangular blocky structure; friable; few faint clay films; very strongly acid; clear, wavy boundary.

Bxt—24 to 59 inches, yellowish-brown (10YR 5/4) heavy silt loam; few, fine, faint, yellowish-brown (10YR 5/6) mottles and common, fine, distinct, light-gray (10YR 6/1) mottles; very coarse, platy structure breaking to subangular blocky; firm, compact and brittle; few clay films; very strongly acid; gradual, wavy boundary.

IIB23t—59 to 65 inches, mottled strong-brown (7.5YR 5/6), light yellowish-brown (2.5Y 6/4), and light-gray (10YR 6/1) silty clay; moderate, fine and medium, subangular blocky structure; firm; few thin clay films; very strongly acid.

The solum ranges from 48 to 80 inches in thickness. Depth to bedrock is more than 5 feet. In a few profiles, small pieces of chert make up 1 to 5 percent, by volume, of the lower horizons. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. In a few profiles, the Ap horizon is as much as 10 percent sand. Some profiles have a B1 horizon of heavy silt loam. The B21t horizon is yellowish brown (10YR 5/4 or 5/6) or strong brown (7.5YR 5/6). In some profiles the B21t and B22t horizons are heavy silt loam. The abundance of mottles in the B22t horizon that have a chroma of 2 or less ranges from few to common. Depth to the B22t horizon ranges from 17 to 28 inches. Depth to the fragipan ranges from 20 to 30 inches. In some profiles the Bxt horizon is light silty clay loam. The B horizon ranges from very strongly acid to extremely acid.

Bedford soils are near Frederick, Frankstown, Hartsells, Mountview, Whitley, and Lawrence soils. They have a fragipan that Frederick soils lack, and they have a browner, less clayey subsoil than Frederick soils. They are deeper over bedrock than Hartsells soils, and they contain less sand and are not so well drained as Hartsells soils. They are not so well drained as Mountview and Whitley soils, which do not have a fragipan. Bedford soils are not so well drained nor so cherty as Frankstown soils, which lack a fragipan. They are better drained than Lawrence soils. Bedford soils are similar to Tilsit soils, but they contain more clay below the fragipan and are near other soils that formed in residuum derived from limestone.

Bedford silt loam, 0 to 2 percent slopes (BeA).—This soil is on ridgetops and stream terraces.

Included with this soil in mapping were small areas of Mountview, Whitley, and Lawrence soils.

This Bedford soil has an effective rooting depth of 20 to 30 inches. Response of crops to lime and fertilizer is good. Drainage, in some areas, improves the growth of most row crops.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Alfalfa and tobacco are sometimes damaged by wetness caused by slow runoff and slow permeability of the fragipan. Where this soil occurs on low stream terraces, it is subject to

flooding, although slight, mostly late in winter or early in spring. Capability unit IIw–2; woodland suitability group 3w1.

Bedford silt loam, 2 to 6 percent slopes (BeB).—This soil is in convex areas on ridgetops and stream terraces. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Mountview and Whitley soils and a few small areas where slopes are as much as 12 percent.

This Bedford soil has an effective rooting depth of 20 to 30 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Alfalfa is generally short lived because of excess water in the rooting zone caused by the slow permeability of the fragipan. Where this soil occurs on low stream terraces, it is subject to flooding, although slight, after heavy rains. Capability unit IIe–4; woodland suitability group 3w1.

Brookside Series

The Brookside series consists of deep, well-drained soils that formed in colluvium. The colluvium was mostly from limestone, but a part of it washed from soils that formed in sandstone, siltstone, and shale. Brookside soils are on hillsides and toe slopes in the eastern and southeastern parts of the county. They have slopes of 30 to 75 percent.

In a representative profile, the surface layer is dark-brown silt loam about 4 inches thick. The subsoil extends to a depth of 66 inches or more. To a depth of about 9 inches, it is dark yellowish-brown, friable, light silty clay loam. Between depths of 9 inches and about 56 inches, it is dark-brown, firm heavy silty clay loam or silty clay. Below a depth of 56 inches, it is strong-brown, firm channery silty clay.

Brookside soils have high available moisture capacity, moderately slow permeability, high natural fertility, and medium organic-matter content.

Representative profile of a Brookside silt loam in an area of Brookside-Rock outcrop complex, 30 to 75 percent slopes, located on Buck Creek, 150 yards west of State Road No. 1097 and 2 miles south of Poplarville:

O11—2½ inches to ½ inch, undecomposed leaves and twigs.

O12—½ inch to 0, partly decomposed leaves and twigs.

A1—0 to 4 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; very friable; 10 percent channery fragments, by volume; many roots; neutral; clear, smooth boundary.

B1—4 to 9 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; moderate, fine, granular structure; friable; 14 percent channery fragments, by volume; common roots; slightly acid; clear, wavy boundary.

B21t—9 to 15 inches, dark-brown (7.5YR 4/4) heavy silty clay loam; moderate, fine, subangular blocky structure; firm; faint, patchy clay films on peds; 8 percent channery fragments, by volume; common roots; neutral; clear, wavy boundary.

B22t—15 to 29 inches, dark-brown (7.5YR 4/4) heavy silty clay loam; moderate, fine, subangular blocky structure; firm; distinct, broken clay films on peds; 8 percent channery fragments, by volume; common roots; neutral; clear, wavy boundary.

B23t—29 to 39 inches, dark-brown (7.5YR 4/4) silty clay; moderate, fine, subangular blocky structure; firm; distinct, complete clay films on peds; 8 percent channery fragments and flagstones, by volume; few roots; neutral; clear, wavy boundary.

B24t—39 to 56 inches; dark-brown (7.5YR 4/4) silty clay; moderate, fine, subangular blocky structure; firm; distinct, complete clay films on peds; 14 percent channery fragments and flagstones, by volume; few roots; neutral; clear, wavy boundary.

B3t—56 to 66 inches, strong-brown (7.5YR 5/6) channery silty clay; weak, fine and medium, subangular blocky structure; firm; faint, patchy clay films on peds; 25 percent channery fragments, by volume; few roots; neutral.

The solum ranges from 60 to 72 inches in thickness. Depth to bedrock is more than 72 inches. Coarse fragments make up 1 to 25 percent, by volume, of the profile. The A horizon has a hue of 10YR or 7.5YR, a value of 3 or 4, and a chroma of 2 or 3. The B2 and B3 horizons have a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 3 to 6. These horizons generally are heavy silty clay loam, silty clay, clay, or channery analogs, but in some profiles they are light silty clay loam. The B horizon ranges from medium acid to neutral.

Brookside soils are near Talbott and Jefferson soils. They are much deeper over bedrock than Talbott soils and are not so red in the B horizon as those soils. They are much more clayey in the B horizon than Jefferson soils and are not so acid as those soils.

Brookside-Rock outcrop complex, 30 to 75 percent slopes (BrF).—This complex is on the long plane sides of valleys along major streams in the eastern and southeastern parts of the county. The areas of Brookside soils and Rock outcrop are so intermingled and so closely associated that separation in mapping is not practical. Brookside soils generally make up about 80 percent of the complex, but they make up 20 to 85 percent of some areas. Rock outcrop consists mostly of exposed areas of limestone that occur at random. It typically makes up about 20 percent of the complex. In some areas, however, Rock outcrop makes up only 15 percent of the complex, and in other places it makes up as much as 80 percent. Stones, dominantly sandstone, are common on the surface in some areas.

Included with this complex in mapping were areas of a soil that is acid and loamy in the upper 2 feet, is medium acid to neutral and clayey to a depth of about 31 inches, and is underlain by limestone bedrock. Also included were areas of Talbott soils and vertical rock cliffs that have an average height of about 100 feet.

Brookside soils have an effective rooting depth of 48 inches or more. Close to and surrounding the rock outcrops, this soil is shallow to bedrock.

This complex is so steep or so rocky, or both, that it is poorly suited to any use other than for trees or wildlife habitat. Most areas are wooded. Capability unit VIIs–1; woodland suitability group 2c2 on north- and east-facing slopes and 3c2 on south- and west-facing slopes.

Chagrin Series

The Chagrin series consists of deep, well-drained soils that formed in alluvium washed from upland soils underlain by sandstone or limestone, or both. These soils are along streams throughout most of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is dark-brown loam about 9 inches thick. The subsoil extends to a depth of about 48 inches and is dark-brown, very

friable heavy loam. The substratum is dark-brown, very friable gravelly loam.

Chagrin soils have high or moderate available moisture capacity, moderate or moderately rapid permeability, moderate or high natural fertility, and low organic-matter content.

Representative profile of Chagrin loam, located 1 mile north-northeast of Buck Creek Baptist Church:

Ap—0 to 9 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable; medium acid; gradual, smooth boundary.

B2—9 to 48 inches, dark-brown (7.5YR 4/4) heavy loam; weak, fine, granular structure; very friable; slightly acid; gradual, smooth boundary.

C—48 to 60 inches, dark-brown (7.5YR 4/4) gravelly loam; structureless; very friable; slightly acid.

The solum ranges from 30 to 48 inches in thickness. Depth to bedrock is more than 5 feet. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. It is loam, gravelly loam, or gravelly silt loam. The B horizon has a hue of 10YR or 7.5 YR, a value of 4, and a chroma of 3 or 4, although in some profiles there are thin layers that have a chroma of 2. The B horizon is loam, light clay loam, gravelly light clay loam, gravelly loam, gravelly silt loam, or gravelly light silty clay loam. It is medium acid to slightly acid.

Chagrin gravelly silt loams in Pulaski County are less sandy and contain more coarse fragments throughout the profile than is in the range defined for the series. The coarse fragments interfere with tillage, reduce available moisture capacity, and increase permeability.

Chagrin soils are near Nolin, Newark, Jefferson, and Whitley soils. They are coarser textured, or contain more gravel, than Nolin soils. They are better drained than Newark soils. They do not have the B horizon of clay accumulation that is typical of Jefferson and Whitley soils and are not so acid as those soils.

Chagrin loam (0 to 2 percent slopes) (Cg).—This soil is on narrow flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Nolin soils and a few gravelly areas.

This Chagrin soil has high natural fertility, high available moisture capacity, moderate permeability, and an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is good. This soil is subject to flooding, mainly late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit I–1; woodland suitability group 1o1.

Chagrin gravelly silt loam (0 to 2 percent slopes) (Ch).—This soil is on narrow to moderately wide flood plains. Its profile contains more silt and gravel in the surface layer and the subsoil than the one described as representative of the series.

Included with this soil in mapping were areas where the surface layer is gravelly loam and a few areas of Nolin and Newark soils.

This Chagrin soil has moderate natural fertility, modrately rapid permeability, and an effective rooting depth of more than 4 feet. Response of crops to lime and fertilizer is good. This soil is subject to flooding, mainly late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIs–1; woodland suitability group 1o1.

Colyer Series

The Colyer series consists of shallow, somewhat excessively drained soils that formed in residuum weathered from acid black shale. These soils are on uplands in the western part of the county. They have slopes of 20 to 50 percent.

In a representative profile, the surface layer is dark-brown silt loam about 6 inches thick. The subsoil extends to a depth of about 12 inches and is a dark yellowish-brown, firm shaly heavy silty clay loam. Below is black shale.

Colyer soils have very low available moisture capacity, slow permeability, very low natural fertility, and low organic-matter content.

Representative profile of Colyer silt loam, 20 to 50 percent slopes, located one-half mile southwest of Beech Grove Church:

Ap—0 to 6 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; 3 percent black shale fragments; extremely acid; clear, wavy boundary.

B—6 to 12 inches, dark yellowish-brown (10YR 4/4) shaly heavy silty clay loam; weak, fine and medium, subangular blocky structure; firm; 15 percent thin, black shale fragments; extremely acid; abrupt, wavy boundary.

R—12 inches, New Albany (black) shale.

The solum ranges from 8 to 18 inches in thickness. Depth to acid black shale ranges from 8 to 20 inches. The Ap horizon ranges from dark brown (10YR 4/3) to dark grayish brown (10YR 4/2). The B horizon is dark yellowish-brown (10YR 4/4), yellowish-brown (10YR 5/4, 5/6, or 5/8), or strong-brown (7.5YR 5/6 or 5/8) shaly heavy silty clay loam or shaly silty clay. Shale makes up 15 to 35 percent of the horizon. The B horizon is very strongly acid to extremely acid. The C horizon, where present, is mottled yellowish-red (5YR 4/6), strong-brown (7.5YR 5/6), yellowish-brown (10YR 5/6), and light-gray (10YR 7/2) shaly or very shaly silty clay loam or silty clay.

Colyer soils in Pulaski County have fewer coarse fragments throughout and are more yellow in the B horizon than is within the range defined for the series, but these differences do not alter their usefulness and behavior.

Colyer soils are near Trimble soils. They have a thin solum, whereas Trimble soils have a thick, cherty solum.

Colyer silt loam, 20 to 50 percent slopes (CoE).—This soil has plane slopes. It is on the sides of ridges.

Included with this soil in mapping were areas of severely eroded soils, a few areas where slopes are as gentle as 12 percent, and a few areas of Trimble soils.

This Colyer soil has an effective rooting depth of 8 to 20 inches. Response of hay and pasture plants to lime and fertilizer is poor. Modern farm machinery is difficult to operate on this soil because of the steep slopes.

This soil is better suited to woods or wildlife habitat than to hay or pasture. Capability unit VIIs–2; woodland suitability group 4r1.

Cumberland Series

The Cumberland series consists of deep, well-drained soils that formed in residuum derived from limestone. These soils are on uplands, mainly between Somerset and Burnside. They have slopes of 2 to 20 percent.

In a representative profile, the surface layer is dark-brown silt loam about 9 inches thick. The subsoil extends to a depth of 65 inches or more. To a depth of about 18

inches, it is dark-red heavy silty clay loam. Below this depth it is dark-red, firm silty clay.

Cumberland soils have moderate permeability. In some areas chert fragments interfere somewhat with tillage.

Representative profile of Cumberland silt loam, 2 to 6 percent slopes, located three-fourths of a mile northeast of Shopville:

Ap—0 to 9 inches, dark-brown (7.5YR 3/2) silt loam, dark brown (7.5YR 4/4) dry; weak, fine, granular structure; very friable; neutral; gradual, smooth boundary.

B21t—9 to 18 inches, dark-red (2.5YR 3/6) heavy silty clay loam; moderate, fine and medium, angular blocky structure; firm, few thin clay films; slightly sticky; neutral; gradual, smooth boundary.

B22t—18 to 23 inches, dark-red (2.5YR 3/6) silty clay; moderate, medium, angular blocky structure; firm; common clay films; slightly sticky; few, round, black concretions; strongly acid; gradual, smooth boundary.

B23t—23 to 65 inches, dark-red (2.5YR 3/6) silty clay; moderate, medium, angular blocky structure; firm; common clay films; slightly sticky; few, round, black concretions; strongly acid.

The solum ranges from 60 to 85 inches or more in thickness. Depth to limestone bedrock is more than 72 inches. The chert content throughout the profile ranges from 1 to 35 percent. The Ap horizon is dark brown (7.5YR 3/2) or dark reddish brown (5YR 3/3). The B2t horizon is dark-red 2.5YR 3/6 or 10R 3/6) heavy silty clay loam, silty clay, or clay. The lower part of the Bt horizon is medium acid to strongly acid.

Cumberland soils in Pulaski County are a few degrees cooler than is in the range defined for the series, but this difference does not alter their usefulness and behavior.

Cumberland soils are near Pembroke and Frederick soils. They have a more clayey B horizon than Pembroke soils and Frederick soils. They have a more clayey B horizon than Pembroke soils and are darker colored in the A horizon and in the upper part of the B horizon than Frederick soils.

Cumberland silt loam, 2 to 6 percent slopes (CuB).—This soil (fig. 8) has both uniform and irregular, or karst, topography. It has the profile described as representative of the series.

Included with this soil in mapping, especially where the topography is karst, were small areas of Nolin and Newark soils in depressions. Also included were small areas of Frederick soils and areas of soils that have bedrock at a depth of less than 72 inches. In a few places there are outcrops of bedrock.

This Cumberland soil has high natural fertility, high available moisture capacity, low to medium organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

The soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe–1; woodland suitability group 2c1.

Cumberland silt loam, 6 to 12 percent slopes (CuC).—This soil has both uniform and irregular, or karst, topography.

Included with this soil in mapping were areas of eroded and severely eroded soils where plowing has mixed some material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were small areas of Frederick soils; small areas of cherty soils; small areas of soils that have bedrock at a depth of less than 72 inches; and a few places where there are outcrops of bedrock. Small areas, especially where the topography is karst, of Nolin and Newark soils in depressions were also included.

Figure 8.—**Corn in an area of Cumberland silt loam, 2 to 6 percent slopes.**

This Cumberland soil has high natural fertility, high available moisture capacity, low organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

The soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–1; woodland suitability group 2c1.

Cumberland cherty silt loam, 2 to 6 percent slopes (CvB).—This soil has both uniform and irregular, or karst, topography. Its profile has much more chert throughout than the one described as representative of the series.

Included with this soil in mapping, especially where the topography is karst, were small areas of Nolin and Newark soils in depressions. Also included were small areas of Frederick soils; areas of soils that are free of chert; and areas of soils that have bedrock at a depth of less than 72 inches. In a few places are outcrops of bedrock.

This Cumberland soil has high natural fertility, moderate available moisture capacity, low to medium organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe–1; woodland suitability group 2c1.

Cumberland cherty silt loam, 6 to 12 percent slopes (CvC).—This soil has both uniform and irregular, or karst, topography. Its profile has much more chert throughout than the one described as representative of the series.

Included with this soil in mapping were areas of eroded and severely eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and present surface layer is redder and more clayey than that of this soil. Also included were small areas of Frederick soils; areas of soils that are free of chert; areas of soils that have bedrock at a depth of less than 72 inches;

and a few places where there are outcrops of bedrock. Small areas, especially where the relief is karst, of Nolin and Newark soils in depressions were also included.

This Cumberland soil has high natural fertility, moderate available moisture capacity, low organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–1; woodland suitably group 2c1.

Cumberland cherty silt loam, 12 to 20 percent slopes (CvD).—This soil has both uniform and irregular, or karst, topography. It has much more chert throughout the profile than the soil described as representative of the series.

Included with this soil in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were small areas of Frederick soils; small areas of soils that are free of chert; small areas of soils that have bedrock at a depth of less than 72 inches; and a few places where there are outcrops of bedrock. Small areas, especially where the topography is karst, of Nolin and Newark soils in depressions were also included.

This Cumberland soil has high natural fertility, moderate available moisture capacity, low organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–1; woodland suitability group 2c1.

Cumberland cherty silty clay loam, 12 to 20 percent slopes, severely eroded (CwD3).—This soil has both uniform and irregular, or karst, topography. Its profile has much more chert throughout than the one described as representative of the series. It also has a redder, more clayey surface layer, because erosion has removed part of the material originally in the surface layer, and material from the subsoil has been mixed with that in the plow layer.

Included with this soil in mapping, especially where the topography is karst, were small areas of Nolin and Newark soils in depressions. Also included were small areas of Frederick soils; small areas of soils that are only slightly to moderately eroded; and areas of soils that have bedrock at a depth of less than 72 inches. In a few places are outcrops of bedrock.

This Cumberland soil has low natural fertility, moderate available moisture capacity, very low organic-matter content, and an effective rooting depth of more than 60 inches. Response of pasture and hay plants to lime and fertilizer is fair.

The soil is suited to grasses and legumes, but it is better suited to drought-resistant plants. Capability unit VIe–2; woodland suitability group 3c1.

Dekalb Series

The Dekalb series consists of moderately deep, well-drained soils that formed in residuum derived from acid sandstone. These soils are on uplands in the eastern and southeastern parts of the county. They have slopes of 6 to 50 percent.

In a representative profile, the surface is sandy loam about 6 inches thick. It is mainly yellowish brown, but the upper inch is dark grayish brown. The subsoil is brownish-yellow, loose sandy loam between depths of about 6 and 13 inches and yellowish-brown, very friable sandy loam between depths of 13 and 37 inches. Sandstone is at a depth of 37 inches.

Dekalb soils have low available moisture capacity, rapid permeability, low natural fertility, and low organic-matter content.

Representative profile of a Dekalb sandy loam in an area of Dekalb-Rock outcrop complex, 20 to 50 percent slopes, located one-half mile south of Little Lick Campground on Forest Service Trail 502:

O1—1¾ inches to ½ inch, loose leaves, twigs, and pine needles.

O2—½ inch to 0, partly decomposed leaves, twigs, and pine needles.

A1—0 to 1 inch, dark grayish-brown (10YR 4/2) sandy loam; weak, medium, granular structure; loose; 2 percent channery fragments, by volume; many roots; extremely acid; abrupt, smooth boundary.

A2—1 to 6 inches, yellowish-brown (10YR 5/4) sandy loam; weak, coarse, granular structure; loose; 2 percent channery fragments, by volume; many roots; very strongly acid; clear, wavy boundary.

B1—6 to 13 inches, brownish-yellow (10YR 6/6) sandy loam; weak, coarse, granular structure; loose; 2 percent channery fragments, by volume; many roots; very strongly acid; clear, wavy boundary.

B21—13 to 18 inches, yellowish-brown (10YR 5/6) sandy loam; weak, fine, subangular blocky structure; very friable; 2 percent channery fragments, by volume; few roots; very strongly acid; clear, wavy boundary.

B22—18 to 27 inches, yellowish brown (10YR 5/8) sandy loam; weak, fine, subangular blocky structure; very friable; 2 percent channery fragments, by volume; few roots; extremely acid; clear, wavy boundary.

B3—27 to 37 inches, yellowish-brown (10YR 5/8) sandy loam; weak, fine, subangular blocky structure; very friable; 14 percent gravel, by volume; few roots; very strongly acid; abrupt, smooth boundary.

R—37 inches, coarse-grained sandstone.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is 20 to 40 inches. Gravel and channery fragments make up 0 to 14 percent, by volume, of the solum. In some places the A1 horizon is very dark grayish brown (10YR 3/2), dark brown (10YR 3/3), or yellowish brown (10YR 5/4). The Ap horizon, where present, has a hue of 10YR, a value of 4, and a chroma of 2 or 3. The B horizon has a hue of 10YR or 7.5 YR, a value of 5 or 6, and a chroma of 4 to 8. The B horizon is strongly acid to very strongly acid. The C horizon, where present, is yellowish-brown (10YR 5/4 or 5/8), light yellowish-brown (10YR 6/4), or brownish-yellow (10YR 6/6 or 6/8) sandy loam or loamy sand. Sandstone fragments less than 10 inches in diameter make up 0 to 75 percent, by volume, of the C horizon.

Dekalb soils in Pulaski County have fewer coarse fragments in the B horizon than is in the range defined for the series, but this difference does not alter their usefulness and behavior.

Dekalb soils are near Hartsells and Jefferson soils. They do not have the clay accumulation in the B horizon of Hartsells soils. They are not so deep over bedrock as Jefferson soils.

Dekalb sandy loam, 6 to 12 percent slopes (DeC).—This soil is in convex areas on narrow ridgetops.

Included with this soil in mapping were a few areas of Hartsells and Jefferson soils, small areas of Rock outcrop, and areas of a soil that is less than 20 inches deep over bedrock.

This Dekalb soil has an effective rooting depth of 20 to 40 inches. Response of crops to lime and fertilizer is fair, but applications are needed more frequently than on finer textured soils. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Alfalfa requires intensive fertilization and ample liming. Capability unit IIIe–3; woodland suitability group 3o1.

Dekalb-Rock outcrop complex, 12 to 20 percent slopes (DrD).—This complex is in convex areas on narrow ridgetops and points of ridges. The areas of Dekalb soils and Rock outcrop are so intermingled and so closely associated that separation in mapping is not practical. Dekalb soils generally make up about 96 percent of the complex, but they make up 85 to 97 percent of some areas. The profile of the Dekalb soils contains more coarse fragments than the one described as representative of the series. Rock outcrop consists of exposed areas of sandstone that occur at random and typically make up about 4 percent of the complex. In some areas, however, Rock outcrop makes up only 3 percent of the complex, and in other places it makes up as much as 15 percent.

Included with this complex in mapping were areas of Hartsells soils, rock cliffs, and areas where bedrock is at a depth of less than 20 inches. Also included were a few areas where boulders are common on the surface.

The soils of this complex have an effective rooting depth of 20 to 40 inches. Tillage is difficult, and rockiness makes these soils unsuited to cultivated crops. Response of pasture and hay plants to lime and fertilizer is poor, and applications are needed more frequently than on finer textured soils.

This complex is suited to grasses and legumes, but it is better suited to drought-resistant plants. It is well suited to trees. Capability unit VIs–1; woodland suitability group 3o1.

Dekalb-Rock outcrop complex, 20 to 50 percent slopes (DrE).—This complex is on the sides of ridges. Dekalb soils generally make up about 95 percent of the complex, but they make up 85 to 97 percent of some areas. The Dekalb soils have the profile described as representative of the Dekalb series. Rock outcrop consists of exposed sandstone that occurs at random and typically makes up about 5 percent of the complex, but the range is from 3 to 15 percent.

Included with this complex in mapping were small areas of Jefferson and Muse soils. Also included were small areas of a soil that is similar to this Dekalb soil but is less than 20 inches deep over bedrock.

In most places this complex is so steep or so rocky, or both, that it is poorly suited to any use other than for trees or wildlife habitat. A few areas can be used for limited grazing. Most areas are wooded. Capability unit VIIs–1; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes.

Etowah Series

The Etowah series consists of deep, well-drained soils that formed in cherty material derived mostly from limestone. These soils are on uplands, mainly in the central part of the county. They have slopes of 2 to 12 percent.

In a representative profile, the surface layer is dark-brown cherty silt loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. Between depths of 9 and 14 inches, it is dark-brown, friable cherty silty clay loam. Between depths of 14 and 55 inches, it is yellowish-red to red, firm cherty silty clay loam. Below a depth of 55 inches it is red, very firm silty clay.

Etowah soils have moderate available moisture capacity, moderate permeability, high natural fertility, and low to medium organic-matter content.

Representative profile of Etowah cherty silt loam, 2 to 6 percent slopes, located one-half mile north-northwest of Burnetta:

Ap—0 to 9 inches, dark-brown (10YR 3/3) cherty silt loam; weak, fine, granular structure; very friable; 20 percent chert fragments, by volume; neutral; clear, smooth boundary.

B1t—9 to 14 inches, dark-brown (7.5YR 4/4) cherty light silty clay loam; moderate, fine, subangular blocky structure; friable; 20 percent chert fragments, by volume; few round, black concretions; few thin clay films; neutral; gradual, smooth boundary.

B21t—14 to 23 inches, yellowish-red (5YR 4/6) cherty light silty clay loam; moderate, fine and medium, subangular blocky structure; firm; 25 percent chert fragments, by volume; few, round, black concretions; common clay films; strongly acid; gradual smooth boundary.

B22t—23 to 36 inches, red (2.5YR 4/6) cherty light silty clay loam; common, fine, faint, yellowish-red (5YR 4/6) mottles; moderate, fine and medium, subangular blocky structure; firm; common clay films; 25 percent chert fragments, by volume; very strongly acid; gradual, smooth boundary.

B23t—36 to 55 inches, red (2.5YR 4/6) cherty heavy silty clay loam; moderate, medium, angular blocky structure; firm; common clay films; 15 percent chert fragments, by volume; very strongly acid; gradual, smooth boundary.

B24t—55 to 60 inches, red (2.5YR 4/6) silty clay; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; moderate, medium, angular blocky structure; very firm; few thick clay films; 5 percent chert fragments, by volume; very strongly acid.

The solum ranges from 60 to 100 inches in thickness. Depth to limestone bedrock is more than 72 inches. The Ap horizon is dark brown (10YR 3/3 or 7.5YR 3/2). Chert fragments make up 15 to 25 percent, by volume, of the horizon. The upper part of the B2t horizon is yellowish red (5YR 4/6) or red (2.5YR 4/6). Chert fragments make up 15 to 25 percent of the upper part of the B2t horizon and 1 to 25 percent of the lower part. The B horizon generally is strongly acid to very strongly acid, but if the soil is limed, the upper part of the B horizon is likely to be less acid.

Etowah soils in Pulaski County are a few degrees cooler than in the range defined for the series, but this difference does not alter their usefulness and behavior.

Etowah soils are near Frederick soils. They have a darker colored A horizon, are much more cherty thoughout, and are less clayey in the upper part of the Bt horizon than Frederick soils.

Etowah cherty silt loam, 2 to 6 percent slopes (EtB).—This soil is in both convex and concave areas because the topography in most places is irregular, or karst. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Frederick and Nolin soils.

This Etowah soil has an effective rooting depth of more than 5 feet. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe-1; woodland suitability group 2o1.

Etowah cherty silt loam, 6 to 12 percent slopes (EtC).—This soil is in both convex and concave areas because the topography in most places is irregular, or karst.

Included with this soil in mapping were small areas of Frederick and Nolin soils and areas of eroded soils.

This Etowah soil has an effective rooting depth of more than 5 feet. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe-1; woodland suitability group 2o1.

Frankstown Series

The Frankstone series consists of moderately deep to deep, well-drained soils that formed in residuum derived mainly from cherty limestone, but in some places the residuum is derived from siltstone. These soils are on uplands, mainly in the western and north-central parts of the county. They have slopes of 2 to 30 percent.

In a representative profile, the surface layer is dark-brown cherty silt loam about 8 inches thick. To a depth of about 27 inches, the subsoil is yellowish-brown, friable cherty heavy silt loam to cherty light silty clay loam. Between a depth of 27 and 36 inches, it is strong-brown, firm cherty light silty clay loam. Below is cherty and shaly limestone.

Frankstown soils have moderate available moisture capacity, moderate permeability, moderate natural fertility, and low organic-matter content. Chert fragments interfere somewhat with tillage.

Representative profile of Frankstown cherty silt loam, 6 to 12 percent slopes, located 1 mile southeast of Science Hill:

Ap—0 to 8 inches, dark-brown (10YR 4/3) cherty silt loam; weak, fine, granular structure; very friable; 15 percent chert fragments, by volume; medium acid; clear, smooth boundary.

B1—8 to 18 inches, yellowish-brown (10YR 5/6) cherty heavy silt loam; weak, fine, granular structure; friable; 20 percent chert fragments, by volume; strongly acid; clear, wavy boundary.

B21t—18 to 27 inches, yellowish-brown (10YR 5/6) cherty light silty clay loam; strong-brown (7.5YR 5/6) ped surfaces; moderate, fine and medium, subangular blocky structure; friable; few, thin clay films; 30 percent chert fragments, by volume; very strongly acid; clear, wavy boundary.

B22t—27 to 36 inches, strong-brown (7.5YR 5/6) cherty light silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm; few thin clay films; 30 percent chert fragments, by volume; very strongly acid; abrupt, wavy boundary.

R—36 inches, dense, cherty and shaly limestone.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock ranges from 32 to 60 inches. Chert fragments range from 2 millimeters to about 4 inches in size and make up 15 to 35 percent, by volume, of the profile. In a few profiles as much as 25 percent of the coarse fragments are sandstone or siltstone, or both. The B21t horizon is strong-brown (7.5YR 5/6 or 5/8) or yellowish-brown (10YR 5/6) cherty silt loam or cherty light silty clay loam. The B22t horizon is yellowish brown (10YR 5/6) in some profiles, and it is mottled in hues of 10YR, values of 5 to 7, and chromas of 3 to 6. In a few profiles, there is a B3 horizon that is mottled in hues of 10YR, values of 5 to 7, and chromas of 3 to 6. It is cherty loam, cherty silt loam, or cherty light silt clay loam. The B horizon is strongly acid to very strongly acid.

Frankstown soils in Pulaski County are outside the range defined for the series in that they have a thicker B horizon and do not have mixed B and C horizons, but these differences do not alter their usefulness and behavior.

Frankstown soils are near Mountview, Garmon, and Bedford soils. They are more cherty in the solum and are not so deep over bedrock as Mountview soils. They are more cherty and have a more distinct B horizon than Garmon soils. They are more cherty and better drained than Bedford soils, and they do not have the fragipan that is typical of those soils. Frankstown soils are similar to Trimble soils, but they are shallower to bedrock and have a thinner solum than those soils.

Frankstown cherty silt loam, 2 to 6 percent slopes (FcB).—This soil is in convex areas on narrow ridgetops.

Included with this soil in mapping were small areas of Mountview soils.

This Frankstown soil has an effective rooting depth of 32 to 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe-3; woodland suitability group 2o1.

Frankstown cherty silt loam, 6 to 12 percent slopes (FcC).—This soil has plane slopes and is on the sides of ridges. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Mountview soils and areas of severely eroded soils.

This Frankstown soil has an effective rooting depth of 32 to 60 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the area. Capability unit IIIe-3; woodland suitability group 2o1.

Frankstown cherty silt loam, 12 to 20 percent slopes (FcD).—This soil has plane slopes and is on the sides of ridges.

Included with this soil in mapping were small areas of Mountview soils and areas of severely eroded soils.

This Frankstown soil has an effective rooting depth of 32 to 60 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe-3; woodland suitability group 2o1.

Frankstown cherty silt loam, 20 to 30 percent slopes (FcE).—This soil has plane slopes and is on the sides of ridges. The surface layer is not so thick as that in the profile described as representative of the series.

Included with this soil in mapping were a few areas where the soil is more than 35 percent chert fragments, a few areas where the soil is less than 32 inches deep over bedrock, and a few areas of severely eroded soils.

This soil has an effective rooting depth of about 30 to 56 inches. Response of hay and pasture plants to lime and fertilizer is fair. Modern farm machinery is difficult to operate, because of steep slopes.

This soil is not suited to cultivation, because of the hazard of erosion. It is suited to most grasses and legumes commonly grown in the county and to trees. Capability unit VIe–1; woodland suitability group 2r1.

Frederick Series

The Frederick series consists of deep, well-drained soils that formed in residuum or old alluvium derived mainly from limestone but partly from sandstone. These soils are on uplands and in valleys, mostly in the western and central parts of the county. They have slopes of 2 to 50 percent.

In a representative profile, the surface layer is dark-brown silt loam about 8 inches thick. The subsoil extends to a depth of 108 inches or more. To a depth of about 14 inches, it is yellowish-red, friable light silty clay loam. Below this depth, it is red, firm silty clay.

Frederick soils have high available moisture capacity and moderate permeability.

Representative profile of Frederick silt loam, 6 to 12 percent slopes, located on State Road No. 1317 across from Pine Hill Baptist Church:

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many roots; estimated 1 percent angular chert fragments less than 3 inches in diameter, by volume; medium acid; abrupt, smooth boundary.

B1t—8 to 14 inches, yellowish-red (5YR 4/6) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; common roots; few thin clay films; estimated 1 percent angular chert fragments less than 3 inches in diameter, by volume; very strongly acid; gradual, smooth boundary.

B21t—14 to 51 inches, red (10YR 4/6) silty clay; few, fine, prominent, yellowish-brown (10YR 5/6) mottles; strong, fine and medium, angular blocky structure; firm, sticky and plastic; few fine roots; thick, continuous, dark-red clay films; estimated 2 percent angular chert fragments less than 3 inches in diameter, by volume; very strongly acid; gradual, wavy boundary.

B22t—51 to 108 inches, red (10YR 4/6) silty clay; common, medium, prominent, yellowish-brown (10YR 5/4) mottles; strong, fine and medium, angular blocky structure; firm, sticky and plastic; thick, continuous, dark-red clay films; estimated 2 percent angular chert fragments less than 3 inches in diameter, by volume; very strongly acid.

The solum is more than 60 inches thick. Depth to limestone bedrock is more than 72 inches. Chert fragments less than 3 inches in diameter make up 1 to 15 percent, by volume, of each horizon. In some profiles as much as 25 percent of the coarse fragments are sandstone or water-worn quartzitic pebbles, or both, that range from 2 to 15 millimeters in diameter. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B1 horizon is commonly yellowish red (5YR 4/6), but in some profiles it is strong brown (7.5YR 5/6 or 5/8) or red (2.5YR 4/6). In some profiles it is heavy silty clay loam. The B2 horizon has a hue of 5YR, 2.5YR, or 10R; a value of 3 to 5; and a chroma of 6 to 8. Yellowish-brown mottles range from few to many, and they increase with depth. This horizon is heavy silty clay loam, silty clay, or clay. The Bt horizon is strongly acid to very strongly acid.

Frederick soils are near Mountview, Frankstown, Cumberland, Waynesboro, Bedford, Fredonia, and Talbott soils. They have a redder and more clayey B horizon than Mountview soils. They contain less chert and have a redder, more clayey B horizon than Frankstown soils. They have a lighter colored A horizon than Cumberland soils and contain less sand than Waynesboro soils. They are better drained than Bedford and Lawrence soils and do not have the fragipan that is typical of those soils. They are deeper over bedrock and have a thicker solum than Fredonia and Talbott soils.

Frederick silt loam, 2 to 6 percent slopes (FdB).—In most places this soil is in convex areas on narrow ridgetops. Some areas have karst topography.

Included with this soil in mapping were small areas of Mountview and Cumberland soils, small areas of soils that have as much as 3 percent rock outcrops, and areas of soils that have as much as 15 percent chert fragments.

This Frederick soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe–1; woodland suitability group 2c1.

Frederick silt loam, 6 to 12 percent slopes (FdC).—In most places this soil is on sides of the main ridgetops. In some places it is on slopes along draws and, in a few areas where the topography is karst, on slopes that encircle depressions. This soil has the profile described as representative of the series.

Included with this soil in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were small areas of Mountview and Cumberland soils, small areas of soils that have as much as 3 percent rock outcrops, and areas of soils that are more than 15 percent chert fragments.

This Frederick soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–1; woodland suitability group 2c1.

Frederick silt loam, 12 to 20 percent slopes (FdD).—In most places this soil is on sides of ridges, but in a few areas where the topography is karst, it is on slopes that encircle depressions.

Included with this soil in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were small areas of Mountview and Cumberland soils, small areas of soils that have as much as 3 percent rock outcrops, and areas of soils that are more than 15 percent chert fragments.

This Frederick soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultiva-

tion. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–1; woodland suitability group 2c1.

Frederick silt loam, 20 to 30 percent slopes (FdE).—This soil is on side slopes along narrow bottoms or streams. It is more cherty than the soil described as representative of the series.

Included with this soil in mapping were areas of eroded and severely eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were small areas of soils that have as much as 3 percent rock outcrops.

This soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 60 inches. Response of pasture and hay plants to lime and fertilizer is fair. It is difficult to operate modern farm machinery on this soil because of steep slopes.

This soil is not suited to cultivation, because of the hazard of erosion. It is suited to trees and to most grasses and legumes commonly grown in the county. Capability unit VIe–1; woodland suitability group 2c2.

Frederick silty clay loam, 6 to 12 percent slopes, severely eroded (FeC3).—In most places this soil is on the sides of the main ridgetops. It is also on slopes along draws, and in a few areas where the topography is karst, it is on slopes that encircle depressions. The profile of this soil has a redder, more clayey surface layer than the one described as representative of the series because the original surface layer has been lost through erosion and material from the subsoil is mixed with that in the plow layer.

Included with this soil in mapping were small areas of Mountview and Cumberland soils, small areas of soils that have as much as 3 percent rock outcrops, and areas of soils that are more than 15 percent chert fragments.

This Frederick soil has low natural fertility, very low organic-matter content, and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Seedbed preparation and germination are hindered by the lack of organic matter and by a moderately fine textured plow layer. Capability unit IVe–2; woodland suitability group 3c1.

Frederick silty clay loam, 12 to 20 percent slopes, severely eroded (FeD3).—In most places this soil (fig. 9) is on side slopes, but in a few areas where the topography is karst, it is on slopes that encircle depressions. The profile of this soil is redder and more clayey in the surface layer than the one described as representative of the series because the material originally in the surface layer has been lost through erosion, and material formerly in the subsoil is mixed with that in the plow layer.

Included with this soil in mapping were small areas of Mountview and Cumberland soils, small areas of soils that have as much as 3 percent rock outcrops, and areas of soils that are more than 15 percent chert fragments.

This Frederick soil has low natural fertility, very low organic-matter content, and an effective rooting depth of more than 60 inches. Response of pasture and hay plants to lime and fertilizer is fair.

Figure 9.—**Fair pasture in an area of Frederick silty clay loam, 12 to 20 percent slopes, severely eroded.**

This soil is not suited to cultivation, because of the hazard of erosion. It is better suited to drought-resistant grasses and legumes than to cultivated crops. Seedbed preparation and germination are hindered by the lack of organic matter and by a moderately fine textured plow layer. Capability unit VIe–2; woodland suitability group 3c1.

Frederick-Jefferson complex, 20 to 50 percent slopes (FfE).—This complex (fig. 10) is on lower side slopes in the east-central part of the county. The areas of Frederick and Jefferson soils are so closely intermingled and so closely associated that separation in mapping is not practical. Frederick soils are below Jefferson soils and generally make up about 60 percent of the complex, but they make up 40 to 80 percent of some areas. Jefferson soils are mostly above Frederick soils, but they occur anywhere that colluvial material has accumulated. They typically make up about 40 percent of the complex, but they make up 20 to 60 percent of some areas. In severely eroded areas the surface layer of these soils is more clayey and more red or more yellow than that in the profiles described as representative of the series. Rocks consisting of about 1 percent sandstone and 3 to 15 percent limestone are intermixed at random over the surface. In places sandstone boulders as much as 10 feet in diameter are on the surface.

Included with this complex in mapping were areas of Talbott and Shelocta soils and areas of soils that have a sandy surface layer. Also included were a few areas where sandstone covers 3 to 15 percent of the soil surface and other areas where limestone outcrops cover more than 15 percent of the surface.

The soils of this complex are so steep, so rocky, or so eroded that they are difficult to work and are unsuited to cultivated crops. Response of drought-resistant pasture plants to lime and fertilizer is fair.

This complex is suited to trees and, in places, to drought-resistant plants. Capability unit VIs–1; woodland suitability group 2c2.

Figure 10.—**Low-quality pasture in a typical area of Frederick-Jefferson complex, 20 to 50 percent slopes. The soils in this complex are not suited to cultivation because of susceptibility to erosion and many rock outcrops and stones on the surface.**

Fredonia Series

The Fredonia series consists of moderately deep, well-drained soils that formed mainly in residuum derived from limestone. These soils are on uplands, mostly in the western and central parts of the county. Limestone outcrops make up 3 to 90 percent of the soil surface. These soils have slopes of 6 to 30 percent.

In a representative profile, the surface layer is dark-brown silt loam about 6 inches thick. The subsoil is dark-red, firm silty clay loam between a depth of 6 and 13 inches and dark-red, very firm silty clay or clay between a depth of 13 and 27 inches. Limestone bedrock is at a depth of 27 inches.

Fredonia soils have moderate available moisture capacity and moderately slow permeability.

Representative profile of a Fredonia soil in an area of Fredonia-Frederick rocky silt loams, 6 to 20 percent slopes, located one-fourth mile due west of Stab on the south side of State Road No. 80:

Ap—0 to 6 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; neutral; clear, smooth boundary.

B21t—6 to 13 inches, dark-red (2.5YR 3/6) heavy silty clay loam; moderate, fine and medium, subangular blocky structure; firm; common thin clay films; strongly acid; gradual, wavy boundary.

B22t—13 to 18 inches, dark-red (2.5YR 3/6) silty clay; strong, medium, angular blocky structure; very firm; common thin clay films; strongly acid; gradual, wavy boundary.

B23t—18 to 27 inches, dark-red (2.5YR 3/6) clay; moderate, coarse, angular blocky structure; very firm; thin, patchy clay films; medium acid; abrupt, wavy boundary.

R—27 inches, hard, massive, limestone bedrock.

The solum ranges from 20 to 36 inches in thickness. Depth to limestone bedrock is 20 to 40 inches. The Ap horizon has a hue of 10YR, a value of 3, and a chroma of 2 or 3; or a hue of 7.5YR, a value of 3, and a chroma of 2. The Bt horizon has a hue of 2.5YR or 10R, a value of 3, and a chroma of 6. It is heavy silty clay loam, silty clay, or clay. The B21t and B22t horizons are strongly acid or medium acid. The B23t horizon and the C horizon, where present, are medium acid to neutral. The C horizon, where present, is red (2.5YR 4/6 or 10R 4/6) silty clay or clay.

Fredonia soils are near Cumberland, Pembroke, Frederick, and Talbott soils. They are shallower to bedrock than Cumberland and Pembroke soils and are more clayey in the upper part of the B horizon than Pembroke soils. They are shallower to bedrock and have a darker colored A horizon than Frederick soils. They are darker throughout the solum than Talbott soils.

Fredonia-Frederick rocky silt loams, 6 to 20 percent slopes (FkD).—This complex (fig. 11) is in plane areas on the sides of ridges, commonly where the topography is karst. The areas of Fredonia and Frederick soils are so

Figure 11.—**Kentucky 31 fescue in an area of Fredonia-Frederick rocky silt loams, 6 to 20 percent slopes. These soils are in capability class VIs.**

intermingled and so closely associated that separation in mapping is not practical. Fredonia soils typically make up about 75 percent of the complex, but they make up 50 to 85 percent of some areas. They have the profile described as representative of the Fredonia series. Frederick soils typically make up about 25 percent of this complex, but in places they make up 15 to 50 percent. Fredonia soils are 20 to 40 inches deep over bedrock, and Frederick soils are more than 60 inches deep over bedrock. Limestone outcrops cover 3 to 15 percent of the soil surface.

Included with this complex in mapping were a few areas of Talbott soils and a few areas where slopes are less than 6 percent. Also included were areas of a soil that is similar to this Fredonia soil, but is less than 20 inches deep over bedrock.

The soils of this complex have moderate natural fertility, low to medium organic-matter content, and an effective rooting depth of more than 20 inches in most places. Tillage is difficult, and rockiness makes these soils unsuited to cultivated crops. Response of pasture and hay plants to lime and fertilizer is good.

This complex is suited to most grasses and legumes commonly grown in the county. It is suited to trees. Capability unit VIs–1; woodland suitability group 3c1.

Fredonia-Frederick rocky silty clay loams, 6 to 20 percent slopes, severely eroded (FID3).—This complex is in plane areas on sides of ridges, commonly where the topography is karst. The areas of Fredonia and Frederick soils are so intermingled and so closely associated that separation is not practical. Fredonia soils typically make up about 75 percent of the complex, but they make up 50 to 85 percent of some areas. Frederick soils make up about 25 percent of the complex, but they make up 15 to 50 percent of some areas. The surface layer of these soils is redder and more clayey than that in the profile described as representative of their respective series. This difference exists because the original surface layer has been lost through erosion, and material formerly in the subsoil is mixed with that in the plow layer. Fredonia soils are 20 to 35 inches deep over bedrock, and Frederick soils are 60 inches or more deep over bedrock. Limestone outcrops cover 3 to 15 percent of the soil surface.

Included with this complex in mapping were a few areas of Talbott soils, a few areas where slopes are less than 6 percent. Also included were areas of a soil that is similar to the Fredonia soil but its less than 20 inches deep to bedrock.

The soils of this complex have low natural fertility and very low organic-matter content. The effective rooting depth is 20 to 35 inches in most places, but in some areas it is more than 60 inches. Tillage is difficult, and rockiness and a severe hazard of erosion make these soils unsuited to cultivated crops. Response of pasture and hay plants to lime and fertilizer is fair to poor.

If this complex is used for pasture or hay, it is better suited to drought-resistant grasses and legumes than to other plants. It is well suited to trees. Capability unit VIs–2; woodland suitability group 4c1.

Fredonia very rocky soils, 6 to 30 percent slopes (FrE).—In most places these soils are on the sides of ridges, but a few areas occur where the topography is karst. The profile of these soils is similar to the one described as representative of the series, but in severely eroded areas the surface layer is redder and more clayey and the solum is not so thick. Limestone outcrops cover 15 to 90 percent of the soil surface, but the average is about 20 percent. The outcrops typically are about 2 feet wide and about 1 foot high, but they range from 6 inches to 10 feet in width and 3 feet or more in height. They are generally about 10 feet apart, but the spacing ranges from 2 to 100 feet or more.

Included with these soils in mapping were areas of Cumberland, Frederick, and Talbott soils. Also included were areas of a soil that is similar to this Fredonia soil, but it is less than 20 inches deep over bedrock.

Some areas of these soils can be used for pasture if drought-resistant grasses and legumes are used, but most areas are so rocky that they are poorly suited to any use other than for trees or wildlife habitat. Most areas are wooded. Capability unit VIIs-1; woodland suitability group 3x2.

Garmon Series

The Garmon series consists of moderately deep, well-drained soils that formed mainly in residuum derived from shaly limestone. These soils are on uplands, mainly in the western and northwestern parts of the county. They have slopes of 30 to 80 percent.

In a representative profile, the surface layer is dark-brown silt loam about 6 inches thick. The subsoil extends to a depth of about 22 inches and is yellowish-brown, friable shaly silt loam. The substratum extends to a depth of about 24 inches and is mottled light olive-brown and olive, friable very shaly light silty clay loam. Shaly limestone is at a depth of about 24 inches.

Garmon soils have moderate available moisture capacity, moderately rapid permeability, low natural fertility, and low organic-matter content.

Representative profile of a Garmon silt loam in an area of Garmon-Trimble complex, 30 to 80 percent slopes, located 1¾ miles northwest of Ringgold:

A1—0 to 6 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; 10 percent shale and chert fragments; strongly acid; clear, smooth boundary.

B—6 to 22 inches, yellowish-brown (10YR 5/4) shaly silt loam; weak, fine, granular structure; friable; 30 percent shale fragments; medium acid; gradual, smooth boundary.

C—22 to 24 inches, mottled light olive-brown (2.5Y 5/4) and olive (5Y 5/3) very shaly light silty clay loam; structureless; friable; 80 percent shale fragments; slightly acid; abrupt, wavy boundary.

R—24 inches, shaly limestone.

The solum ranges from 15 to 25 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. The A1 horizon has a hue of 10YR, a value of 3 to 5, and a chroma of 2 or 3. In a few profiles small pieces of chert or shale, or both, make up 5 to 10 percent of this horizon, by volume. The B horizon is strong brown (7.5YR 5/6) in some profiles. It is shaly light silty clay loam or shaly silt loam, and coarse fragments make up 15 to 35 percent of the horizon, by volume. The B horizon is slightly acid to medium acid. The C horizon is 15 to 85 percent coarse fragments, by volume.

Garmon soils are near Frankstown and Trimble soils. They have a shaly subsoil that is not so acid and cherty as the subsoil of Frankstown soils. They are not so deep, so acid, or so cherty as Trimble soils. Garmon soils do not have the clay-enriched B horizon that is typical of Frankstown and Trimble soils.

Garmon-Trimble complex, 30 to 80 percent slopes (GmF).—This complex is in long, plane areas of very steep sides of valleys along major streams in the western and northwestern parts of the county. Garmon soils occupy the upper residual positions and typically make up about 60 percent of the complex, but they make up 30 to 90 percent of some areas. Trimble soils are in coves, at the base of the slopes, and in other areas where colluvial soil material has accumulated. They typically make up about 40 percent of the complex, but they make up 10 to 70 percent of some areas.

Included with this complex in mapping were rock cliffs that have an average height of about 50 feet. Also included were areas of soils that are less than 20 inches deep over bedrock.

The Garmon soils have an effective rooting depth of 20 to 40 inches, and Trimble soils of more than 60 inches.

This complex is so steep that it is poorly suited to any use other than for trees or wildlife habitat. Most areas are wooded. Capability unit VIIe-1; woodland suitability group 4r1.

Gilpin Series

The Gilpin series consists of moderately deep, well-drained soils that formed in residuum weathered from acid sandstone and shale. These soils are on narrow ridgetops and side slopes in the eastern part of the county. They have slopes of 12 to 20 percent.

In a representative profile, the surface layer is dark-brown silt loam about 10 inches thick. The subsoil extends to a depth of about 22 inches and is yellowish-brown, friable light silty clay loam. The substratum extends to a depth of about 24 inches and is yellowish-brown, friable very gravelly silt loam. Sandstone bedrock is at a depth of 24 inches.

Gilpin soils have moderate available moisture capacity, moderate permeability, moderate natural fertility, and low organic-matter content.

Representative profile of Gilpin silt loam, 12 to 20 percent slopes, located one-half mile south-southeast of Stab:

Ap—0 to 10 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; 5 percent sandstone gravel; medium acid; abrupt, smooth boundary.

B1t—10 to 14 inches, yellowish-brown (10YR 5/4) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; 5 percent sandstone gravel; few, thin, patchy clay films; strongly acid; gradual, wavy boundary.

B2t—14 to 22 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; 10 percent sandstone gravel; few, thin, patchy clay films; strongly acid; clear, irregular boundary.

C—22 to 24 inches, yellowish-brown (10YR 5/6) very gravelly silt loam; weak, fine, granular structure; friable; 75 percent sandstone gravel; strongly acid; abrupt, wavy boundary.

R—24 inches, brown and gray acid sandstone bedrock.

The solum ranges from 18 to 30 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Gravel makes up 1 to 15 percent, by volume, of all horizons except the C horizon, which is more than 30 percent gravel in most profiles. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The Bt horizon is strong brown (7.5YR 5/6), yellowish brown (10YR 5/4 or 5/6), or light olive brown (2.5Y 5/4 or 5/6). Gravel makes up less than 15 percent of this horizon, by volume. In some profiles the C horizon is absent. The B and C horizons are strongly acid to extremely acid.

Gilpin soils are near Whitley, Tilsit, and Muse soils. They are shallower to bedrock and have a thinner solum than Whitley soils. They do not have the fragipan that is typical of Tilsit soils, and they are shallower to bedrock than those soils. They have a coarser textured subsoil and are shallower to bedrock than Muse soils.

Gilpin silt loam, 12 to 20 percent slopes (GnD).—This soil is in convex areas on narrow ridgetops.

Included with this soil in mapping were areas where slopes are as low as 6 percent. Also included were a few areas of Whitley and Muse soils.

This Gilpin soil has an effective rooting depth of 20 to 40 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–3; woodland suitability group 3o1.

Hartsells Series

The Hartsells series consists of moderately deep, well-drained soils that formed in residuum weathered from acid sandstone. These soils are on ridgetops and side slopes, mostly in the northern and eastern parts of the county. They have slopes of 2 to 30 percent.

In a representative profile, the surface layer is dark-brown fine sandy loam about 7 inches thick. The subsoil extends to a depth of about 25 inches. It is yellowish-brown, very friable fine sandy loam between depths of 7 and 12 inches and strong-brown, friable clay loam between depths of 12 and 25 inches. The substratum extends to a depth of about 31 inches and is yellowish-red, very friable loamy sand. Sandstone bedrock is at a depth of about 31 inches.

Hartsells soils have moderate available moisture capacity, moderately rapid permeability, moderate natural fertility, and low organic-matter content.

Representative profile of Hartsells fine sandy loam, 12 to 20 percent slopes, located three-fifths of a mile west-southwest of Burnett Church on the west side of State Road No. 934:

Ap—0 to 7 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B1—7 to 12 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; very friable; 2 percent sandstone gravel; strongly acid; gradual, smooth boundary.

B2t—12 to 25 inches, strong-brown (7.5YR 5/6) light clay loam; weak, fine, subangular blocky structure; friable; few clay films; 10 percent sandstone gravel; very strongly acid; abrupt, wavy boundary.

C—25 to 31 inches, yellowish-red (5YR 4/6) loamy sand; many, fine, distinct, yellowish-brown (10YR 5/6) mottles; single grained; very friable; very strongly acid; abrupt, wavy boundray.

R—31 inches, brown sandstone bedrock.

The solum ranges from 15 to 34 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Coarse fragments less than 10 inches in diameter make up 0 to 10 percent, by volume, of all horizons. Most coarse fragments are sandstone, but in some profiles as much as 25 percent are chert. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. It is fine sandy loam or loam. The B horizon is dark yellowish-brown (10YR 4/4), yellowish-brown (10YR 5/4 to 5/8), or strong-brown (7.5YR 5/6 or 5/8) fine sandy loam or light clay loam. It is strongly acid to extremely acid. The C horizon is yellowish-red (5YR 4/6), strong-brown (7.5YR 5/6 or 5/8), or yellowish-brown (10YR 5/4 to 5/8) loamy sand, fine sandy loam, loam, or light clay loam.

Hartsells soils in Pulaski County are outside the range defined for the series, inasmuch as they are a few degrees cooler, but this difference does not alter their usefulness and behavior.

Hartsells soils are near Muse, Mountview, Whitley, Tilsit, and Bedford soils. They are shallower to bedrock and are sandier than Muse, Mountview, and Whitley soils. They are better drained than Tilsit and Bedford soils, which have a fragipan.

Hartsells fine sandy loam, 6 to 12 percent slopes (HaC).—This soil (fig. 12) is in plane areas on the sides of ridges.

Included with this soil in mapping were areas of a soil that is similar to this Hartsells soil, but its surface layer is less sandy. Also included were a few areas of Dekalb and Mountview soils and a few areas where slopes are less than 6 percent.

This Hartsells soil has an effective rooting depth of 20 to 40 inches. Response of crops to lime and fertilizer is fair, but applications need to be made more frequently than on finer textured soils. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Alfalfa requires intensive fertilization. Capability unit IIIe–3; woodland suitability group 2o1.

Hartsells fine sandy loam, 12 to 20 percent slopes (HaD).—This soil (fig. 13) is in plane areas on the sides of ridges. It has the profile described as representative of the series. Sandstone fragments less than 10 inches in diameter cover 0 to about 5 percent of the soil surface. In places are a few stones more than 10 inches in diameter. In some areas chert and sandstone fragments are mixed.

Included with this soil in mapping were a few areas of Dekalb soils and a few areas of severely eroded soils.

This Hartsells soil has an effective rooting depth of 20 to 40 inches. Response of crops to lime and fertilizer is fair, but the applications need to be made more frequently than on finer textured soils. In some areas the coarse fragments interfere with tillage. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Alfalfa requires intensive fertilization. Capability unit IVe–3; woodland suitability group 2o1.

Hartsells fine sandy loam, 20 to 30 percent slopes (HaE).—This soil is in plane areas on the sides of ridges. Sandstone fragments less than 10 inches in diameter cover 0 to about 5 percent of the soil surface. In some areas a few rocks are as much as 2 feet in diameter. In some areas chert and sandstone fragments are mixed.

Figure 12.—**Kentucky 31 fescue in an area of Hartsells fine sandy loam, 6 to 12 percent slopes.**

Included with this soil in mapping were a few areas of Dekalb soils and a few areas of severely eroded soils.

This Hartsells soil has an effective rooting depth of 20 to 40 inches. Response of hay and pasture plants to lime and fertilizer is fair, but applications need to be made more frequently than on finer textured soils. In some areas coarse fragments interfere with tillage. Where slopes are steep, modern farm machinery is difficult to operate. The hazard of erosion makes this soil unsuited to cultivation.

This soil is suited to most grasses and legumes commonly grown in the county. Alfalfa requires intensive fertilization. This soil is suited to trees. Capability unit VIe–1; woodland suitability group 2r1.

Hartsells loam, 2 to 6 percent slopes (HrB).—This soil is in convex areas on narrow ridgetops. It has a less sandy surface layer than the soil described as representative of the series. Also, it does not contain coarse fragments.

Included with this soil in mapping were small areas of Mountview and Bedford soils.

This Hartsells soil has an effective rooting depth of 20 to 40 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe–3; woodland suitability group 2o1.

Huntington Series

The Huntington series consists of deep, well-drained soils that formed in alluvium washed mainly from upland areas that are underlain by limestone. These soils are mainly in depressions in the central part of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is dark-brown silt loam about 12 inches thick. The subsoil extends to a depth of about 55 inches and is dark-brown, friable heavy silt loam. The substratum is dark-brown, friable heavy silt loam stratified with loam.

Huntington soils have high available moisture capacity, moderate permeability, high natural fertility, and medium organic-matter content.

Representative profile of Huntington silt loam, located 2,800 feet south of Plato:

Ap—0 to 12 inches, dark-brown (7.5 YR 3/2) silt loam; weak, fine, granular structure; very friable; neutral; gradual, smooth boundary.

B21—12 to 36 inches, dark-brown (10YR 3/3) heavy silt loam, dark brown (10YR 4/3) when crushed; weak, fine, granular structure; friable; neutral; gradual, smooth boundary.

B22—36 to 55 inches, dark-brown (10YR 4/3) heavy silt loam; common, fine, faint, dark-brown (7.5YR 4/4) mottles; weak, fine, granular structure; friable; neutral; gradual, smooth boundary.

C—55 to 65 inches, dark-brown (10YR 4/3) heavy silt loam; structureless; friable; neutral; generally several feet thick, but stratified with thin layers of loam.

The solum ranges from 40 to 72 inches in thickness. Depth to bedrock is more than 60 inches. In a few areas small pieces of chert make up as much as 5 percent, by volume, of all horizons. The Ap horizon has a hue of 7.5YR or 10YR and a value of less than 4. Below a depth of 30 inches, some profiles contain few to common mottles that have a chroma of 2 or less. The B horizon ranges from medium acid to neutral.

Huntington soils are near Pembroke and Cumberland soils. They are young soils that formed in alluvium and are less red in the B horizon than Pembroke and Cumberland soils, which formed in old residuum.

Figure 13.—**Prepared seedbed in an area of Hartsells fine sandy loam, 12 to 20 percent slopes.**

Huntington silt loam (0 to 2 percent slopes) (Hu).—In most places this soil is in small depressions and around sinkholes.

Included with this soil in mapping were a few areas of Newark soils.

This Huntington soil has an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is good. This soil is subject to flooding, mostly late in winter or early in spring.

This soil is well suited to most crops and pasture and hay plants commonly grown in the county. Capability unit I–1; woodland suitability group 1o1.

Jefferson Series

The Jefferson series consists of deep, well-drained soils that formed in colluvium washed from soils that formed in residuum derived from acid sandstone, siltstone, and shale. Stones make up 3 to 30 percent of the soil surface where slopes are steep. These soils are mostly in the eastern part of the county. They have slopes of 6 to 65 percent.

In a representative profile, the surface layer is stony loam about 9 inches thick. It is mainly yellowish brown, but the upper 2 inches is dark brown. The subsoil extends to a depth of about 42 inches. To a depth of about 19 inches, it is yellowish-brown, friable loam. Between depths of 19 and 28 inches, it is yellowish-brown, friable gravelly heavy loam. Below a depth of 28 inches, it is yellowish-brown, friable clay loam. The substratum, between depths of 42 and 60 inches, is strong-brown, firm clay loam that has gray and brownish-yellow mottles.

Jefferson soils have moderately rapid to moderately slow permeability in the substratum, moderate natural fertility, and low organic-matter content.

Representative profile of Jefferson stony loam, 30 to 65 percent slopes, located 1¾ miles north of Buck Creek Baptist Church:

O11—1½ inches to ½ inch, hardwood leaves.

O12—½ inch to 0, partly decomposed hardwood leaves.

A1—0 to 2 inches, dark-brown (10YR 3/3) stony loam; weak, fine, granular structure; very friable; 3 percent sandstone gravel, by volume; many roots; very strongly acid; abrupt, smooth boundary.

A2—2 to 9 inches, yellowish-brown (10YR 5/4) stony loam; weak, very fine, subangular blocky structure; very friable; 5 percent sandstone gravel, by volume; 5 percent channery fragments; many roots; very strongly acid; clear, wavy boundary.

B1—9 to 14 inches, yellowish-brown (10YR 5/4) loam; weak, fine, subangular blocky structure; friable; 8 percent sandstone gravel; by volume; 10 percent channery fragments; many roots; very strongly acid; clear, wavy boundary.

B21t—14 to 19 inches, yellowish-brown (10YR 5/6) heavy loam; weak, fine, subangular blocky structure; friable; faint, patchy clay films in cavities; 8 percent sandstone gravel, by volume; 10 percent channery fragments; few roots; very strongly acid; clear, wavy boundary.

B22t—19 to 28 inches, yellowish-brown (10YR 5/6) gravelly heavy loam; moderate, fine, subangular blocky structure; friable; faint, patchy clay films on peds; 15 percent sandstone gravel, by volume; 15 percent channery fragments; few roots; very strongly acid; clear, wavy boundary.

B3—28 to 42 inches, yellowish-brown (10YR 5/6) clay loam; common, medium, distinct, very pale brown (10YR 7/3) and strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure; friable; 10 percent sandstone gravel, by volume; 5 percent channery fragments; very strongly acid; gradual, wavy boundary.

C—42 to 50 inches, strong-brown (7.5YR 5/8) light clay loam; many, medium, distinct, gray (10YR 5/1) and brownish-yellow (10YR 6/6) mottles; massive; firm; 3 percent sandstone gravel, by volume; 5 percent channery fragments; extremely acid.

The solum ranges from 42 to 54 inches in thickness. Depth to hard sandstone bedrock is more than 60 inches. Gravel or channery fragments, or both, make up 0 to 35 percent, by volume, of the profile. The A1 horizon has a hue of 10YR, a value of 3 or 4, and a chroma of 2 or 3. It is loam or sandy loam and is less than 6 inches thick. The A2 horizon has a hue of 10YR, a value of 5, and a chroma of 4 to 6. The Ap horizon, where present, has a hue of 10YR, a value of 4, and a chroma of 2 or 3. It is loam or sandy loam. The B horizon is yellowish-brown (10YR 5/4 to 5/8) or strong-brown (7.5YR 5/6 or 5/8) loam or clay loam. It is strongly acid to very strongly acid. The C horizon is yellowish-brown (10YR 5/4 to 5/8) or strong-brown (7.5YR 5/6 or 5/8) sandy loam, loam, clay loam, or clay.

Jefferson sandy loam in Pulaski County has a B horizon that is more clayey and less acid below a depth of about 2 feet than is within the range defined for the series, but these differences do not alter their usefulness and behavior.

Jefferson soils are near Muse, Shelocta, and Talbott soils. They are less clayey than Muse soils and more sandy than Shelocta soils. They are much less clayey in the solum and are deeper to bedrock than Talbott soils.

Jefferson sandy loam, 20 to 40 percent slopes (JeE).—This soil is on the lower sides of ridges. It is more sandy in the surface layer and in the upper part of the subsoil than the soil described as representative of the series. Also, it is clayey and medium acid to neutral below a depth of about 2 feet. The surface layer and subsoil are 1 to 20 percent small sandstone fragments. As much as 15 percent of the soil surface is covered with sandstone cobblestones, and as much as 2 percent is covered with stones.

Included with this soil in mapping were small area of Shelocta soils and small areas of soils that have as much as 5 percent stones and rocks on the surface.

This Jefferson soil has moderate available moisture capacity and an effective rooting depth of more than 48 inches.

Some areas of this soil can be used for limited grazing, especially where slopes are less than 30 percent and rocks

and stones do not hinder tillage. Where slopes are more than 30 percent, this soil is well suited to trees and wildlife habitat. Capability unit VIIe–1; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes.

Jefferson gravelly loam, 6 to 12 percent slopes (JfC).—This soil is in colluvial areas at the base of steep side slopes and on benches that are a part of the steep valley walls. It contains more sandstone gravel than the soil described as representative of the series. In addition, this soil is 15 to 35 percent gravel and as much as 3 percent angular sandstone cobblestones.

Included with this soil in mapping were a few small areas of Muse and Shelocta soils. Also included were areas of eroded soils that, if plowed and mixed, have a more yellow surface layer than the soil described as representative of the series.

This Jefferson soil has moderate available moisture capacity and an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is fair. Gravel and cobblestones interfere with tillage. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–3; woodland suitability group 2o1.

Jefferson gravelly loam, 12 to 20 percent slopes (JfD).—This soil is in colluvial areas at the base of steep side slopes and on benches that are a part of the steep valley walls. It contains more sandstone gravel than the soil described as representative of the series. This soil is 15 to 35 percent gravel and as much as 3 percent angular sandstone cobblestones and an occasional sandstone boulder.

Included with this soil in mapping were a few small areas of Muse and Shelocta soils. Also included were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is more yellow than that of this soil.

This Jefferson soil has moderate available moisture capacity and an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is fair. Gravel and cobblestones interfere with tillage. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture or hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–3; woodland suitability group 2o1.

Jefferson stony loam, 20 to 30 percent slopes (JlE).—This soil is in colluvial areas at the base of hills. It is about 6 percent sandstone cobblestones and stones, and the stones on the surface are about 30 to 100 feet apart. A few sandstone boulders are also on the surface.

Included with this soil in mapping were a few areas of Shelocta soils, a few sandy areas, and areas that are almost free of stones. Also included were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is more yellow than that of this soil.

This soil has low available moisture capacity and an effective rooting depth of more than 48 inches. Response of pasture and hay plants to lime and fertilizer is fair. Where slopes are steep, modern farm machinery is difficult to operate. The hazard of erosion and the stones on the surface make this soil unsuited to cultivation.

This soil is better suited to drought-resistant grasses and legumes than to other plants. It is well suited to trees. Capability unit VIe–1; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes.

Jefferson stony loam, 30 to 65 percent slopes (JlF).—This soil is in plane and concave, colluvial areas of the valley walls. It has the profile described as representative of the series. Sandstone rocks, as much as 24 inches in diameter, are scattered on 3 to 30 percent of the soil surface and are embedded in the soil. A few sandstone boulders, 30 inches or more in diameter, are on the surface.

Included with this soil in mapping were a few areas of Shelocta soils, a few sandy areas, and sandstone cliffs that average about 50 feet in height. Also included were a few areas of Muse and Dekalb soils.

This Jefferson soil has low available moisture capacity and an effective rooting depth of more than 48 inches.

This soil is so steep or so stony, or both, that it is poorly suited to any uses other than trees or wildlife habitat. Most areas are wooded. Capability unit VIIs–1; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes.

Lawrence Series

The Lawrence series consists of deep, somewhat poorly drained soils that have a fragipan. These soils formed in residuum derived from limestone, sandstone, or alluvial sediment. They are on uplands and stream terraces, mainly in the western and north-central parts of the county. They have slopes of 0 to 4 percent.

In a representative profile, the surface layer is grayish-brown silt loam about 8 inches thick. The subsoil extends to a depth of 65 inches or more. To a depth of about 22 inches, it is light yellowish-brown, friable silt loam that has yellowish-brown and light brownish-gray mottles. The fragipan, between depths of about 22 and 58 inches, is light-gray, firm, compact and brittle heavy silt loam that has light yellowish-brown and strong-brown mottles. Below a depth of 58 inches, the subsoil is yellowish-brown, firm light silty clay loam that has light-gray mottles.

Lawrence soils have moderate available moisture capacity, slow permeability, low natural fertility, and low organic-matter content.

Representative profile of Lawrence silt loam, located 1¾ miles northwest of Walnut Grove Church of Christ on the south side of State Highway No. 935:

Ap—0 to 8 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B2t—8 to 22 inches, light yellowish-brown (2.5Y 6/4) silt loam that contains at least 4 percent more clay than the overlying horizon; many, fine distinct, yellowish-brown (10YR 5/6) mottles and common, fine, faint, light brownish-gray (10YR 6/2) mottles; weak, fine, subangular blocky structure; friable; few thin clay films; very strongly acid; gradual, smooth boundary.

Bxtg—22 to 58 inches, light-gray (10YR 7/1) heavy silt loam; many, fine, distinct, light yellowish-brown (10YR 6/4) mottles and few, fine, prominent, strong-brown (7.5YR 5/6) mottles; weak, coarse, angular

blocky structure; firm, compact and brittle; few thin clay films; very strongly acid; gradual, smooth boundary.

B3t—58 to 65 inches, yellowish-brown (10YR 5/6) light silty clay loam; many, medium, distinct, light-gray (10YR 7/1) mottles; weak, fine, subangular blocky structure; firm; few faint clay films; very strongly acid.

The solum ranges from 60 to 80 inches in thickness. Depth to bedrock is more than 60 inches. In a few profiles, all horizons contain as much as 5 percent, by volume, very coarse sand. The Ap horizon has a hue of 10YR or 2.5Y, a value of 4 or 5, and a chroma of 2 or 3. The B2t horizon has a hue of 10YR or 2.5Y, a value of 5 or 6, and a chroma of 4 to 6. Mottles that have a chroma of 2 or less range from few to common. Depth from the surface to these mottles ranges from 8 to 17 inches. Depth to the fragipan ranges from 20 to 32 inches. The B3t horizon is absent in some profiles. The B horizon is very strongly acid or strongly acid throughout.

Lawrence soils are near Frederick, Frankstown, Hartsells, Mountview, Whitley, and Bedford soils. They are somewhat poorly drained, have a fragipan, and do not have the red, clayey subsoil that is typical of Frederick soils. They are deeper over bedrock and less sandy than Hartsells soils and are not so well drained as those soils. They are not so well drained as Mountview and Whitley soils, and they have a fragipan that does not occur in those soils. They are not so well drained as Bedford soils.

Lawrence silt loam (0 to 4 percent slopes) (La).—This soil is on ridgetops and stream terraces.

Included with this soil in mapping were a few areas of Bedford and Robertsville soils.

This Lawrence soil has an effective rooting depth of 20 to 32 inches. The high water table during wet seasons interferes with tillage and plant growth. Artificial drainage is needed to remove the excess water. Where excess water is not a limitation, response of crops to lime and fertilizer is fair.

If excess water is controlled, this soil is suited to most crops and pasture and hay plants commonly grown in the county, except alfalfa and tobacco. Where this soil is on low stream terraces, it is subject to occasional flooding, mostly late in winter and early in spring. Capability unit IIIw–2; woodland suitability group 2w1.

Lindside Series

The Lindside series consists of deep, moderately well drained soils that formed in alluvium washed from upland soils underlain mainly by limestone, but in places partly underlain by sandstone. These soils are on flood plains along streams, around sinkholes, and in depressions in all parts of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is dark-brown silt loam about 7 inches thick. The subsoil extends to a depth of about 30 inches. To a depth of about 16 inches, it is dark grayish-brown, friable heavy silt loam. Below, to a depth of 30 inches, it is dark grayish-brown, friable heavy silt loam that has gray and dark-brown mottles. The substratum extends to a depth of about 60 inches and is gray, friable heavy silt loam that has dark-brown mottles.

Lindside soils have high available moisture capacity, moderate permeability, high natural fertility, and low organic-matter content. Depth to the seasonal high water table ranges from 18 to 24 inches.

Representative profile of Lindside silt loam, located 300 feet south of the confluence of Briary and Buck Creeks, near State Road No. 70:

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B21—7 to 16 inches, dark grayish-brown (10YR 4/2) heavy silt loam; weak, fine, granular structure; friable; slightly acid; gradual, smooth boundary.

B22—16 to 30 inches, dark grayish-brown (10YR 4/2) heavy silt loam; common, fine, faint, gray (10YR 5/1) mottles and few, fine, distinct, dark-brown (7.5YR 4/4) mottles; weak, fine, granular structure; friable; slightly acid; clear, smooth boundary.

C—30 to 60 inches, gray (10YR 5/1) heavy silt loam; few, fine, distinct dark-brown (7.5YR 4/4) mottles; massive; friable; slightly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is more than 60 inches. In a few areas small pieces of chert make up as much as 5 percent, by volume, of all horizons. The Ap and B21 horizons have a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. Mottles that have a chroma of 2 or less in the B22 horizon range from 2 to 40 percent. The B horizon is medium acid to slightly acid. Stratification is common below a depth of about 30 inches, and texture and color vary widely.

Lindside soils are near Nolin and Newark soils. They are not so well drained as Nolin soils and are better drained than Newark soils.

Lindside silt loam (0 to 2 percent slopes) (Ld).—This soil is on narrow to moderately wide flood plains. It is also around sinkholes and in depressions.

Included with this soil in mapping were small areas of Nolin and Newark soils.

This Lindside soil has an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is good. Overflow is a hazard, mostly late in winter or early in spring. Artificial drainage improves growth of plants during wet seasons.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit I–2; woodland suitability group 1o1.

Melvin Series

The Melvin series consists of deep, poorly drained soils that formed in alluvium washed from upland soils underlain mainly by limestone but in places partly by sandstone. These soils are on flood plains of streams in the western and central parts of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is dark grayish-brown silt loam about 8 inches thick that has grayish-brown mottles. The subsoil extends to a depth of about 40 inches. To a depth of 20 inches, it is light brownish-gray, very friable silt loam that has grayish-brown and dark yellowish-brown mottles. Below a depth of 20 inches, it is dark-gray, very friable heavy silt loam that has yellowish-brown mottles. The substratum extends to a depth of about 60 inches and is light brownish-gray, very friable silt loam that has grayish-brown and yellowish-brown mottles.

Melvin soils have high available moisture capacity, moderate permeability, moderate natural fertility, and low organic-matter content. Depth to the seasonal high water table ranges from 0 to 6 inches.

Representative profile of Melvin silt loam, located one-fourth mile east of Ringgold Church:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, faint, grayish-brown (2.5Y 5/2) mottles; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B21g—8 to 20 inches, light brownish-gray (2.5Y 6/2) silt loam; common, medium, faint, grayish-brown (2.5Y 5/2) and dark yellowish-brown (10YR 4/4) mottles; weak, fine, granular structure; very friable; few, small, black concretions; slightly acid; gradual, smooth boundary.

B22g—20 to 40 inches, dark-gray (N 4/0) heavy silt loam; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, fine, granular structure; very friable; few, small, black concretions; slightly acid; gradual, smooth boundary.

C—40 to 60 inches, light brownish-gray (2.5Y 6/2) silt loam; common, medium, faint, grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/4) mottles; massive; very friable; common, small, black concretions; medium acid.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is more than 60 inches. In a few places, small pebbles make up as much as 5 percent, by volume, of the profile. The Ap horizon has a hue of 10YR or 2.5 Y, a value of 4 to 6, and a chroma of 1 or 2. The B horizon ranges from medium acid to slightly acid. Stratification is common below a depth of about 30 inches, and texture and color vary widely.

Melvin soils are near Newark soils. They are more poorly drained than those soils.

Melvin silt loam (0 to 2 percent slopes) (Me).—This soil is in narrow bands on flood plains.

Included with this soil in mapping were small areas of Newark soils. Also included were areas of a soil that is very dark gray to black in the surface layer and in the upper part of the subsoil.

The rooting depth is restricted by a seasonal high water table. Response of crops to lime and fertilizer is fair in drained areas. This soil is subject to flooding, mostly late in winter or early in spring.

If this soil is adequately drained, it is suited to most crops and pasture and hay plants commonly grown in the county, except alfalfa, tobacco, and small grain. Capability unit IIIw–1; woodland suitability group 1w2.

Monongahela Series

The Monongahela series consists of deep, moderately well drained soils that have a fragipan. These soils formed in residuum derived from sandstone or in old alluvium washed from soils underlain mainly by sandstone but in some places partly by limestone. They are on uplands and stream terraces in the northern and southwestern parts of the county. They have slopes of 2 to 6 percent.

In a representative profile, the surface layer is dark-brown loam about 9 inches thick. The subsoil extends to a depth of about 54 inches. To a depth of 21 inches, it is yellowish-brown, friable heavy loam. Between depths of 21 and 27 inches, it is light yellowish-brown, friable light clay loam that has strong-brown and light-gray mottles. The fragipan extends to a depth of 54 inches and is mottled light yellowish-brown, strong-brown, and light-gray, firm, compact and brittle heavy loam. The substratum extends to a depth of 65 inches or more and is strong-brown, friable light clay loam that has light-gray mottles.

Monongahela soils have moderate available moisture capacity, slow permeability, moderate natural fertility, and low organic-matter content.

Representative profile of Monongahela loam, 2 to 6 percent slopes, located two-fifths of a mile south of Elrod:

Ap—0 to 9 inches, dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B21t—9 to 21 inches, yellowish-brown (10YR 5/6) heavy loam; weak, fine and medium, subangular blocky structure; friable; few thin clay films; very strongly acid; gradual, smooth boundary.

B22t—21 to 27 inches, light yellowish-brown (10YR 6/4) light clay loam; few, fine, distinct, strong-brown (7.5YR 5/6) and light-gray (10YR 7/1) mottles; moderate, fine and medium, subangular blocky structure; friable; few thin clay films; strongly acid; clear, wavy boundary.

Bxt—27 to 54 inches, mottled light yellowish-brown (10YR 6/4), strong-brown (7.5YR 5/6), and light-gray (10YR 7/1) heavy loam; weak, fine and medium, subangular blocky structure; firm, compact and brittle; few thin clay films; strongly acid; gradual, wavy boundary.

C—54 to 65 inches, strong-brown (7.5YR 5/6) light clay loam; common, fine, prominent, light-gray (10YR 7/1) mottles; massive; friable; strongly acid.

The solum ranges from 48 to 60 inches in thickness. Depth to bedrock is more than 60 inches. In some places, gravel makes up as much as 5 percent, by volume, of the profile. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B21t horizon is light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4 to 5/8), or strong brown (7.5YR 5/6). In some profiles it is light clay loam. The B22t horizon is light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4 to 5/8), or strong brown (7.5YR 5/6). In some profiles it is heavy loam. Depth to this horizon ranges from 10 to 24 inches. Texture of the Bx horizon in some profiles is light clay loam. Depth to the fragipan ranges from 20 to 30 inches. The B horizon is strongly acid to very strongly acid.

Monongahela soils are near Waynesboro and Hartsells soils. They have a fragipan, are browner, and have a much less clayey subsoil than Waynesboro soils. They are deeper over bedrock than Hartsells soils and are not so well drained as those soils.

Monongahela loam, 2 to 6 percent slopes (MgB).—This soil is in convex areas on ridgetops and stream terraces.

Included with this soil in mapping were small areas of Hartsells soils and a few areas where slopes are less than 2 percent.

This Monongahela soil has an effective rooting depth of 20 to 30 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Alfalfa is generally short lived because of excess water in the rooting zone caused by the slow permeability of the fragipan. Where this soil is on low stream terraces, it is subject to flooding after periods of heavy rain, but floods are slight. Capability unit IIe–4; woodland suitability group 3w1.

Mountview Series

The Mountview series consists of deep, well-drained soils that formed in loamy residuum. These soils are relatively free of coarse fragments, and the underlying clayey material is derived mainly from cherty limestone, but in some places it is partly derived from sandstone. These

soils are on uplands, mainly in the western and central parts of the county. They have slopes of 2 to 20 percent.

In a representative profile, the surface layer is dark-brown silt loam about 7 inches thick. The subsoil extends to a depth of about 75 inches or more. To a depth of 30 inches, it is yellowish-brown, friable silt loam to silty clay loam. Between depths of 30 and 36 inches, it is red, very firm silty clay that has brownish-yellow mottles. Below a depth of 36 inches, it is mottled red, brownish-yellow, and light-gray, very firm silty clay.

Mountview soils have high available moisture capacity, moderate permeability in the upper part of the subsoil and moderately slow permeability in the lower part of the subsoil, moderate natural fertility, and low organic-matter content.

Representative profile of Mountview silt loam, 2 to 6 percent slopes, located one-half mile east of U.S. Highway No. 27 on the south side of State Road No. 70:

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; slightly acid; gradual, smooth boundary.

B1t—7 to 10 inches, yellowish-brown (10YR 5/4) heavy silt loam; weak, fine and medium, subangular blocky structure; friable; few thin clay films; slightly acid; gradual, smooth boundary.

B21t—10 to 30 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; few thin clay films; 1 percent sandstone, chert fragments, and water-worn pebbles; strongly acid; clear, wavy boundary.

IIB22t—30 to 36 inches, red (2.5YR 4/6) silty clay; few, fine, prominent, brownish-yellow (10YR 6/6) mottles; moderate, fine and medium, angular blocky structure; very firm; common thick clay films; 5 percent chert fragments; very strongly acid; gradual, wavy boundary.

IIB23t—36 to 70 inches, mottled red (2.5YR 4/6), brownish-yellow (10YR 6/6), and light-gray (10YR 7/1) silty clay; moderate, coarse, angular blocky structure; very firm; common thick clay films; 1 percent chert fragments; very strongly acid; gradual, wavy boundary.

IIB24t—70 to 75 inches, mottled red (2.5YR 4/6), brownish-yellow (10YR 6/6), and light-gray (10YR 7/1) silty clay; moderate, coarse, angular blocky structure; very firm; thick, patchy clay films; strongly acid.

The solum ranges from 70 to 100 inches or more in thickness. Depth to limestone or sandstone bedrock is more than 72 inches. In a few places, small pieces of chert make up as much as 5 percent, by volume, of the profile. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The Bt horizon is yellowish-brown (10YR 5/4 or 5/6) or strong-brown (7.5YR 5/6) heavy silt loam or light silty clay loam. The IIBt horizon is heavy silty clay loam, silty clay, or clay. The B horizon generally is strongly acid to very strongly acid, but if the B1 horizon is limed it is slightly acid.

Mountview soils in Pulaski County are a few degrees cooler and, in some profiles, are more acid in the B horizon than is defined in the range for the series, but these differences do not alter their usefulness and behavior.

Mountview soils are near Frederick, Frankstown, Hartsells, Bedford, and Lawrence soils. They are less red and much less clayey in the upper part of the B horizon than Frederick soils. They contain fewer chert fragments in the upper part of the B horizon and are deeper over bedrock than Frankstown soils. They are deeper over bedrock and are less sandy than Hartsells soils. They are better drained than Bedford and Lawrence soils, and they do not have the fragipan that is typical of those soils.

Mountview silt loam, 2 to 6 percent slopes (MnB).—This soil is in convex areas on narrow to moderately wide ridgetops and side slopes. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Hartsells and Bedford soils. Also included were small areas of soils that are about 42 inches deep over bedrock and areas of soils that have a compacted layer in the form of a thin, weak fragipan about 30 inches below the surface.

This Mountview soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe–2; woodland suitability group 2o1.

Mountview silt loam, 6 to 12 percent slopes (MnC).—This soil is in plane areas on the sides of ridges.

Included with this soil in mapping were areas of severely eroded soils where plowing has mixed material formerly in the subsoil with that in the surface layer, and the present surface layer is more yellow and finer textured than that of this soil. Also incluled were a few areas of soils that are about 42 inches deep to bedrock and a few small areas of Hartsells soils.

This Mountview soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the survey area. Capability unit IIIe–2; woodland suitability group 2o1.

Mountview silt loam, 12 to 20 percent slopes (MnD).—This soil is in plane areas on the sides of ridges.

Included with this soil in mapping were areas of severely eroded soils where plowing has mixed material formerly in the subsoil with that in the surface layer, and the present surface layer is more yellow and finer textured than that of this soil. Also included were a few areas of Hartsells soils.

This Mountview soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture or hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–1; woodland suitability group 2o1.

Muse Series

The Muse series consists of deep, well-drained soils that formed in residuum or colluvium derived mainly from acid shale, but in places the material is derived partly from sandstone or siltstone, or both. These soils are on uplands and toe slopes in the eastern part of the county. They have slopes of 6 to 50 percent.

In a representative profile, the surface layer is dark-brown silt loam about 6 inches thick. The subsoil extends to a depth of about 48 inches. To a depth of about 12 inches, it is yellowish-brown, friable light silty clay loam. Below this depth it is strong-brown to yellowish-brown, very firm silty clay that has light-gray mottles in the

lower part. Sandstone, shale, or both are at a depth of 48 inches.

Muse soils have high available moisture capacity and moderately slow permeability.

Representative profile of Muse silt loam, 12 to 20 percent slopes, located one-half mile north-northwest of White Lily Elementary School:

Ap—0 to 6 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B1t—6 to 12 inches, yellowish-brown (10YR 5/8) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; few thin clay films; very strongly acid; gradual, smooth boundary.

B2t—12 to 35 inches, strong-brown (7.5YR 5/6) silty clay; few, fine, distinct, light olive-brown (2.5Y 5/4) and yellowish-red (5YR 4/6) mottles; strong, fine and medium, angular blocky structure; very firm; common thick clay films; very strongly acid; clear, smooth boundary.

B3t—35 to 48 inches, yellowish-brown (10YR 5/6) silty clay; common, fine, distinct, light-gray (10YR 7/1) mottles; weak, coarse, subangular blocky structure; very firm; few, thin, patchy clay films; 10 percent gravel and shale fragments, by volume; very strongly acid; abrupt, wavy boundary.

R—48 inches, acid sandstone and shale.

The solum ranges from 40 to 50 inches in thickness. Depth to sandstone or soft shale bedrock ranges from 40 to 80 inches. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The A2 horizon, where present, is brown (10YR 5/3), dark brown (10YR 4/3), yellowish brown (10YR 5/4 or 5/6), or pale brown (10YR 6/3). The A horizon in some profiles is as much as 35 percent gravel. The B1t horizon is yellowish-brown (10YR 5/6 or 5/8) or strong-brown (7.5YR 5/6 or 5/8) silty clay loam or silty clay. Gravel makes up 0 to 10 percent, by volume, of this horizon. The B2t horizon is yellowish-brown (10YR 5/6 or 5/8), strong-brown (7.5YR 5/6 or 5/8), or yellowish-red (5YR 5/6 or 5/8) heavy silty clay loam, silty clay, or clay. Gravel or shale, or both, make up 0 to 10 percent, by volume, of this horizon. The B3t horizon has the same range as the B2t horizon. It is silty clay or clay. Shale makes up 0 to 15 percent, by volume, of this horizon. The B horizon is strongly acid or very strongly acid. Some profiles have a C horizon that is mottled yellowish-red (5YR 4/6), strong-brown (7.5YR 5/6), yellowish-brown (10YR 5/6), and light-gray (10YR 7/1) silty clay or clay.

Muse soils are near Hartsells, Whitley, Jefferson, and Shelocta soils. They are deeper over bedrock and are much more clayey in the B horizon than Hartsells soils. They are more clayey in the B2 horizon than Whitley soils. They have a more clayey B horizon than Jefferson and Shelocta soils.

Muse silt loam, 6 to 12 percent slopes (MoC).—This soil is in convex areas on ridgetops and in concave areas on toe slopes.

Included with this soil in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is more yellow and more clayey than that of this soil. Also included were a few areas of Whitley and Hartsells soils and a few areas where slopes are as little as 2 percent.

This Muse soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 40 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–2; woodland suitability group 2c1.

Muse silt loam, 12 to 20 percent slopes (MoD).—This soil is in convex areas on ridgetops, in concave areas on toe slopes, and in plane areas on side slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is more yellow and more clayey than that of this soil. Also included were a few areas of Shelocta and Jefferson soils and a few areas where slopes are as much as 30 percent.

This Muse soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 40 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–1; woodland suitability group 2c1.

Muse silty clay loam, 6 to 12 percent slopes, severely eroded (MsC3).—This soil is in convex areas on ridgetops and in concave areas on toe slopes. The profile of this soil is similar to the one described as representative of the series, but the surface layer is more yellowish and more clayey because the original surface layer has been lost through erosion and material originally in the subsoil has been mixed with that in the plow layer.

Included with this soil in mapping were a few small areas of Whitley and Hartsells soils.

This Muse soil has low natural fertility, very low organic-matter content, and an effective rooting depth of 36 inches or more. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. Drought-resistant plants provide a better protective cover on this soil than other plants. Capability unit IVe–2; woodland suitability group 3c1.

Muse silty clay loam, 12 to 20 percent slopes, severely eroded (MsD3).—This soil is in convex areas on ridgetops, in concave areas on toe slopes, and in plane areas on side slopes. This soil has a more yellowish and a more clayey surface layer than the one described as representative of the series, because the original surface layer has been lost through erosion, and material formerly in the subsoil is mixed with that in the plow layer.

Included with this soil in mapping were a few areas of Shelocta and Jefferson soils. Also included were a few areas where slopes are as much as 30 percent.

This Muse soil has low natural fertility, very low organic-matter content, and an effective rooting depth of 36 inches or more. Response of pasture and hay plants to lime and fertilizer is fair.

This soil is not suited to cultivated crops. It is suited to drought-resistant grasses and legumes, and is well suited to trees. Capability unit VIe–2; woodland suitability group 3c1.

Muse-Hartsells complex, 12 to 20 percent slopes (MtD).—This complex is in convex areas on ridgetops that have a hill-saddle topography. In most places the Muse soils are in saddlelike positions and on hillsides. Most of

the Hartsells soils are on hilltops, but they occur anywhere that colluvial material has accumulated. Muse soils typically make up about 60 percent of the complex, but they make up 40 to 80 percent of some areas. Hartsells soils typically make up about 40 percent of the complex, but they make up 20 to 60 percent of some areas.

Included with this complex in mapping were a few areas of Dekalb and Whitley soils, a few areas where slopes are as little as 6 percent. Also included were a few areas of soils that are stony and gravelly.

The soils of this complex have moderate natural fertility and low organic-matter content. The effective rooting depth is 20 to 40 inches in areas of Hartsells soils and more than 40 inches in areas of Muse soils. Response of crops to lime and fertilizer is fair. In some areas sandstones on the soil surface interfere with tillage. The hazard of erosion is very severe in cultivated areas.

This complex is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. In areas of Hartsells soils, alfalfa requires intensive fertilization and liming. Capability unit IVe–3; woodland suitability group 2c1.

Muse-Shelocta complex, 12 to 20 percent slopes (MuD).—Muse soils make up about 65 to 75 percent of this complex. They are in plane areas on side slopes and in noselike positions. Shelocta soils make up about 25 to 35 percent. They are mostly on lower side slopes and toe slopes, but they occur anywhere that colluvial soil material has accumulated.

Included with this complex in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is more yellow, and, in some areas, more clayey than that of this soil. Also included were areas of Jefferson soils, a few areas where stones cover 3 to 15 percent of the surface, and areas that are gravelly and channery.

The soils of this complex have moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 40 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This complex is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–1; woodland suitability group 2c1.

Muse-Shelocta complex, 20 to 30 percent slopes (MuE).—Muse soils make up about 55 to 65 percent of this complex. They are in plane areas on upper side slopes and noses. Shelocta soils make up about 35 to 45 percent. In most places they are on the lower side slopes and toe slopes and in coves, but they occur anywhere that colluvial soil material has accumulated.

Included with this complex in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is more yellow and, in places, more clayey than that of these soils. Also included were areas of Jefferson soils, a few areas where stones cover 3 to 15 percent of the surface, and areas that are gravelly and channery.

The soils of this complex have moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 40 inches. Response of pasture and hay plants to lime and fertilizer is fair. Modern farm machinery is difficult to operate where slopes are steep. The hazard of erosion makes these soils unsuited to cultivation.

This complex is suited to most grasses and legumes commonly grown in the county. It is suited to trees. Capability unit VIe–1; woodland suitability group 2c2 on north- and east-facing slopes and 3c2 on south- and west-facing slopes.

Muse-Shelocta complex, 20 to 30 percent slopes, severely eroded (MuE3).—Muse soils make up about 55 to 65 percent of this complex. They are in plane areas on upper side slopes and noses. Shelocta soils make up about 35 to 45 percent of the complex. In most places they are on the lower side slopes and toe slopes and in coves, but they occur anywhere that colluvial soil material has accumulated. The surface layer of these soils is more yellow, and, in most places, more clayey than the one in the profile described as representative of their respective series because material originally in the surface layer has been lost through erosion, and material formerly in the subsoil is mixed with that in the plow layer.

Included with this complex in mapping were areas of Jefferson soils and a few areas where stones cover 3 to 15 percent of the surface. Also included were areas that are gravelly and channery.

The soils of this complex have low natural fertility, very low organic-matter content, and an effective rooting depth of 36 inches or more. Response of pasture and hay plants to lime and fertilizer is fair. Modern farm machinery is difficult to operate where slopes are steep.

The hazard of erosion and the effects of past erosion make this complex unsuited to cultivation. This complex is better suited to drought-resistant grasses and legumes than to cultivated crops. It is well suited to trees. Capability unit VIe–2; woodland suitability group 3c2.

Muse-Shelocta complex, 30 to 50 percent slopes (MuF).—Muse soils make up about 55 to 65 percent of this complex (fig. 14). They are in plane areas on upper side slopes and noses. Shelocta soils make up about 34 to 45 percent. In most places they are on the lower side slopes and toe slopes and in coves, but they occur anywhere that colluvial soil material has accumulated.

Included with this complex in mapping were areas of severely eroded soils that, if plowed and mixed, have a more yellow surface layer that in places is more clayey than that of the profile described as representative of the series. Also included were areas of Jefferson soils, a few areas where stones cover 3 to 15 percent of the surface, and a few areas that are gravelly or channery, or both.

The soils of this complex are so steep, so eroded, and so stony that their use for pasture is limited even under good management. They are well suited to trees and wildlife habitat. Capability unit VIIe–1; woodland suitability group 2c2 on north- and east-facing slopes and 3c2 on south- and west-facing slopes.

Needmore Series

The Needmore series consists of moderately deep to deep, well-drained soils that formed in residuum weath-

Figure 14.—**Wooded area of Muse-Shelocta complex, 30 to 50 percent slopes. These soils are in capability class VIIe.**

ered from calcareous shale. These soils are on uplands in small scattered areas throughout the county. They have slopes of 6 to 25 percent.

In a representative profile, the surface layer is yellowish-brown silty clay loam about 8 inches thick. The subsoil extends to a depth of about 26 inches. To a depth of 21 inches, it is strong-brown, firm silty clay. Below this depth it is yellowish-brown, firm silty clay that has gray mottles. The substratum is light olive-brown, very firm clay that has gray and yellowish-brown mottles, and it is about 5 percent shale fragments. Partly weathered, calcareous shale is at a depth of about 40 inches.

Needmore soils have moderate available moisture capacity and moderately slow permeability.

Representative profile of Needmore silty clay loam, 6 to 12 percent slopes, eroded, located 2 miles southwest of Norfleet:

Ap—0 to 8 inches, yellowish-brown (10YR 5/8) silty clay loam; strong, fine, angular blocky structure; firm, sticky and plastic; thick clay films; strongly acid; gradual, smooth boundary.

B21t—8 to 21 inches, strong-brown (7.5YR 5/6) silty clay; strong, fine, angular blocky structure; firm, sticky and plastic; thick clay films; strongly acid; gradual, smooth boundary.

B22t—21 to 26 inches, yellowish-brown (10YR 5/6) silty clay; common, fine, distinct, gray (10YR 6/1) mottles; strong, fine, angular blocky structure; firm, sticky and plastic; thick clay films; strongly acid; gradual, smooth boundary.

C—26 to 40 inches, light olive-brown (2.5Y 5/6) clay; common, fine, distinct, gray (10YR 6/1) mottles and common, fine, faint, yellowish-brown (10YR 5/6) mottles; massive; very firm, sticky and plastic; 5 percent shale fragments; neutral; abrupt, wavy boundary.

R—40 inches, partly weathered, calcareous shale.

The solum ranges from 17 to 36 inches in thickness. Depth to calcareous shale is 20 to 50 inches. Where the Ap horizon is not eroded, it is silt loam and has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B horizon is yellowish brown (10YR 5/6) or strong brown (7.5YR 5/6). The mottles in the lower part of the B horizon range from gray (10YR 6/1) to yellowish red (5YR 5/6). The B horizon is strongly acid to very strongly acid, and the C horizon ranges from medium acid to neutral.

Needmore soils are near Frederick soils. They have a sticky and plastic B horizon that is not so thick or so red as that of Frederick soils.

Needmore silty clay loam, 6 to 12 percent slopes, eroded (NcC2).—This soil is in plane areas on sides of ridges. It has the profile described as representative of the series.

Included with this soil in mapping were a few areas of uneroded soils that have slopes of less than 6 percent. Also included were areas of severely eroded soils that have a more yellow and more clayey surface layer than

this soil. Areas where slopes are as much as 20 percent and a few areas of Frederick soils were also included.

This Needmore soil has low natural fertility, low organic-matter content, and an effective rooting depth of 20 to 50 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

Most of this soil is in hay and pasture, and it is better suited to this use than to cultivated crops. This soil, however, is suitable for occasional cultivation. It is better suited to drought-resistant grasses and legumes for hay or pasture than to cultivated crops. Capability unit IVe–4; woodland suitability group 3c1.

Needmore complex, 12 to 25 percent slopes (NdD).—This complex is in convex areas on noses and in plane areas on benches of long side slopes and on the top of knoblike hills. The soils in this complex range from severely eroded to uneroded. The surface layer of the severely eroded soils is yellowish brown to strong brown and is sticky and plastic when wet. The surface layer of the uneroded soils is dark grayish-brown, friable silt loam. These soils have profiles similar to those described as representative for the series, but in severely eroded areas the plow layer is silty clay or clay. Also, in about 25 percent of the areas these soils are medium acid to mildly alkaline and are olive colored in the upper part of the subsoil. The soils in these areas formed in residuum weathered from limestone, and in some areas limestone crops out on the surface. The rest of the soils are generally deeper over calcareous shale than is representative of the series, and the surface layer in some areas is about 5 percent sandstone cobblestones or gravel, or both.

Included with this complex in mapping were small areas of Talbott, Muse, and Jefferson soils. Also included were a few areas where slopes are more than 25 percent.

The soils of this complex have low to very low natural fertility and very low organic-matter content. The effective rooting depth is 20 to 36 inches. Response of pasture and hay plants to lime and fertilizer is poor.

Most areas of this complex are suited to pasture, but in some areas the surface layer is so clayey that it is difficult to work. These soils are better suited to trees and to wildlife habitat than to most other uses. Capability unit VIe–2; woodland suitability group 4c1.

Newark Series

The Newark series consists of deep, somewhat poorly drained soils that formed in alluvium washed mainly from upland soils that are commonly underlain by limestone but in places partly by sandstone. These soils are on flood plains of streams and in depressions in all parts of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is dark-brown silt loam about 9 inches thick. The subsoil extends to a depth of about 24 inches. To a depth of 13 inches, it is dark-brown, very friable heavy silt loam that has light brownish-gray and dark yellowish-brown mottles. Below a depth of 13 inches, it is light brownish-gray, very friable heavy silt loam that has dark-brown and dark yellowish-brown mottles. The substratum is gray, very friable heavy silt loam that has dark-brown and dark yellowish-brown mottles.

Newark soils have moderate or moderately rapid permeability, moderate natural fertility, and low organic-matter content. Depth to the seasonal high water table ranges from 6 to 18 inches.

Representative profile of Newark silt loam, located 500 feet east of Buck Creek and 20 feet south of State Road No. 70:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B21—9 to 13 inches, dark-brown (10YR 4/3) heavy silt loam; common, fine, distinct, light brownish-gray (10YR 6/2) mottles and few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, fine, granular structure; very friable; slightly acid; gradual, smooth boundary.

B22g—13 to 24 inches, light brownish-gray (10YR 6/2) heavy silt loam; many, fine, distinct, dark-brown (10YR 4/3) mottles and few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, fine, granular structure; very friable; slightly acid; gradual, wavy boundary.

Cg—24 to 65 inches, gray (10YR 6/1) heavy silt loam; few, fine, faint, dark-brown (10YR 4/3) mottles and few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; structureless; very friable; medium acid.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is more than 60 inches. In a few places, small pieces of chert make up 1 to 5 percent, by volume, of all horizons. The Ap horizon has a hue of 10YR or 2.5Y, a value of 4 or 5, and a chroma of 2 or 3. The matrix of the B21 horizon is dark brown (10YR 4/3) or brown (10YR 5/3). Mottles generally are light gray (10YR 7/1), light brownish gray (10YR 6/2), or gray (10YR 5/1). In most profiles mottles have a chroma of 3 or 4. The matrix color of the B22g horizon is light brownish gray (10YR 6/2), light gray (10YR 7/1), or gray (10YR 6/1). Mottles have a chroma of 3 or 4 in most profiles. The B horizon is medium acid to slightly acid in reaction. The Cg horizon is mostly gray, medium acid to neutral, stratified silt and sand.

Newark gravelly silt loam in Pulaski County contains more coarse fragments than is in the range defined for the series, but this difference does not alter its usefulness and behavior.

Newark soils are near Nolin and Lindside soils. They are somewhat poorly drained, whereas Nolin soils are well drained, and Lindside soils are moderately well drained.

Newark silt loam (0 to 2 percent slopes) (Ne).—This soil is on narrow to moderately wide flood plains and in depressions. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Nolin soils.

This Newark soil has high available moisture capacity. Its rooting depth is limited by a seasonal high water table. It has moderate permeability. Response of crops to lime and fertilizer is good. This soil is subject to flooding, mostly late in winter or early in spring. Artificial drainage is needed to lower the water table during wet seasons.

If this soil is properly drained, it is suited to most crops and pasture and hay plants commonly grown in the county. It is not suited to alfalfa. Capability unit IIw–1; woodland suitability group 1w2.

Newark gravelly silt loam (0 to 2 percent slopes) (Ng).—This soil is on narrow stream bottoms. It has a profile similar to the one described as representative of the series, but it is 15 to 35 percent gravel.

Included with this soil in mapping were a few areas of soils that are free of gravel. Also included were areas of soils that have a surface layer of loam or sandy loam.

This soil has moderate available moisture capacity. Its rooting depth is limited by a seasonal high water table. It has moderately rapid permeability because of the gravel content. Response of crops to lime and fertilizer is good. This soil is subject to flooding, mostly late in winter or early in spring. Artificial drainage is needed to lower the water table during wet seasons.

If this soil is properly drained, it is suited to most crops and pasture and hay plants commonly grown in the county. It is not suited to alfalfa. Capability unit IIw–1; woodland suitability group 1w2.

Nolichucky Series

The Nolichucky series consists of deep, well-drained soils that formed in colluvium or old alluvium washed from soils that formed in residuum derived mainly from acid sandstone and shale, but in places the residuum is derived partly from limestone. These soils are on foot slopes and ridgetops in the east-central part of the county. They have slopes of 6 to 20 percent.

In a representative profile, the surface layer is dark grayish-brown loam about 8 inches thick. The subsoil extends to a depth of about 70 inches or more. To a depth of about 32 inches, it is yellowish-red, friable light clay loam. Below this depth it is yellowish-brown and red, friable light clay loam.

Nolichucky soils have high available moisture capacity, moderate permeability, moderate natural fertility, and low organic-matter content.

Representative profile of Nolichucky loam, 6 to 12 percent slopes, located 1½ miles southwest of Shopville on the east side of State Road No. 692:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; very friable; 2 percent sandstone gravel; mildly alkaline; clear, smooth boundary.

B21t—8 to 14 inches, yellowish-red (5YR 4/6) light clay loam; moderate, fine and medium, subangular blocky structure; friable; few thin clay skins; 2 percent sandstone gravel; very strongly acid; gradual, smooth boundary.

B22t—14 to 32 inches, yellowish-red (5YR 5/6) light clay loam; moderate, fine and medium, angular blocky structure; friable; common thick clay skins; 2 percent sandstone gravel; very strongly acid; gradual, smooth boundary.

B23t—32 to 45 inches, yellowish-brown (10YR 5/6) light clay loam; common, medium, prominent, red (2.5YR 4/6) mottles; moderate, fine and medium, angular blocky structure; friable; common, thick, red (2.5YR 4/6) clay skins; 2 percent sandstone gravel; very strongly acid; gradual, wavy boundary.

B3t—45 to 70 inches, mottled yellowish-brown (10YR 5/6) and red (2.5YR 4/6) light clay loam; weak, coarse, angular blocky structure; friable; few thin clay films; very strongly acid.

The solum is more than 60 inches thick. Depth to bedrock is more than 60 inches. Gravel makes up 0 to 10 percent by volume, of all horizons. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B21t horizon is strong brown (7.5YR 5/6) in some profiles. In places it is loam. The B22t horizon is yellowish red (5YR 5/6) or red (2.5YR 4/6). The B23t and B3t horizons are yellowish brown (10YR 5/6), yellowish red (5YR 5/6), or red (2.5YR 4/6). The Bt horizon is strongly acid to very strongly acid in reaction.

Nolichucky soils are near Jefferson and Frederick soils. They are much redder in the B horizon and have a thicker solum than Jefferson soils. They are less clayey in the B horizon than Frederick soils.

Nolichucky loam, 6 to 12 percent slopes (NkC).—This soil is in convex areas on narrow ridges or in concave areas on foot slopes. It has the profile described as representative of the series.

Included with this soil in mapping were areas of eroded soil where plowing has mixed material originally in the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were a few areas where slopes are less than 6 percent.

This soil has an effective rooting depth of 60 inches or more. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–2; woodland suitability group 2o1.

Nolichucky loam, 12 to 20 percent slopes (NkD).—This soil is in convex areas on narrow ridges or in concave areas on foot slopes.

Included with this soil in mapping were areas of eroded soils and severely eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil.

This soil has an effective rooting depth of 60 inches or more. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–1; woodland suitability group 2o1.

Nolin Series

The Nolin series consists of deep, well-drained, soils that formed in alluvium washed mainly from upland soils commonly underlain by limestone, but in places the soils are partly underlain by sandstone. These soils are on flood plains of streams and in depressions, mainly in the western and central parts of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil extends to a depth of 65 inches or more. To a depth of about 42 inches, it is dark-brown or brown, very friable heavy silt loam. Between depths of 42 and 60 inches, it is dark-brown, very friable silt loam that has light brownish-gray mottles. Below a depth of 60 inches, it is mottled strong-brown and light brownish-gray, very friable silt loam.

Nolin soils have high available moisture capacity, moderate permeability, high natural fertility, and low organic-matter content.

Representative profile of Nolin silt loam, located 200 feet east of Buck Creek and 400 feet north of State Road No. 70:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; slightly acid; gradual, smooth boundary.

B21—9 to 30 inches, dark-brown (10YR 4/3) heavy silt loam; weak, fine, granular structure; very friable; slightly acid; gradual, wavy boundary.

B22—30 to 42 inches, brown (10YR 5/3) heavy silt loam; weak, fine, granular structure; very friable; slightly acid; gradual, smooth boundary.

B23—42 to 60 inches, dark-brown (10YR 4/3) silt loam; few, fine, distinct, light brownish-gray (10YR 6/2) mottles; weak, fine, granular structure; very friable; slightly acid; gradual, smooth boundary.

B24—60 to 65 inches, mottled strong-brown (7.5YR 5/6) and light brownish-gray (2.5Y 6/2) silt loam; weak, fine, granular structure; very friable; slightly acid.

The solum ranges from 40 to 72 inches in thickness. Depth to bedrock is more than 60 inches. In a few places, small pieces of chert make up as much as 5 percent, by volume, of the profile. The B horizon, to a depth of 30 inches, has a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 3 or 4. Because of stratification below a depth of 30 inches, some profiles vary widely in color and texture. The B horizon is medium acid to slightly acid.

Nolin soils are near Newark and Lindside soils. They are better drained than those soils.

Nolin silt loam (0 to 2 percent slopes) (No).—This soil (fig. 15) is on narrow to moderately wide flood plains and in depressions.

Included with this soil in mapping were small areas of Newark and Lindside soils.

This Nolin soil has an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is good. This soil is subject to flooding, mostly late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit I–1; woodland suitability group 1o1.

Pembroke Series

The Pembroke series consists of deep, well-drained soils that formed mainly in residuum weathered from limestone. These soils are on uplands and toe slopes, mainly in the central part of the county. They have slopes of 2 to 12 percent.

In a representative profile, the surface layer is dark-brown silt loam about 11 inches thick. The subsoil extends to a depth of 75 inches or more. To a depth of 24 inches it is reddish-brown, friable light silty clay loam. Between depths of 24 and 66 inches, it is yellowish-red, friable light silty clay loam. Below a depth of 66 inches, it is red, firm silty clay mottled with yellowish brown and brown.

Pembroke soils have high available moisture capacity, moderate permeability, high natural fertility, and low to medium organic-matter content.

Representative profile of Pembroke silt loam, 2 to 6 percent slopes, located 0.9 mile east of Elrod:

Ap—0 to 11 inches, dark-brown (7.5YR 3/2) silt loam; weak, fine, granular structure; very friable; slightly acid; clear, smooth boundary.

B1t—11 to 24 inches, reddish-brown (5YR 4/4) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; few clay films; about 2 percent round, black concretions; very strongly acid; gradual, smooth boundary.

B21t—24 to 50 inches, yellowish-red (5YR 4/6) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; common thin clay films; about 2 percent round, black concretions; few black featherings; very strongly acid; gradual, smooth boundary.

B22t—50 to 66 inches, yellowish-red (5YR 4/6) light silty clay loam; few, fine, prominent, yellowish-brown (10YR 5/6) and brown (10YR 5/3) mottles; moderate, fine and medium, subangular blocky structure; friable; few thin clay films; 2 percent round, black concretions; very strongly acid; gradual, smooth boundary.

Figure 15.—An area of Nolin silt loam (0 to 2 percent slopes).

B23t—66 to 75 inches, red (2.5YR 4/6) silty clay; few, fine, prominent, yellowish-brown (10YR 5/6) and brown (10YR 5/3) mottles; moderate, fine and medium, angular blocky structure; firm; common clay films; very strongly acid.

The solum ranges from 60 to 100 inches in thickness. Depth to bedrock is more than 60 inches. In a few places small pieces of chert make up as much as 5 percent by volume, of all horizons. The B1t horizon is yellowish red (5YR 4/6) in places. It is heavy silt loam in some profiles. The B21t and B22t horizons are red (2.5YR 4/6) in places. The B23t horizon in places is yellowish red (5YR 4/6). The B horizon is strongly acid to very strongly acid in reaction.

Pembroke soils are near Cumberland and Frederick soils. They are less clayey in the upper part of the B horizon than either of those soils. They have a darker surface layer than Frederick soils.

Pembroke silt loam, 2 to 6 percent slopes (PeB).—In most places this soil is in convex areas, mostly on smooth ridgetops, but some areas have an irregular, or karst, topography. It is also in a few concave areas on foot slopes. It has the profile described as representative of the series.

Included with this soil in mapping were a few areas of soils that have a thinner and lighter colored surface layer than this soil.

This soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe–1; woodland suitability group 1o1.

Pembroke silt loam, 6 to 12 percent slopes (PeC).—In most places this soil is in plane areas on the sides of ridges, but in a few areas it has irregular, or karst, topography and is on slopes surrounding depressions. It is also in a few concave areas on foot slopes.

Included with this soil in mapping were areas of eroded soils that have a surface layer that is thinner than that of this soil. Also included were a few areas of soils that have a surface layer that is lighter colored than that of this soil and a few areas where slopes are as much as 20 percent.

This soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe-1; woodland suitability group 1o1.

Pope Series

The Pope series consists of deep, well-drained soils that formed in alluvium washed from upland soils underlain by sandstone and shale. These soils are on flood plains of streams in the eastern part of the county. They have slopes of 0 to 4 percent.

In a representative profile, the surface layer is dark-brown fine sandy loam about 11 inches thick. The subsoil extends to a depth of about 39 inches and is yellowish-brown, very friable sandy loam and fine sandy loam. The substratum extends to a depth of 70 inches and is yellowish-brown, very friable sandy loam.

Pope soils have moderate available moisture capacity, moderately rapid permeability, moderate natural fertility, and low organic-matter content.

Representative profile of Pope fine sandy loam, located on Buck Creek one-half mile southwest of Stab:

Ap—0 to 11 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; mildly alkaline; gradual, smooth boundary.

B1—11 to 18 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; very friable; strongly acid; gradual, smooth boundary.

B2—18 to 39 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine and very fine, subangular blocky structure; very friable; very strongly acid; gradual, smooth boundary.

C—39 to 70 inches, yellowish-brown (10YR 5/4) sandy loam; massive; very friable; strongly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Gravel makes up 0 to 15 percent, by volume, of the profile. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B horizon has a hue of 10YR or 7.5YR, a value of 4 or 5, and a chroma of 3 to 6. In some profiles gray mottles that have a chroma of 2 or less are common below a depth of 30 inches. The B horizon is strongly acid or very strongly acid. The C horizon has a hue of 10YR, a value of 5 or 6, and a chroma of 1 to 6. It is sandy loam, loamy sand, or sand.

Pope soils are near Stendal and Jefferson soils. They are better drained than Stendal soils. They do not have the B horizon of clay accumulation that is typical of Jefferson soils.

Pope fine sandy loam (0 to 4 percent slopes) (Po).—This soil is on narrow flood plains.

Included with this soil in mapping were areas of soils that are similar to Pope soils but are either less acid or less well drained or show faint evidence of a clay-enriched subsoil. Also included were a few areas where slopes are as much as 20 percent.

This soil has an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is good. This soil is subject to flooding, mostly late in winter or early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit I-3; woodland suitability group 1o1.

Robertsville Series

The Robertsville series consists of deep, poorly drained soils that have a fragipan. These soils formed in residuum, derived from Mississippian limestone or sandstone, or in alluvial sediment. They are on uplands and stream terraces, mainly in the western and north-central parts of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is grayish-brown silt loam about 6 inches thick that has light-gray mottles. The subsoil extends to a depth of about 62 inches. To a depth of 18 inches, it is light-gray, friable heavy silt loam that has strong-brown mottles. Below this depth it is light-gray, firm, compact and brittle heavy silt loam that has light yellowish-brown and light-gray mottles. The substratum is mottled light brownish-gray and yellowish-brown, very firm silty clay.

Robertsville soils have moderate available moisture capacity, slow permeability, low natural fertility, and low organic-matter content.

Representative profile of Robertsville silt loam, located 1¾ miles northwest of Walnut Grove Church of Christ on the south side of State Road No. 935:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) silt loam; few, fine, faint, light-gray (10YR 7/1) mottles; weak, fine, granular structure; very friable; extremely acid; clear, smooth boundary.

Bg—6 to 18 inches, light-gray (10YR 7/1) heavy silt loam; common, fine, prominent, strong-brown (7.5YR 5/6) mottles; weak, fine, granular structure; friable, very strongly acid; clear, smooth boundary.

Bx1g—18 to 35 inches, light-gray (10YR 7/1) heavy silt loam; fine, prominent, light yellowish-brown (10YR 6/4) mottles; weak, fine, granular structure; firm, compact and brittle; few thin clay films; extremely acid; gradual, smooth boundary.

Bx2g—35 to 62 inches, light-gray (10YR 7/2) heavy silt loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles and common, fine faint, light-gray (10YR 7/1) mottles; weak, fine, granular structure; firm, compact and brittle; few thin clay films; strongly acid; gradual, smooth boundary.

C—62 to 65 inches, mottled light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/6) silty clay; massive; very firm; slightly acid.

The solum ranges from 40 to 65 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 15 to 30 inches. In a few profiles, all horizons are as much as 5 percent small pebbles. The Ap horizon has a hue of 10YR or 2.5Y. The Bg horizon has a hue of 10YR or 2.5Y, a value of 5 to 7, and a chroma of 2 to 0. In some profiles this horizon is light silty clay loam. The Bx horizon has a hue of 10YR or 2.5Y, a value of 6 or 7, and a chroma of 2 to 0. Some profiles have a B3 or Bt horizon, 5 to 15 inches thick, between the fragipan and the C horizon or bedrock. The B horizon ranges from strongly acid to extremely acid. The C horizon is silty clay loam or silty clay.

Robertsville soils are near Mountview, Lawrence, and Bedford soils. They have a fragipan and are not so well drained as Mountview soils. They are more poorly drained and are grayer in the horizon above the fragipan than Lawrence and Bedford soils.

Robertsville silt loam (0 to 2 percent slopes) (Ro).—This soil is on ridgetops and stream terraces.

Included with this soil in mapping were a few areas of Lawrence soils.

This Robertsville soil has an effective rooting depth of 14 to 30 inches. The water table is near the surface during wet seasons, and it interferes with tillage operations and plant growth. This soil needs artificial drainage. If it is drained, response of crops to lime and fertilizer is fair.

If this soil is drained, it is suited to most crops and pasture and hay plants commonly grown in the county, except tobacco and alfalfa. In undrained areas, plants that are not tolerant of wetness do not grow well. Where this soil is on low stream terraces, it is subject to flood-

ing, mostly late in winter or early in spring, but floods are slight. Capability unit IVw-1; woodland suitability group 1w2.

Rockcastle Series

The Rockcastle series consists of moderately deep, somewhat excessively drained soils that formed in residuum derived from clay shale. These soils are on upland in the western part of the county. They have slopes of 20 to 30 percent.

In a representative profile, the surface layer is dark-brown silt loam about 6 inches thick. The subsoil extends to a depth of about 22 inches and is light olive-brown, firm heavy silty clay loam that has yellowish-red and light-gray mottles in the lower part. The substratum extends to a depth of about 40 inches and is mottled gray and reddish-brown, very firm clay. Below is olive soft clay shale.

Rockcastle soils have moderate available moisture capacity, slow permeability, low natural fertility, and low organic-matter content.

Representative profile of Rockcastle silt loam, 20 to 30 percent slopes, located 2 miles west-northwest of Cooks Chapel Church:

AP—0 to 6 inches, dark brown (10YR 4/3) heavy silt loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary.

B21—6 to 16 inches, light olive-brown (2.5Y 5/4) heavy silty clay loam; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; strong, medium, angular blocky structure; firm; very strongly acid; gradual, smooth boundary.

B22—16 to 22 inches, light, olive-brown (2.5Y 5/4) heavy silty clay loam; common, fine, prominent, yellowish-red (5YR 4/6) mottles and common, fine, distinct, light-gray (10YR 7/1) mottles; weak, medium, angular blocky structure; firm; very strongly acid; gradual, smooth boundary.

C—22 to 40 inches, mottled gray (10YR 6/1) and reddish-brown (5YR 4/3) clay; massive; very firm; very strongly acid; gradual, smooth boundary.

R—40 to 70 inches, olive (5Y 5/3) soft clay shale; common, medium, faint, gray (5Y 5/1) mottles; massive; very firm; medium acid.

The solum ranges from 12 to 22 inches in thickness. Depth to soft clay shale is 20 to 40 inches. In places the Ap Horizon is dark grayish brown (10YR 4/2). The B horizon is light olive brown (2.5Y 5/4) or yellowish brown (10YR 5/4 to 5/8). In some profiles it is silty clay or clay. Some profiles are free of mottles. The B horizon ranges from strongly acid to extremely acid. The C horizon is very strongly acid to strongly acid at a depth of less than 30 inches, and in places it is medium acid below a depth of 30 inches.

Rockcastle soils are near Trimble soils and on some basal slopes below Garmon soils. They are more clayey in the subsoil than Trimble or Garmon soils. They lack the chert fragments of Trimble soils, and they are less shaly than Garmon soils.

Rockcastle silt loam, 20 to 30 percent slopes (RsE).—This soil is in concave areas below the very steep Garmon soils.

Included with this soil in mapping were a few areas of Trimble soils, a few areas where slopes are as little as 12 percent, and a few areas of severely eroded soils. Also included were a few areas of a soil that is similar to this Rockcastle soil, but it is deeper over shale.

This soil has an effective rooting depth of 20 to 30 inches. Response of pasture and hay plants to lime and fertilizer is fair. This soil is not suited to cultivated crops, because modern farm machinery is difficult to operate where slopes are steep and because of the hazard of erosion.

This soil is suited to drought-resistant pasture and hay plants. It is also suited to trees and wildlife habitat. Capability unit VIe-3; woodland suitability group 4c2.

Rock Outcrop

Rock outcrop is mapped with Brookside and Dekalb soils. The outcrops are limestone or sandstone, or both. The areas are on uplands in the eastern and southeastern parts of the county. Some areas are on narrow ridgetops, but most are on side slopes. Slopes are 12 to 75 percent.

Steepness and many outcrops of rock make operation of machinery difficult. Rock outcrop is better suited to woods or to wildlife habitat than to most other uses.

Shelocta Series

The Shelocta series consists of deep, well-drained soils that formed in colluvium washed from soils that formed in residuum derived from sandstone, siltstone, and shale. These soils are in colluvial areas in the eastern part of the county. They have slopes of 6 to 50 percent.

In a representative profile, the surface layer is silt loam about 4 inches thick. It is mainly dark yellowish brown, but the upper 1½ inches is dark brown. The subsoil extends to a depth of about 43 inches. To a depth of about 18 inches, it is strong-brown, friable silt loam. Between depths of 18 and 25 inches, it is strong-brown, friable light silty clay loam. Between depths of 25 and 37 inches, it is strong-brown, firm heavy silty clay loam. Below a depth of 37 inches, it is yellowish-brown, firm heavy silty clay loam that has strong-brown and light yellowish-brown mottles . The substratum is mottled yellowish-brown, dark-brown, dark-gray, and reddish-brown, firm clay.

Shelocta soils have moderate to high available moisture capacity, moderate permeability, moderate natural fertility, and low organic-matter content.

Representative profile of a Shelocta silt loam in an area of Shelocta-Jefferson complex, 30 to 50 percent slopes, located one-fourth mile west of Bee Rock Recreational Area:

O1—¾ inch to 0, hardwood leaves and twigs.

A11—0 to 1½ inches, dark-brown (10YR 4/3) silt loam; weak, medium, granular structure; very friable; 10 percent channery fragments, by volume; many roots; very strongly acid; abrupt, smooth boundary.

A12—1½ to 4 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, medium, granular structure; very friable; 10 percent channery fragments, by volume; many roots; strongly acid; abrupt, smooth boundary.

B1—4 to 8 inches, strong-brown (7.5YR 5/6) silt loam; weak, medium, subangular blocky structure; friable; 10 percent channery fragments, by volume; common roots; strongly acid; clear, wavy boundary.

B21t—8 to 18 inches, strong-brown (7.5YR 5/6) silt loam; weak, medium, subangular blocky structure; friable; distinct, patchy clay films on peds; 10 percent channery fragments, by volume; common roots; strongly acid; clear, wavy boundary.

B22t—18 to 25 inches, strong-brown (7.5YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; friable; distinct, patchy clay film on peds; 5 percent channery fragments, by volume; common roots; strongly acid; clear, wavy boundary.

B23t—25 to 37 inches, strong-brown (7.5YR 5/6) heavy silty clay loam; moderate, medium, subangular blocky structure; firm; distinct, patchy clay films on peds; 5 percent channery fragments, by volume; few roots; strongly acid; gradual, wavy boundary.

B3t—37 to 43 inches, yellowish-brown (10YR 5/6) heavy silty clay loam; common, fine, faint, strong-brown (7.5YR 5/6) and light yellowish-brown (10YR 6/4) mottles; weak, medium, subangular blocky structure; firm, faint, patchy clay films in cavities; 5 percent channery fragments, by volume; few roots; common manganese concretions; very strongly acid; clear, wavy boundary.

C—43 to 56 inches, mottled yellowish-brown (10YR 5/8), dark-brown (7.5YR 4/4), dark-gray (10YR 4/1), and reddish-brown (5YR 4/4) clay; massive; firm; common manganese concretions; strongly acid.

The solum ranges from 40 to 59 inches in thickness. Depth to hard shale or sandstone bedrock is more than 48 inches. Gravel, channery fragments, or flags make up 5 to 35 percent, by volume, of the solum. The A1 horizon is dark brown (10YR 4/3) or dark yellowish brown (10YR 4/4). The Ap horizon, where present, has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B horizon is generally yellowish brown (10YR 5/4 to 5/8) or strong brown (7.5YR 5/6 or 5/8), but in some profiles it is dark brown (7.5YR 4/4). In some places it is silt loam or silty clay loam throughout. In some profiles the B3 horizon is massive. Where the clayey C horizon is absent, the B3 horizon extends to bedrock, is silt loam in the lower part, and is 5 to 35 percent coarse fragments, by volume. The B horizon is strongly acid to very strongly acid.

Shelocta soils in Pulaski County have a coarser textured C horizon than is defined in the range for the series, but this difference does not alter their usefulness or behavior.

Shelocta soils are near Muse and Jefferson soils. They are less clayey than Muse soils and less sandy than Jefferson soils.

Shelocta gravelly silt loam, 6 to 12 percent slopes (SgC).—This soil is in slightly concave areas, mostly at the base of steep slopes. It is more gravelly in the surface layer and less clayey in the lower horizons than the soil described as representative of the series.

Included with this soil in mapping were a few areas where slopes are as little as 6 percent. Also included were a few areas of Jefferson and Whitley soils.

This Shelocta soil has an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and hay and pasture plants commonly grown in the county. Capability unit IIIe–3; woodland suitability group 1o1.

Shelocta gravelly silt loam, 12 to 20 percent slopes (SgD).—This soil is in concave areas, mostly at the base of steep slopes. It is more gravelly in the surface layer and less clayey in the lower horizons than the soil described as representative of the series.

Included with this soil in mapping were a few areas of severely eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is more yellow than that of this soil. Also included were a few areas of Jefferson and Muse soils.

This Shelocta soil has an effective rooting depth of more than 48 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture or hay than to cultivated crops, but it is suited to occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–3; woodland suitability group 2o1.

Shelocta-Jefferson complex, 12 to 20 percent slopes (ShD).—Shelocta soils make up about 55 to 65 percent of the complex. They are in convex areas off the points of ridges, on side slopes, and on benches of side slopes. Jefferson soils make up about 35 to 45 percent of this complex. They are in plane to concave areas below cliffs and in coves at the head of drainageways.

Included with this complex in mapping were a few areas of Muse and Needmore soils and a few areas of severely eroded soils. Also included were some gravelly areas and a few areas where stones cover as much as 5 percent of the soil surface.

The soils of this complex have moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 4 feet. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This complex is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–3; woodland suitability group 2o1.

Shelocta-Jefferson complex, 20 to 30 percent slopes (ShE).—Shelocta soils make up about 55 to 65 percent of this complex. They are in convex areas off the points of ridges, on side slopes, and on benches of side slopes. Jefferson soils make up about 35 to 45 percent of this complex. They are in plane to concave areas below cliffs and in coves at the head of drainageways. Stones cover 3 to 5 percent of the soil surface, and a few boulders are near streams and below rock cliffs.

Included with this complex in mapping were a few areas of Muse and Dekalb soils, areas of severely eroded soils, and some gravelly areas. Also included were areas of a soil in north-facing coves that is similar to Jefferson soils, but it is darker colored throughout the profile.

The soils of this complex have moderate natural fertility, low organic-matter content, and an effective rooting depth of more than 4 feet. Response of pasture and hay plants to lime and fertilizer is fair.

These soils are not suited to cultivation. Modern farm machinery is difficult to operate because of steep slopes and stony areas. Also, erosion is a hazard in cultivated areas. This complex is suited to most grasses and legumes commonly grown in the county and to trees. Capability unit VIe–1; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes.

Shelocta-Jefferson complex, 30 to 50 percent slopes (ShF).—Shelocta soils make up about 55 to 65 percent of this complex. They are in convex areas off the points of ridges and in plane areas on side slopes. They have the profile described as representative of the Shelocta series. Jefferson soils make up about 35 to 45 percent of this complex. They are in plane or concave areas below cliffs and in coves at heads of drainageways. Their profile is more sandy than the one described as representatives of the Jefferson series. Stones cover 3 to 5 percent of the soil surface, and a few boulders are near streams and below rock cliffs.

Included with this complex in mapping were areas of Muse and Dekalb soils and sandstone cliffs that average

about 50 feet in height. Also included were areas of a soil in north-facing coves that is similar to these Shelocta and Jefferson soils, but it is darker colored throughout the profile.

The soils of this complex are so steep or so stony that they are not suited to cultivation. Use of these soils for pasture is limited, even under good management. This complex is better suited to trees and wildlife habitat than to most other uses. Capability unit VIIe–1; woodland suitability group 2r1 on north- and east-facing slopes and 3r1 on south- and west-facing slopes.

Stendal Series

The Stendal series consists of deep, somewhat poorly drained soils that formed in alluvium washed from upland soils underlain by sandstone and shale. These soils are on flood plains of streams in the eastern part of the county. They have slopes of 0 to 2 percent.

In a representative profile, the surface layer is loam about 6 inches thick. It is mainly olive brown, but the upper 2 inches is dark brown. The subsoil extends to a depth of about 26 inches. To a depth of 11 inches, it is yellowish-brown, very friable sandy loam. Between depths of 11 and 16 inches, it is light yellowish-brown, very friable sandy loam that has light-gray and yellowish-brown mottles. Below a depth of 26 inches, it is light brownish-gray, very friable sandy loam that has yellowish-brown and yellowish-red mottles. The substratum extends to a depth of 42 inches and is light brownish-gray, very friable gravelly sandy loam than has strong-brown and yellowish-brown mottles.

Stendal soils have moderate available moisture capacity and moderately rapid permeability. Depth to the seasonal high water table ranges from 6 to 18 inches.

Representative profile of Stendal loam, located 2 miles south of Squib:

O11—2 inches to ¼ inch, loose leaves, needles, and twigs.

O12—¼ inch to 0, partly decomposed leaves, needles, and twigs.

A11—0 to 2 inches, dark-brown (10YR 4/3) loam; weak, medium, granular structure; very friable; many roots; very strongly acid; abrupt, smooth boundary.

A12—2 to 6 inches, olive-brown (2.5Y 4/4) loam; weak, medium and coarse, granular structure; very friable; many roots; very strongly acid; clear, smooth boundary.

B1—6 to 11 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine, subangular blocky structure; very friable; many roots; very strongly acid; clear, wavy boundary.

B21—11 to 16 inches, light yellowish-brown (2.5Y 6/4) sandy loam; common, fine, faint, light-gray (10YR 7/2) and yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; very friable; many roots; very strongly acid; clear, wavy boundary.

B22—16 to 26 inches, light brownish-gray (2.5Y 6/2) sandy loam; common, fine, distinct, yellowish-brown (10YR 5/8) and yellowish-red (5YR 4/8) mottles; weak, medium, subangular blocky structure; very friable; 3 percent gravel, by volume; common roots; very strongly acid; clear, wavy boundary.

C—26 to 42 inches, light brownish-gray (2.5Y 6/2) gravelly sandy loam; common, fine, prominent, strong-brown (7.5YR 5/6) and yellowish-brown (10YR 5/8) mottles; massive; very friable; 35 percent gravel, by volume; few roots; extremely acid.

The solum ranges from 24 to 40 inches in thickness. Depth to bedrock is more than 60 inches. In some profiles the A horizon is dark yellowish brown (10YR 4/4). In some profiles the matrix of the B22 horizon is light gray (10YR 7/2). The B horizon is strongly acid to very strongly acid. The C horizon has a hue of 2.5Y or 10YR, a value of 5 to 7, and a chroma of 1 or 2. It is sandy loam or loamy sand. Gravel makes up 0 to 35 percent, by volume, of this horizon.

Stendal soils in Pulaski County are more sandy throughout the profile and are more permeable than is defined in the range for the series, and they have higher chroma in the upper part of the B horizon, but these differences do not alter their usefulness and behavior.

Stendal soils are near Pope and Jefferson soils. They are not so well drained as Pope soils. They are not so well drained as Jefferson soils and do not have the B horizon of clay accumulation that is typical of those soils.

Stendal loam (0 to 2 percent slopes) (Sn).—This soil is on narrow flood plains.

Included with this soil in mapping were small areas of a soil that is less well drained and less sandy than this Stendal soil. Also included were small areas of a soil that is better drained, is less sandy, and has stronger evidence of development than this Stendal soil.

This soil has moderate natural fertility and low organic-matter content. Its rooting depth is impeded by a seasonal high water table. Response of crops to lime and fertilizer is good. Where this soil is in low areas along streams, it is subject to flooding, mostly late in winter or early in spring. During wet seasons this soil needs artificial drainage to lower the water table for most uses.

If this soil is properly drained, it is suited to most crops and pasture and hay plants commonly grown in the county. This soil is not suited to alfalfa. Capability unit IIw–1; woodland suitability group 1w2.

Strip Mines

Strip mines (St) consists of areas where the material above coal seams has been removed to allow open-pit mining. Extensive acreages of strip mines are in the vicinity of Billows and Ano. Some areas are also near Mount Victory.

Strip mines have three main features: a high wall, a bench, and a spoil bank. The high wall is the vertical or nearly vertical face of the strip mine on the uphill side of the mining pit above the coal seam. The spoil bank is made up of soil material, shale, coal waste, and sandstone. Between the high wall and the spoil bank, water generally accumulates in the bench area. This water is generally extremely acid because of the chemical reaction of water and sulfurous materials associated with the coal.

Most strip mines in the survey area are on steep soils. A few have been opened on sloping soils. The width of the areas varies with the thickness of the coal seam and the gradient of the slope, but it averages about 250 feet. The length ranges from a few yards to more than a mile. The high wall is commonly 40 feet high. Spoil-bank gradients are typically 60 percent, but they range from 30 to 80 percent. The spoil bank slumps easily if saturated with water and releases polluted water trapped behind the spoil bank into the associated watershed. Strip mines are very low in natural fertility, are typically droughty, and range from strongly acid to extremely acid. This land type, where it is very strongly acid or less acid, is suited to trees and wildlife habitat. Not placed in a capability unit or woodland suitability group.

Talbott Series

The Talbott series consists of moderately deep, well-drained soils that formed in residuum derived from limestone that was influenced by varying amounts of sandstone. These soils are on uplands throughout the county. They have slopes of 6 to 30 percent.

In a representative profile, the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsoil extends to a depth of about 28 inches. To a depth of about 13 inches, it is red, very firm silty clay. Between depths of 13 and 18 inches, it is red, very firm silty clay that has yellowish-brown mottles. Below a depth of 18 inches, it is red, extremely firm silty clay that has light olive-brown mottles. The substratum is mottled red, yellowish-brown, and olive, very firm clay. Hard, massive limestone is at a depth of about 31 inches.

Talbott soils have moderate available moisture capacity and moderate to slow permeability.

Representative profile of Talbott rocky silt loam, 6 to 20 percent slopes, located 1½ miles north-northwest of Bent:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) rocky silt loam; weak, fine, granular structure; friable; medium acid; clear, smooth boundary.

B21t—7 to 13 inches, red (2.5YR 4/6) silty clay; moderate, medium, angular blocky structure; very firm; common thin clay films; sticky and plastic, hard when dry; strongly acid; clear, wavy boundary.

B22t—13 to 18 inches, red (2.5YR 4/6) silty clay; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, angular blocky structure; very firm; common thin clay films; very sticky and plastic, very hard when dry; strongly acid; clear, wavy boundary.

B23t—18 to 28 inches, red (2.5YR 4/6) silty clay; many, fine, prominent, light olive-brown (2.5Y 5/4) mottles; moderate, coarse, angular blocky structure; extremely firm; common thin clay films; few, black, round concretions; very sticky and plastic, very hard when dry; strongly acid; gradual, wavy boundary.

C—28 to 31 inches, mottled red (2.5YR 5/6), yellowish-brown (10YR 5/6), and olive (5Y 5/3) clay; massive; very firm, very sticky and plastic, very hard when dry; neutral; abrupt, wavy boundary.

R—31 inches, hard, massive limestone bedrock.

The solum ranges from 15 to 35 inches in thickness. Depth to limestone bedrock is 20 to 40 inches. The Ap horizon has a hue of 10YR, a value of 4, and a chroma of 2 or 3. It is silt loam or silty clay loam. Sandstone gravel makes up 0 to 10 percent, by volume, of the A horizon. The A1 horizon, where present, has a hue of 10YR, a value of 3 or 4, and a chroma of 2 or 3. It is silt loam or silty clay loam 3 to 6 inches thick. The B21t horizon is red (2.5YR 4/6), yellowish-red (5YR 4/6), or strong-brown (7.5YR 5/6) heavy silty clay loam, silty clay, or clay. The B22t horizon is similar to the B21t horizon in color and texture, but yellowish-brown (10YR 5/6) or strong-brown (7.5YR 5/6) mottles are in most profiles. The B23t horizon is red (2.5YR 4/6), yellowish red (5YR 4/6), or strong brown (7.5YR 5/6) and has light olive-brown (2.5Y 5/4) or olive-brown (2.5Y 4/4) mottles. It is silty clay or clay. The B horizon is strongly acid or medium acid. The C horizon is mottled red (2.5YR 5/6), yellowish brown (10 YR 5/6), olive (5Y 5/3), or gray (10YR 6/1); in some profiles one of these colors dominates and is mottled with the others. The C horizon is silty clay or clay. It is medium acid to neutral.

Talbott soils in Pulaski County are a few degrees cooler than is defined in the range for the series, but this difference does not alter their usefulness and behavior.

Talbott soils are near Frederick, Brookside, Fredonia, and Jefferson soils. They are shallower to bedrock than Frederick and Brookside soils. They have a lighter colored surface layer than Fredonia soils. They are more shallow and clayey than Jefferson soils.

Talbott silty clay loam, 6 to 12 percent slopes, eroded (TaC2).—This soil is in plane areas on the sides of ridges. It has a redder, more clayey surface layer than the soil described as representative of the series, because tillage operations have mixed some subsoil material into the plow layer. This soil is 30 to 40 inches deep over bedrock.

Included with this soil in mapping were areas of Frederick soils, a few areas of soils that have outcrops of rock on the surface, a few areas where slopes are 2 to 6 percent, and a few areas of uneroded and severely eroded soils.

This Talbott soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of 16 to 36 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county, but plants that are resistant to drought grow better than others. Capability unit IVe-4; woodland suitability group 3c1.

Talbott rocky silt loam, 6 to 20 percent slopes (TbD).—This soil is in plane areas on the sides of ridges. It has the profile described as representative of the series. Limestone outcrops cover 3 to 15 percent of the surface. Some areas have a few sandstones on the surface and are gravelly in spots. This soil is 20 to 40 inches deep over bedrock.

Included with this soil in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were areas of soils that have a surface layer of loam, areas where the surface layer is very dark grayish brown, and areas of Frederick and Jefferson soils that are deeper to bedrock than this Talbott soil.

This Talbott soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of 20 to 40 inches. It is difficult to work. It is not suited to cultivated crops, because it is rocky. Response of pasture and hay plants to lime and fertilizer is fair.

This soil is suited to most grasses and legumes commonly grown in the county and to trees. Capability unit VIs-1; woodland suitability group 3c1.

Talbott rocky silt loam, 20 to 30 percent slopes (TbE).—This soil is in plane areas on the sides of ridges. Limestone outcrops cover 3 to 15 percent of the surface. This soil is 20 to 40 inches deep over bedrock.

Included with this soil in mapping were areas of Frederick soils that are deeper over bedrock than this Talbott soil.

This soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of 20 to 40 inches. It is not suited to cultivated crops, because of the hazard of erosion and rocks on the surface. Response of pasture and hay plants to lime and fertilizer is poor.

This soil is suited to grasses and legumes, but plants that are resistant to drought grow better than others. It is suited to trees. Capability unit VIs-1; woodland suitability group 3x2.

Talbott rocky silty clay loam, 6 to 20 percent slopes, severely eroded (TcD3).—This soil is in plane areas on the sides of ridges. It has a redder colored, more clayey surface layer than the soil described as representative of the series. This is the result of removal of the original surface layer by erosion and mixing of subsoil material into the plow layer. Limestone outcrops cover 3 to 15 percent of the soil surface. In some areas a few sandstones are on the surface. This soil is 20 to 35 inches deep to bedrock.

Included with this soil in mapping were areas of Frederick and Jefferson soils that are deeper to bedrock than this Talbott soil and areas of soils that are less than 15 inches deep to bedrock.

This soil has low natural fertility, very low organic-matter content, and an effective rooting depth of 15 to 35 inches. This soil is difficult to work. It is not suited to cultivated crops, because it is rocky and severely eroded. Response of pasture and hay plants to lime and fertilizer is poor.

This soil is suited to drought-resistant grasses and legumes. It is suited to trees. Capability unit VIs–2; woodland suitability group 4c1.

Tarklin Series

The Tarklin series consists of deep, moderately well drained soils that have a fragipan. These soils formed in colluvium or old alluvium washed from soils that formed in residuum derived from cherty limestone. They are on terraces and foot slopes, mainly in the western part of the county. They have slopes of 2 to 12 percent.

In a representative profile, the surface layer is dark grayish-brown cherty silt loam about 8 inches thick. The subsoil extends to a depth of about 50 inches or more. To a depth of about 23 inches, it is yellowish-brown, friable cherty light silty clay loam that has gray and yellowish-brown mottles in the lower part. Below this depth, the fragipan is light yellowish-brown, firm, compact and brittle cherty light silty clay loam that has gray and yellowish-brown mottles.

Tarklin soils have moderate available moisture capacity, slow permeability, low natural fertility, and low organic-matter content.

Representative profile of Tarklin cherty silt loam, 2 to 6 percent slopes, located 1½ miles southwest of Ingle:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) cherty silt loam; weak, fine, granular structure; very friable; strongly acid; clear, smooth boundary.

B1t—8 to 20 inches, yellowish-brown (10YR 5/4) cherty light silty clay loam; moderate, fine and medium, subangular blocky structure; friable; few patchy clay films; strongly acid; gradual, smooth boundary.

B2t—20 to 23 inches, yellowish-brown (10YR 5/4) cherty light silty clay loam; common, fine, distinct, gray (10YR 6/1) and yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; friable; few patchy clay films; very strongly acid; clear, wavy boundary.

Bxt—23 to 50 inches, light yellowish-brown (10YR 6/4) cherty light silty clay loam; many, medium, distinct, gray (10 YR 6/1) and yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm, compact and brittle; few thin clay films; very strongly acid.

The solum ranges from 48 to 65 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 20 to 30 inches. Chert fragments make up 15 to 35 percent, by volume, of the profile. The Ap horizon has a hue of 10YR, a value of 4 to 5, and a chroma of 2 to 3. In some profiles the B1t horizon is yellowish brown (10YR 5/6 or 5/8). It is cherty silt loam or cherty light silty clay loam. The B2t horizon is cherty heavy silt loam in some profiles, and the number of mottles that have a chroma of 2 or less ranges from few to common. The Bxt horizon in some profiles is cherty silt loam. The B horizon ranges from strongly acid to extremely acid.

Tarklin soils are near Trimble, Bedford, and Lawrence soils. They have a fragipan and are not so well drained as Trimble soils. They are more cherty than Bedford and Lawrence soils and are better drained than Lawrence soils.

Tarklin cherty silt loam, 2 to 6 percent slopes (TkB).—This soil is in concave areas, mostly at the base of steep slopes. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Bedford and Lawrence soils and a few areas where slopes are less than 2 percent. Also included were small areas of a soil that is similar to this Tarklin soil, but it is nonacid in the subsoil.

This soil has an effective rooting depth of 20 to 30 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Alfalfa and tobacco are sometimes damaged by excess water in the rooting zone because of slow permeability in the fragipan. Capability unit IIe–4; woodland suitability group 3w1.

Tarklin cherty silt loam, 6 to 12 percent slopes (TkC).—This soil is in concave areas. It formed in colluvial material at the base of steep slopes.

Included with this soil in mapping were small areas of Trimble soils.

This Tarklin soil has an effective rooting depth of 20 to 30 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county, except alfalfa. Capability unit IIIe–4; woodland suitability group 3w1.

Tilsit Series

The Tilsit series consists of deep, moderately well drained soils that have a fragipan. These soils formed in residuum derived from sandstone and shale. They are on uplands in the eastern part of the county, where they are mapped in an undifferentiated group with Whitley soils. They have slopes of 2 to 6 percent.

In a representative profile, the surface layer is light olive-brown to pale-brown silt loam about 6 inches thick. The subsoil extends to a depth of about 42 inches or more. To a depth of 16 inches, it is yellowish-brown, very friable silt loam. Between depths of 16 and 21 inches, it is yellowish-brown, friable light silty clay loam. Between depths of 21 and 29 inches, the fragipan is yellowish-brown, very firm, compact and brittle loam that has light brownish-gray mottles. Below a depth of 29 inches, the subsoil is strong-brown, firm heavy silty clay loam that has yellowish-red and light yellowish-brown mottles.

Tilsit soils have moderate available moisture capacity, slow permeability, moderate natural fertility, and low

organic-matter content. The effective rooting depth ranges from 20 to 26 inches.

Representative profile of Tilsit loam in an area of Whitley and Tilsit silt loams, 2 to 6 percent slopes, located 1 mile east of Little Lick Campground:

O11—2 inches to 1 inch, loose leaves, twigs, and pine needles.

O12—1 inch to 0, partly decomposed leaves, twigs, and pine needles.

A1—0 to 3 inches, light olive-brown (2.5Y 5/4) silt loam; weak, fine, granular structure; very friable; many roots; very strongly acid; abrupt, smooth boundary.

A2—3 to 6 inches, pale-brown (10 YR 6/3) silt loam; weak, medium, granular structure; very friable; common roots; extremely acid; clear, wavy boundary.

B1—6 to 10 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, subangular blocky structure; very friable; few roots; extremely acid; clear, wavy boundary.

B21t—10 to 16 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, subangular blocky structure; very friable; faint, patchy clay films on peds; common roots; extremely acid; clear, wavy boundary.

B22t—16 to 21 inches, yellowish-brown (10YR 5/6) light silty clay loam; weak, fine, subangular blocky structure; friable; faint, patchy clay films on peds; few roots; extremely acid; clear, wavy boundary.

Bxt—21 to 29 inches, yellowish-brown (10YR 5/6) loam; many, medium, distinct, light brownish-gray (10YR 6/2) mottles; moderate, very fine, subangular blocky structure; very firm, compact and brittle; faint, patchy clay films on peds; few roots; extremely acid; gradual, wavy boundary.

IIB23t—29 to 42 inches, strong-brown (7.5YR 5/6) heavy silty clay loam; common, fine and faint, yellowish-red (5YR 4/8) and light yellowish-brown (10YR 6/4) mottles; weak, very fine, subangular blocky structure; firm; faint, patchy clay films on peds; extremely acid.

The solum ranges from 36 to 60 inches in thickness. Depth to bedrock ranges from 40 to 60 inches. Depth to the fragipan ranges from 20 to 26 inches. Coarse fragments make up 0 to 5 percent, by volume, of the profile. In some profiles the A horizon is yellowish brown (10YR 5/4). The Ap horizon, where present, has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B2t horizon is yellowish brown (10YR 5/6 or 5/8). In some profiles gray mottles are in the lower part of the B2t horizon. The Bxt horizon is yellowish-brown (10YR 5/6 or 5/8) or strong-brown (7.5YR 5/6 or 5/8) loam, silt loam, or light silty clay loam. In some profiles the IIBt horizon is absent. Tht B horizon ranges from strongly acid to extremely acid. The C horizon, where present, is olive gray (5Y 5/2), yellowish brown (10YR 5/4 or 5/6), brownish yellow (10YR 6/6 or 6/8), or strong brown (7.5YR 5/6 or 5/8) or is mottled with these colors. It is silt loam, silty clay loam, clay loam, or silty clay.

Tilsit soils are near Whitley, Hartsells, and Muse soils. They have a fragipan and are not so well drained as Whitley soils. They are deeper over bedrock than Hartsells soils and are not so well drained as those soils. They are not so clayey nor so well drained as Muse soils.

Trimble Series

The Trimble series consists of deep, well-drained soils that formed in colluvium washed from soils that formed in residuum derived from cherty limestone. Trimble soils are mainly in the western and northwestern parts of the county. They have slopes of 2 to 80 percent. Trimble soils that have slopes of more than 30 percent are mapped in a complex with Garmon soils.

In a representative profile, the surface layer is dark grayish-brown cherty silt loam about 8 inches thick. The subsoil extends to a depth of 72 inches or more. To a depth of about 68 inches, it is yellowish-brown, friable cherty heavy silt loam. Below is mottled strong-brown and light-gray, friable cherty light silty clay loam.

Trimble soils have moderate available moisture capacity, moderate permeability, and low organic-matter content.

Representative profile of Trimble cherty silt loam, 20 to 30 percent slopes, located one-fourth mile south of Hogue Elementary School:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) cherty silt loam; weak, fine, granular structure; very friable; 20 percent chert fragments, by volume; slightly acid; clear, smooth boundary.

B2t—8 to 68 inches, yellowish-brown (10YR 5/6) cherty heavy silt loam; weak, fine and medium, subangular blocky structure; friable; 35 percent chert fragments, by volume; few faint clay films; strongly acid; clear, wavy boundary.

B3t—68 to 72 inches, mottled strong-brown (7.5YR 5/6) and light-gray (10YR 7/1) cherty light silty clay loam; weak, fine and medium, subangular blocky structure; friable; 35 percent chert fragments, by volume; few faint clay films; strongly acid.

The solum ranges from 60 to 72 inches in thickness. Depth to bedrock is more than 60 inches. Chert fragments make up 15 to 35 percent, by volume, of any horizon. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B2t horizon is strong brown (7.5YR 5/6) in some profiles. It is cherty light silty clay loam or cherty heavy silt loam. In some profiles the B3t horizon is cherty silt loam. Mottles have a hue of 10YR or 5YR, a value of 5 to 7, and a chroma of 1 to 6. The B horizon is strongly acid to very strongly acid. In some profiles the B3t horizon is replaced by an olive-colored, clayey C horizon at a depth below 60 inches.

Trimble soils are near Garmon, Tarklin, and Whitley soils. They are deeper over bedrock and more cherty than Garmon soils. They are better drained than Tarklin soils and do not have the fragipan that is typical of those soils. They are more cherty and generally deeper than Whitley soils.

Trimble cherty silt loam, 2 to 6 percent slopes (TrB).—This soil is in slightly concave areas, mostly at the base of steep slopes. It is less cherty in the surface layer than the soil described as representative of the series.

Included with this soil in mapping were small areas of Whitley and Tarklin soils.

This Trimble soil has moderate natural fertility and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe-3; woodland suitability group 2o1.

Trimble cherty silt loam, 6 to 12 percent slopes (TrC).—This soil is in concave areas and formed in colluvial material at the base of steep slopes. It is less cherty in the surface layer than the soil described as representative of the series.

Included with this soil in mapping were small areas of Tarklin and Whitley soils.

This Trimble soil has moderate natural fertility and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is fair. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe-3; woodland suitability group 2o1.

Trimble cherty silt loam, 12 to 20 percent slopes (TrD).—This soil is in concave areas. It formed in colluvial material at the base of steep slopes.

Included with this soil in mapping were some areas of a soil that has an olive-colored clay layer at a depth of about 30 inches. Also included were areas of soils that are more than 35 percent chert fragments in the surface layer.

This soil has low natural fertility and an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is poor. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to drought-resistant grasses and legumes. Capability unit IVe–3; woodland suitability group 2o1.

Trimble cherty silt loam, 20 to 30 percent slopes (TrE).—This soil is in concave areas and formed in colluvial material below very steep Garmon soils. It has the profile described as representative of the series.

Included with this soil in mapping were some areas of a soil that has an olive-colored clay layer at a depth of about 30 inches. Also included were areas of soils that are more than 35 percent chert fragments in the surface layer, and a few areas of severely eroded soils.

This soil has low natural fertility and an effective rooting depth of more than 60 inches. Response of pasture and hay plants to lime and fertilizer is fair.

This soil is not suited to cultivated crops, because erosion caused by runoff is a hazard. Also, farm machinery is difficult to operate where slopes are moderately steep. This soil is suited to pasture consisting of drought-resistant grasses and legumes. It is well suited to trees. Capability unit VIe–1; woodland suitability group 2rl.

Waynesboro Series

The Waynesboro series consists of deep, well-drained soils that formed in old alluvium derived from limestone and sandstone. These soils are on old high terraces, mostly in the southwestern part of the county. They have slopes of 2 to 30 percent.

In a representative profile, the surface layer is brown loam about 9 inches thick. The subsoil extends to a depth of 90 inches or more. To a depth of about 15 inches, it is yellowish-red, friable light clay loam. Below this depth it is red, firm heavy clay loam.

Waynesboro soils have high available moisture capacity and moderate permeability.

Representative profile of Waynesboro loam, 2 to 6 percent slopes, located 1 mile southwest of Slate Branch Baptist Church:

Ap—0 to 9 inches, brown (10YR 5/3) loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary.

B1t—9 to 15 inches, yellowish-red (5YR 4/6) light clay loam; moderate, fine and medium, subangular blocky structure; friable; few thin clay films; very strongly acid; clear, smooth boundary.

B21t—15 to 57 inches, red (2.5YR 4/6) heavy clay loam; strong, fine and medium, angular blocky structure; firm; dark-red, discontinuous clay films; 2 percent sandstone gravel; very strongly acid; gradual, smooth boundary.

B22t—57 to 90 inches, red (2.5YR 4/6) heavy clay loam; few, medium, prominent, yellowish-brown (10YR 5/6) mottles; strong, fine and medium, angular blocky structure; firm; dark-red, discontinuous clay films; 2 percent sandstone gravel; very strongly acid.

The solum is more than 60 inches thick. Depth to limestone bedrock is more than 72 inches. Sandstone fragments or water-worn quartzitic pebbles, or both, make up 0 to 15 percent, by volume, of each horizon. Sand makes up more than 20 percent of each horizon. The Ap horizon has a hue of 10YR, a value of 4 or 5, and a chroma of 2 or 3. The B1t horizon has a hue of 5YR, 2.5YR, or 10YR; a value of 4; and a chroma of 6 to 8. Yellowish-brown mottles are few to common in the lower part. The B2t horizon is heavy clay loam or clay. It is strongly acid to very strongly acid in reaction.

Waynesboro soils in Pulaski County are a few degrees cooler than is defined in the range for the series, but this difference does not alter their usefulness and behavior.

Waynesboro soils are near Frederick soils. They are more sandy throughout the profile than those soils.

Waynesboro loam, 2 to 6 percent slopes (WaB).—This soil is in convex areas on narrow ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Frederick soils.

This Waynesboro soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of 72 inches or more. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is well suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe–1; woodland suitability group 2o1.

Waynesboro loam, 6 to 12 percent slopes (WaC).—This soil is in plane areas on the sides of ridges.

Included with this soil in mapping were areas of eroded and severely eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were small areas of Frederick soils.

This Waynesboro soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of 72 inches or more. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is well suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–1; woodland suitability group 2o1.

Waynesboro loam, 12 to 20 percent slopes (WaD).—This soil is in plane areas on the sides of ridges.

Included with this soil in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were small areas of Frederick soils.

This Waynesboro soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of 72 inches or more. Response of crops to lime and fertilizer is fair. The hazard of erosion is very severe in cultivated areas.

This soil is better suited to pasture and hay than to cultivated crops, but it is suitable for occasional cultivation. It is suited to most grasses and legumes commonly grown in the county. Capability unit IVe–1; woodland suitability group 2o1.

Waynesboro loam, 20 to 30 percent slopes (WaE).—This soil is in plane areas on the sides of ridges.

Included with this soil in mapping were areas of eroded soils where plowing has mixed material from the subsoil with that in the surface layer, and the present surface layer is redder and more clayey than that of this soil. Also included were small areas of Frederick soils.

This Waynesboro soil has moderate natural fertility, low organic-matter content, and an effective rooting depth of 72 inches or more. Response of pasture and hay plants to lime and fertilizer is fair.

This soil is not suited to cultivated crops, because of the hazard of erosion, and modern farm machinery is difficult to operate where slopes are moderately steep. This soil is suited to most grasses and legumes commonly grown in the county. It is also suited to trees. Capability unit VIe–1; woodland suitability group 2r1.

Waynesboro clay loam, 12 to 30 percent slopes, severely eroded (WbE3).—This soil is in plane areas on the sides of ridges. Its surface layer is redder and more clayey than that in the profile described as representative of the series, because material originally in the surface layer has been lost through erosion, and material from the subsoil has been mixed with that in the plow layer.

Included with this soil in mapping were areas of Frederick soils.

This Waynesboro soil has low natural fertility, very low organic-matter content, and an effective rooting depth of 60 inches or more. Response of pasture and hay plants to lime and fertilizer is fair. Farm machinery is difficult to operate in some of the steeper areas.

This soil is not suited to cultivation, because of the hazard of erosion and the resulting damage to the soil. This soil is suited to drought-resistant grasses and legumes. Capability unit VIe–2; woodland suitability group 3c1.

Whitley Series

The Whitley series consists of deep, well-drained soils that formed in residuum derived from acid sandstone or shale, or both, and in old alluvium derived from limestone, sandstone, or shale. These soils are on uplands and stream terraces, mostly in the eastern part of the county. They have slopes of 0 to 12 percent.

In a representative profile, the surface layer is silt loam about 6 inches thick. It is mainly light olive brown, but the upper 2 inches is dark brown. The subsoil extends to a depth of about 40 inches. To a depth of 12 inches, it is yellowish-brown, friable silt loam. Between depths of 12 and 31 inches, it is yellowish-brown or strong-brown, friable light silty clay loam. Below a depth of 31 inches, it is strong-brown, firm heavy silty clay loam that has brownish-yellow and red mottles. At a depth of 40 inches is soft shale that is broken easily by hand.

Whitley soils have high available moisture capacity, moderate permeability, moderate natural fertility, and low organic-matter content.

Representative profile of Whitley silt loam, 6 to 12 percent slopes, located 2¼ miles east of Mount Victory on State Road 192 and then 2 miles northeast on Bee Rock Overlook Road:

O11—2 inches to ½ inch, hardwood leaves and pine needles.

O12—½ inch to 0, partly decomposed leaves and needles.

A1—0 to 2 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many roots; very strongly acid; abrupt, smooth boundary.

A2—2 to 6 inches, light olive-brown (2.5Y 5/6) silt loam; weak, coarse, granular structure; very friable; 1 percent channery fragments, by volume; many roots; very strongly acid; clear, wavy boundary.

B1—6 to 12 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, subangular blocky structure; friable; 1 percent channery fragments, by volume; many roots; very strongly acid; clear, wavy boundary.

B21t—12 to 23 inches, yellowish-brown (10YR 5/8) light silty clay loam; moderate, fine, subangular blocky structure; friable; distinct, broken clay films on peds; 2 percent gravel, by volume; common roots; very strongly acid; clear, wavy boundary.

B22t—23 to 31 inches, strong-brown (7.5YR 5/8) light silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/4) and yellowish-red (5YR/8) mottles; strong, fine, subangular blocky structure; friable; distinct, complete clay films on peds; 2 percent gravel, by volume; few roots; very strongly acid; clear, wavy boundary.

B3t—31 to 40 inches, strong-brown (7.5YR 5/8) heavy silty clay loam; many, medium, prominent, brownish-yellow (10YR 6/6) and red (2.5YR 4/8) mottles; moderate, medium and coarse, angular blocky structure parting to weak, fine, subangular blocky; firm; common, distinct clay films on peds; 3 percent gravel, by volume; few roots; very strongly acid; clear, wavy boundary.

R—40 to 65 inches, mottled red (2.5YR 4/8), strong-brown (7.5YR 5/8), and light-gray (10YR 7/2) soft shale that is broken easily by hand, silty clay when crushed and wetted; very few roots; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is 40 inches or more. The A1 horizon has a hue of 10YR, a value of 3 or 4, and a chroma of 1 to 3; or a hue of 2.5Y, a value of 3 or 4, and a chroma of 2. The A2 horizon is yellowish brown (10YR 5/4 or 5/6) or light olive brown (2.5YR 5/4 or 5/6). The Ap horizon, where present, is grayish brown (10YR 5/2), brown (10YR 5/3), dark grayish brown (10YR 4/2), or dark brown (10YR 4/3). The B1 horizon is yellowish brown (10YR 5/4 or 5/6) or strong brown (7.5YR 5/6). In some profiles it is light silty clay loam. The B2t horizon is yellowish brown (10YR 5/4 to 5/8) or strong brown (7.5YR 5/6 or 5/8). The B3t horizon is yellowish brown (10YR 5/4 or 5/6) or strong brown (7.5YR 5/6 or 5/8 and has brownish-yellow (10YR 6/6) or red (2.5YR 4/6 or 4/8) mottles, or both. Some profiles are mottled with grayish brown in the lower part of the B3t horizon. The B3t horizon is silt loam, silty clay loam, clay loam, or silty clay. The B horizon ranges from strongly acid to very strongly acid in reaction. Some profiles have a C horizon that is yellowish brown (10YR 5/4 to 5/8) or strong brown (7.5YR 5/6 or 5/8) silt loam, silty clay loam, or clay loam that has grayish-brown mottles. Gravel makes up 0 to 35 percent, by volume, of this horizon.

Whitley soils are near Tilsit, Bedford, Lawrence, Gilpin, Hartsells, and Muse soils. They are better drained than Tilsit, Bedford, and Lawrence soils and do not have the fragipan that is typical of those soils. They are generally deeper over bedrock and have a thicker solum than Gilpin soils. They are less sandy and are deeper over bedrock than Hartsells soils. They are less clayey in the B horizon than Muse soils.

Whitley silt loam, 6 to 12 percent slopes (WhC).—This soil is in plane areas on the sides of ridges. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Gilpin soils and areas of severely eroded soils. Also included were areas where slopes range from 12 to 20 percent.

This Whitley soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–2; woodland suitability group 2o1.

Whitley silt loam, terrace, 0 to 2 percent slopes (WIA).—This soil is on stream terraces. Its profile is less clayey in the lower part of the subsoil than the one described as representative of the series, and it is deeper to bedrock.

Included with this soil in mapping were small areas of Bedford soils.

This Whitley soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Where this soil occurs on low stream terraces, it is subject to infrequent flooding, mostly late in the winter or early in spring. Capability unit I–4; woodland suitability group 1o1.

Whitley silt loam, terrace, 2 to 6 percent slopes (WIB).—This soil is in plane areas on stream terraces. Its profile is less clayey in the lower part of the subsoil than the one described as representative of the series, and it is much deeper over bedrock.

Included with this soil in mapping were small areas of Bedford soils.

This Whitley soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIe–1; woodland suitability group 2o1.

Whitley silt loam, terrace, 6 to 12 percent slopes (WIC).—This soil is in plane areas on stream terraces. Its profile is less clayey in the lower part of the subsoil than the one described as representative of the series, and it is much deeper over bedrock.

Included with this soil in mapping were small areas of eroded soils.

This soil has an effective rooting depth of more than 60 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Capability unit IIIe–1; woodland suitability group 2o1.

Whitley and Tilsit silt loams, 2 to 6 percent slopes (WtB).—This complex is in plane areas on ridgetops in the eastern part of the county. Some areas consist of Whitley and Tilsit soils that are so intermingled that separation is not practical. Other areas consist entirely of Whitley soils or of Tilsit soils. The Whitley soil makes up about 65 percent of this complex, and the Tilsit soil, about 30 percent.

Included with this complex in mapping were small areas of Gilpin, Hartsells, and Muse soils.

The soils of this complex have moderate natural fertility and low organic-matter content. The effective rooting depth of the Whitley soil is more than 40 inches, and that of the Tilsit soil is 20 to 26 inches. Response of crops to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

The Whitley soil is suited to most crops and pasture and hay plants commonly grown in the county. Alfalfa is typically short lived on the Tilsit soil, because the slow permeability in the fragipan causes excess water in the rooting zone. Capability unit IIe–2; woodland suitability group 2o1.

Use and Management of the Soils

This section is designed to help the landowner understand how soils behave and how they can be used. It describes the use and management of soils for crops and pasture, for woodland, for wildlife habitat, for engineering works, and for town and country development.

Use of the Soils for Crops and Pasture [2]

This subsection is a guide to the suitability and management of the soils for crops and pasture. Specific management is not suggested for each soil. Suggestions for the use of each soil are given in the section "Descriptions of the Soils."

This section has four main parts. In the first part some general principles of soil management are given. In the second part the capability classification system is explained. In the third part the capability units are described and the use, suitability, and management requirements for each are discussed. In the fourth part estimates of yields for suitable crops are shown for each of the soils under high and medium levels of management.

General principles of soil management

Some principles of management are general enough to apply to all soils throughout the county that are suitable for crops and pasture. Individual soils or groups of soils, however, require different kinds and degrees of management.

Most soils in Pulaski County, such as the Bedford and Frederick soils, are naturally low in organic-matter content. It is important that organic matter be returned to the soil by adding manure, by leaving plant residue on the surface, and by growing sod crops, cover crops, and green-manure crops.

All of the soils in the county require the addition of fertilizer for food growth of crops. Lime is also required on many soils to correct acidity. Some soils on flood plains, such as the Nolin and Newark soils, do not require lime. Information concerning the natural fertility and acidity of the individual soils is provided in the section "Descriptions of the Soils." Suggestions about liming and fertilizing are only general because the soils should be fertilized and limed according to needs indicated by tests. The plow layer of soils that are limed is likely to be less acid than is indicated in the discussions of the capability units.

On most wet soils in the county, such as Newark silt loam and Lawrence silt loam, production of cultivated

[2] WALTER J. GUERNSEY, conservation agronomist, Soil Conservation Service, helped to prepare this subsection.

crops can be improved by removing excess water by use of tile or ditch drainage.

Some tillage is generally needed to prepare a seedbed and to control weeds, but tillage should be kept to a minimum because it tends to break down the structure of the soils and causes the plow layer to clod or crust.

The local Soil Conservation Service technician can provide assistance in planning the proper management for the soils on a given farm.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, the kinds of soil are grouped at three levels: the capability class, the subclass, and the unit. These are discussed 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, 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, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife habitat. (None in Pulaski County.)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife habitat, water supply, or esthetic purposes. (None in Pulaski County.)

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States but not in Pulaski County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, although they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability Units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–1 or IIe–2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraphs; and the Arabic numeral specifically identifies the capability unit within each subclass.

Use and management by capability units

In this subsection the soils of Pulaski County are placed in capability units and each unit is described. Each unit consists of soils that have about the same limitations, need about the same management, and respond to this management in about the same way. The discussions of the capability units describe the soil or soils in the units, name suitable crops or kinds of farming, and give suitable cropping systems and suggestions for management. The cropping systems given are only examples; other systems may be as well suited. Representatives of the Soil Conservation Service are available to help select a cropping system that is suitable for a given farm.

The names of the soil series represented in each capability unit are given, but this does not mean that all the soils in the series are in the unit. To find the unit in which a given soil has been placed, refer to the "Guide to Mapping Units" at the back of this survey.

All cultivated soils in Pulaski County that are gently sloping or steeper are subject to erosion and loss of organic matter and plant nutrients from the plow layer. Because most runoff and erosion occur when the cultivated crop is growing or soon after the crop has been harvested, a cropping system needs to be used in combination with erosion-control practices that prevent ex-

cessive runoff and soil loss. As used here, cropping system refers to the sequence of crops grown in combination with cultural and management measures, including minimum tillage, mulch planting, use of crop residue, growing of cover and green-manure crops, and use of lime and fertilizer. Erosion-control practices refers to contour cultivation, terraces, contour stripcropping, diversions, and grassed waterways. The effectiveness of a particular combination of these measures varies among the different kinds of soil, but different combinations are equally effective on the same soil. For example, a corn-meadow-meadow crop sequence used with proper applications of fertilizer and no erosion-control practices keeps soil loss within permissible limits in an area of Frederick silt loam that has slopes of 5 percent slope and is 200 feet long. If a crop sequence that uses more years of row crops, such as corn-meadow, is desired, such an erosion-control practice as contour cultivation is needed.

The high level of management mentioned in the discussion of certain capability units is explained in the subsection "Estimated yields."

CAPABILITY UNIT I-1

This unit consists of soils of the Chagrin, Huntington, and Nolin series. These soils are on flood plains and have a surface layer of loam or silt loam. They are well drained and have a deep rooting zone. Slopes are 0 to 2 percent. Available moisture capacity is high, permeability is moderate, and organic-matter content is low to medium. Reaction is medium acid to neutral. These soils are easy to till but are subject to flooding, mostly late in winter and early in spring.

The soils in this unit are well suited to all crops and pasture and hay plants commonly grown in the area. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky bluegrass, smooth bromegrass, Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Ladino clover, Korean lespedeza, and sericea lespedeza. In some areas alfalfa and fall-seeded small grain are subject to damage by flooding. These soils are also suited to trees and to other less intensive uses.

The general principles of good management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping these soils productive. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT I-2

This unit consists only of Lindside silt loam. This soil is on flood plains. It is moderately well drained and has a deep rooting zone. Slopes are 0 to 2 percent. Available moisture capacity is high, permeability is moderate, and organic-matter content is low. Reaction is medium acid to slightly acid. This soil is easy to till but is subject to flooding, mostly late in winter and early in spring. In most areas crop production is improved by artificial drainage.

This soil is well suited to most crops and pasture and hay plants commonly grown in the country. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky bluegrass, smooth bromegrass, Kentucky 31 fescue, orchardgrass, red clover, Ladino clover, Korean lespedeza, and sericea lespedeza. Fall-seeded small grain is subject to damage by flooding. This soil is also suited to trees and to other less intensive uses.

The general principles of good management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping this soil productive. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT I-3

This unit consists only of Pope fine sandy loam. This soil is on flood plains. It is well drained and has a deep rooting zone. Slopes are 0 to 4 percent. Available moisture capacity is moderate, permeability is moderately rapid, and organic-matter content is low. Reaction is strongly acid or very strongly acid. This soil is easy to till, but it is slightly droughty and is subject to flooding, mostly late in winter and early in spring.

This soil is well suited to most crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Korean lespedeza, and siricea lespedeza. In some areas alfalfa and fall-seeded small grain are subject to damage by flooding. This soil is also suited to trees and to other less intensive uses.

The general principles of good management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping this soil productive. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT I-4

This unit consists of soils of the Ashton and Whitley series. These soils are on stream terraces and have a surface layer of silt loam. They are well drained and have a deep rooting zone. Slopes are 0 to 2 percent. Available moisture capacity is high, permeability is moderate, and organic-matter content is low to medium. The Ashton soil does not generally require liming, but the acid Whitley soil does. These soils are easy to till, but they are subject to infrequent flooding, although not generally during the growing season.

The soils in this unit are well suited to all crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky bluegrass, smooth bromegrass, Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Ladino clover, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

The general principles of good management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping these soils productive. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT IIe-1

This unit consists of soils of the Cumberland, Etowah, Frederick, Pembroke, Waynesboro, and Whitley series. These soils are on uplands, stream terraces, and toe slopes. They have a surface layer of silt loam, loam

or cherty slit loam. They are well drained and have a deep rooting zone. Slopes are 2 to 6 percent. Available moisture capacity is moderate to high, permeability is moderate, and organic-matter content is low to medium. Reaction is strongly acid to very strongly acid. These soils are easy to till, but the hazard of erosion is moderate in cultivated areas.

The soils in this unit are well suited to all crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky bluegrass, smooth bromegrass, Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Ladino clover, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IIe-2

This unit consists of soils of the Allegheny, Mountview, Tilsit, and Whitley series. These soils are on uplands, toe slopes and stream terraces. They have a surface layer of loam or silt loam. Slopes are 2 to 6 percent. The Allegheny, Mountview, and Whitley soils are well drained and have a deep rooting zone. They have high available moisture capacity, moderate permeability, and low organic-matter content. These soils are strongly acid or very strongly acid. The Tilsit soil is moderately well drained and moderately deep over a slowly permeable fragipan that restricts root growth. It has moderate available moisture capacity and is strongly acid to very strongly acid. All of these soils are easy to till, but the hazard of erosion is moderate in cultivated areas.

All of the soils in this unit except the Tilsit soil are well suited to most crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky 31 fescue, orchardgrass, alfalfa red clover, Ladino clover, Korean lespedeza, and sericea lespedeza. All of these plants grow well on the Tilsit soil except alfalfa, which makes poor growth and tends to die out after 2 or 3 years, and tobacco when the water table is high during wet seasons and the rooting zone is restricted because of the slowly permeable fragipan. All of these soils are suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IIe-3

This unit consists of soils of the Frankstown, Hartsells, and Trimble series. These soils are on uplands and toe slopes and have a surface layer of loam or cherty silt loam. They are well drained and have a moderately deep to deep rooting zone. Slopes are 2 to 6 percent. Available moisture capacity is moderate, permeability is moderate to moderately rapid, and organic-matter content is low. Reaction is strongly acid to very strongly acid. Gravel in the surface layer of all these soils except the Hartsells soil makes tillage somewhat difficult. The hazard of erosion is moderate in cultivated areas.

The soils in this unit are suited to most crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IIe-4

This unit consists of soils of the Bedford, Monongahela, and Tarklin series. These soils are on uplands and stream terraces. The Tarklin soil has a surface layer of cherty silt loam, and the others have a surface layer of loam or silt loam. These soils are moderately well drained. A slowly permeable fragipan restricts root growth mainly to the upper 20 to 30 inches and results in a seasonal perched water table. Slopes are 2 to 6 percent. Available moisture capacity is moderate, and organic-matter content is low. Reaction is strongly acid to very strongly acid. Where these soils are in low areas along streams, they are subject to flooding, mostly late in winter or early in spring. These soils are easy to till, but the hazard of erosion is moderate in cultivated areas.

The soils in this unit are suited to most crops and to pasture and hay plants commonly grown in the county. Alfalfa tends to die out after 2 or 3 years. Because of the slowly permeable fragipan in these soils, plant growth is adversely affected by unusually dry seasons or unusually wet seasons. Suitable grasses and legumes are Kentucky 31 fescue, orchardgrass, red clover, Ladino clover, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IIw-1

This unit consists of soils of the Newark and Stendal series. These soils are on flood plains. They have a surface layer of loam, silt loam, or gravelly silt loam. They are somewhat poorly drained, and the rooting zone is impeded by a seasonal high water table. Slopes are 0 to 2 percent. Available moisture capacity is moderate to

high, permeability is moderate to moderately rapid, and organic-matter content is low. The Newark soils are medium acid to slightly acid, and the Stendal soil is strongly acid to very strongly acid. These soils are easy to till except where gravel makes tillage somewhat difficult. Unless these soils are artificially drained, a seasonal high water table keeps these soils saturated below a depth of 6 to 18 inches. These soils are subject to flooding, mostly late in winter and early in spring.

If these soils are adequately drained, they are suited to corn and small grain. Fall-seeded small grain is subject to damage by flooding. These soils are suitable for pasture and hay plants that tolerate wetness, including Kentucky 31 fescue, redtop, Ladino clover, reed canarygrass, Kobe lespedeza, and Korean lespedeza. These soils are also suited to trees and to other less intensive uses.

In addition to the need for artificial drainage in cultivated areas, the general principles of good management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping these soils productive.

CAPABILITY UNIT IIw-2

This unit consists only of Bedford silt loam, 0 to 2 percent slopes. This soil is on uplands and stream terraces. It is moderately well drained and is moderately deep over a slowly permeable fragipan that restricts root growth and causes the root zone to be waterlogged during periods of heavy rain. Available moisture capacity is moderate, and organic-matter content is low. Reaction is strongly acid to very strongly acid. Where this soil is in low areas along streams, it is subject to flooding, mostly late in winter and early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the country, but alfalfa tends to die out after 1 or 2 years. Plant growth, in either unusually dry seasons or unusually wet seasons, is limited because of the fragipan. Suitable grasses and legumes are Kentucky 31 fescue, redtop, Ladino clover, reed canarygrass, Kobe lespedeza, Korean lespedeza, and sericea lespedeza. This soil is also suited to trees and to other less intensive uses.

In addition to the need for artificial drainage in cultivated areas, the general principles of good management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping this soil productive.

CAPABILITY UNIT IIs-1

This unit consists only of Chagrin gravelly silt loam. This soil is on flood plains. It is well drained and has a deep rooting zone. Slopes are 0 to 2 percent. Available moisture capacity is moderate, permeability is moderately rapid, and organic-matter content is low. Reaction is medium acid to slightly acid. Gravel in the surface layer causes this soil to be somewhat difficult to till. This soil is subject to flooding, mostly late in winter and early in spring.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Korean lespedeza, and sericea lespedeza. In some areas alfalfa and fall-seeded small grain are subject to damage by flooding. This soil is also suited to trees and to other less intensive uses.

The general principles of good management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping this soil productive.

CAPABILITY UNIT IIIe-1

This unit consists of soils of the Cumberland, Etowah, Frederick, Pembroke, Waynesboro, and Whitley series. These soils are on uplands, toe slopes, and stream terraces. They have a surface layer of silt loam, loam, or cherty silt loam. They are well drained and have a deep rooting zone. Slopes are 6 to 12 percent. Available moisture capacity is moderate to high, permeability is moderate, and organic-matter content is low to medium. Reaction is strongly acid to very strongly acid. These soils are easy to till, but the hazard of erosion is severe in cultivated areas.

The soils in this unit are well suited to all crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky bluegrass, smooth bromegrass, Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Ladino clover, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IIIe-2

This unit consists of soils of the Allegheny, Mountview, Muse, Nolichucky, and Whitley series. These soils are on uplands, toe slopes, and stream terraces. They have a surface layer of loam or silt loam. They are well drained and have a deep rooting zone. Slopes are 6 to 12 percent. Available moisture capacity is high, permeability is moderately slow in the Muse soil and moderate in the other soils. Organic-matter content is low in all the soils, and reaction is strongly acid or very strongly acid. These soils are easy to till, but the hazard of erosion is severe in cultivated areas.

The soils in this unit are suited to most crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Ladino clover, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If the soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IIIe-3

This unit consists of soils of the Dekalb, Frankstown, Hartsells, Jefferson, Shelocta, and Trimble series. These

soils are on uplands and toe slopes. They have a surface layer of sandy loam, gravelly loam, gravelly silt loam, or cherty silt loam. They are well drained and have a moderately deep to deep rooting zone. Slopes are 6 to 12 percent. Available moisture capacity is low in the Dekalb soil, moderate to high in the Shelocta soil, and moderate in the other soils. Permeability is moderate to rapid in all the soils, and organic-matter content is low. Reaction is strongly acid to very strongly acid. The Dekalb and Hartsells soils are easy to till, but the other soils are somewhat difficult to till, because of gravel or chert fragments on the surface. The hazard of erosion is severe in cultivated areas.

The soils in this unit are suited to most crops and pasture and hay plants commonly grown in the county. Among the plants that grow well are corn, tobacco, small grain, and grasses and legumes, including Kentucky 31 fescue, orchardgrass, alfalfa, red clover, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IIIe-4

This unit consists only of Tarklin cherty silt loam, 6 to 12 percent slopes. This soil is on stream terraces. It is moderately well drained and is moderately deep over a slowly permeable fragipan that restricts root growth and causes seasonal wetness. Available moisture capacity is moderate, permeability is slow, and organic-matter content is low. Reaction is strongly acid to extremely acid. Chert fragments in the surface layer make this soil somewhat difficult to till. The hazard of erosion is severe in cultivated areas.

This soil is suited to most crops and pasture and hay plants commonly grown in the county. Alfalfa tends to make poor growth and dies out after 2 or 3 years. Because of the fragipan, plant growth is somewhat limited in growing seasons that are unusually dry or are unusually wet. Among the grasses and legumes that grow well are Kentucky 31 fescue, orchardgrass, red clover, Korean lespedeza, and sericea lespedeza. This soil is also suited to trees and other less intensive uses.

If this soil is cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IIIw-1

This unit consists only of Melvin silt loam. This soil is on flood plains. It is poorly drained and has a rooting zone that is impeded by a seasonal high water table. Slopes are 0 to 2 percent. Available moisture capacity is high, permeability is moderate, and organic-matter content is low. Reaction is medium acid to slightly acid. This soil is easy to till where the areas are dry enough to support modern farm machinery. Unless this soil is artificially drained, the seasonal high water table saturates it to very near the surface. This soil is subject to flooding, mostly late in winter and early in spring.

If adequately drained, this soil is suited to corn and small grain. Fall-seeded small grains is subject to damage by flooding. Pasture and hay plants that tolerate wetness grow better on this soil than other plants. Among the plants that grow well are Kentucky 31 fescue, redtop, Ladino clover, reed canarygrass, Kobe lespedeza, and Korean lespedeza. This soil is also suited to trees and other less intensive uses.

In addition to the need for artificial drainage in cultivated areas, the general principles of management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping this soil productive. Under a high level of management, row crops can be grown year after year.

CAPABILITY UNIT IIIw-2

This unit consists only of Lawrence silt loam. This soil is on uplands and stream terraces. It is somewhat poorly drained. A slowly permeable fragipan restricts root growth mainly to the upper 20 to 32 inches. Slopes are 0 to 4 percent. Available moisture capacity is moderate, and organic-matter content is low. Reaction is very strongly acid to strongly acid. This soil is easy to till where the areas are dry enough to support modern farm machinery. A seasonal high water table saturates this soil below a depth of 6 to 18 inches. Where this soil is in low areas along streams, it is subject to flooding, mostly late in winter and early in spring.

If adequately drained, which is difficult because of the fragipan, this soil is suited to such plants as corn, Kentucky 31 fescue, redtop, reed canarygrass, alsike clover, Ladino clover, Kobe lespedeza, and Korean lespedeza. This soil is also suited to trees and to other less intensive uses.

If soils that have slopes of 3 or 4 percent are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. Where slopes are less steep, the general principles of good management that apply to fertilization, maintenance of organic-matter content, drainage, and tillage are important in keeping this soil productive. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IVe-1

This unit consists of soils of the Cumberland, Frederick, Mountview, Muse, Nolichucky, Shelocta, and Waynesboro series. These soils are on uplands and toe slopes. Most of these soils have a surface layer of loam or silt loam, but the Cumberland soil has a cherty surface layer and the Shelocta soil has a surface layer that is about 10 percent sandstone fragments. All of the soils in this unit are well drained and have a deep rooting zone. Slopes are 12 to 20 percent. Available moisture capacity is moderate to high. Permeability is moderately slow in the Muse soils and moderate in the other soils. Organic-matter content is low, and reaction is strongly

acid to very strongly acid. These soils are easy to till, but a very severe hazard of erosion makes them suited to only occasional cultivation.

These soils are better suited to pasture and hay than to such crops as tobacco, corn, and small grain. Among the suited grasses and legumes are Kentucky 31 fescue, orchardgrass, alfalfa, red clover, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IVe-2

This unit consists of severely eroded soils of the Frederick and Muse series. These soils are on uplands and toe slopes and have a surface layer of silty clay loam. They are well drained and have a deep rooting zone. Slopes are 6 to 12 percent. Available moisture capacity is high, permeability is moderate in the Frederick soil and moderately slow in the Muse soil. Organic-matter content is very low in both soils, and reaction is strongly acid to very strongly acid. These soils are somewhat difficult to till because of the moderately fine textured plow layer. A very severe hazard of erosion makes them suited to only occasional cultivation. Seed germination is only fair in these areas.

These soils are better suited to pasture and hay than to corn and small grain. Among the grasses and legumes that grow well are Kentucky 31 fescue, timothy, alfalfa, red clover, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control further erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IVe-3

This unit consists of soils of the Frankstown, Gilpin, Hartsells, Jefferson, Muse, Shelocta, and Trimble series. These soils are on uplands and on toe slopes. They have a surface layer of fine sandy loam, loam, silt loam, gravelly loam, or gravelly silt loam. They are well drained and have a moderately deep to deep rooting zone. Slopes are 12 to 20 percent. Available moisture capacity is high in the Muse soil and moderate in the other soils. Permeability is moderately rapid in the Hartsells and Jefferson soils, moderately slow in the Muse soil, and moderate in the others. Organic-matter content is low in all these soils, and they are strongly acid to very strongly acid. In some places, chert fragments or gravel in the surface layer of the Frankstown, Jefferson, Shelocta, and Trimble soils hinders tillage. A very severe hazard of erosion makes all these soils suited to only occasional cultivation.

Among the grasses and legumes that grow well on these soils are Kentucky 31 fescue, orchardgrass, red clover, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IVe-4

This unit consists of eroded soils of the Needmore and Talbott series. These soils are on uplands and have a surface layer of silty clay loam. They are well drained and have a shallow to deep rooting zone. Slopes are 6 to 12 percent. Available moisture capacity is moderate, permeability is moderate to slow, and organic-matter content is low. Reaction is strongly acid to very strongly acid in the upper part of the subsoil and medium acid to neutral in the lower part. These soils are somewhat difficult to till because of a high content of clay in the plow layer. A very severe hazard of erosion makes them suited to only occasional cultivation. Poor seed germination is common in these areas.

These soils are better suited to pasture and hay than to such crops as corn and small grain. Among the suited grasses and legumes are Kentucky 31 fescue, orchardgrass, Korean lespedeza, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

If these soils are cultivated, a suitable cropping system needs to be used in combination with practices that reduce runoff and help to control erosion. It is important that pasture management provide a good plant cover. Regulating grazing to retain a minimum plant height of at least 3 inches, along with other good management practices, assures vigorous growth of pasture plants.

CAPABILITY UNIT IVw-1

This unit consists only of Robertsville silt loam. This soil is on uplands and stream terraces. It is poorly drained and is shallow to moderately deep over a slowly permeable fragipan that restricts root growth. Slopes are 0 to 2 percent. Available moisture capacity is moderate, and organic-matter content is low. Reaction is strongly acid to extremely acid. This soil is easy to till where the areas are dry enough to support modern farm machinery. In undrained areas, the seasonal high water table saturates this soil to very near the surface. Where this soil is in low areas along streams, it is subject to flooding, mostly late in winter and early in spring.

If adequately drained, this soil is suited to such plants as corn, Kentucky 31 fescue, redtop, reed canarygrass, alsike clover, Ladino clover, Korean lespedeza, and Kobe lespedeza. This soil is also suited to trees and to other less intensive uses.

In addition to the need for artificial drainage, the general principles of good management that apply to fertilization, maintenance of organic-matter content, and tillage are important in keeping this soil productive.

CAPABILITY UNIT VIe-1

This unit consists of soils of the Frankstown, Frederick, Hartsells, Jefferson, Muse, Shelocta, Trimble, and

Waynesboro series. These soils are on uplands and toe slopes. They have a surface layer that ranges from silt loam, including cherty and gravelly phases, through loam, including gravelly and stony phases, to fine sandy loam. All these soils are well drained and have a deep rooting zone except the Hartsells soil, which has a moderately deep to deep rooting zone. Slopes are 20 to 30 percent. Available moisture capacity is moderate to high in all of the soils in this unit, except the Jefferson soil. It is low in the Jefferson soil. Permeability is moderately slow in the Muse soil and moderate to moderately rapid in the other soils. Organic-matter content is low, and reaction ranges from strongly acid to extremely acid.

The hazard of erosion makes these soils unsuited to cultivation. These soils are better suited to pasture than to crops. Among the grasses and legumes that grow well are Kentucky 31 fescue, orchardgrass, redtop, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

It is important that pasture management provide a good plant cover to reduce runoff and to help control erosion. Grass and legume mixtures should be selected that produce adequate forage and ground cover and require the least frequent renovation. Periods are needed during which pasture is not grazed to permit regrowth of plants. Grazing should be regulated to maintain a minimum plant height of at least 3 inches.

CAPABILITY UNIT VIe-2

This unit consists of soils of the Cumberland, Frederick, Muse, Needmore, Shelocta, and Waynesboro series. They are on uplands and toe slopes. Except for some of the Needmore soils, these soils are severely eroded, and they have a surface layer that ranges from silt loam to silty clay. They are well drained, and all have a deep rooting zone, except the Needmore soils, which have a shallow to deep rooting zone. Slopes are 12 to 30 percent. Available moisture capacity is moderate to high, permeability is moderately slow in the Muse and Needmore soils and moderate in the other soils. Organic-matter content is very low in the soils of this unit, and reaction is strongly acid to very strongly acid.

The hazard of erosion makes these soils unsuited to cultivation. These soils are suited to pasture. The less steep soils are suited to hay. Among the grasses and legumes that grow well are Kentucky 31 fescue, orchardgrass, timothy, and sericea lespedeza. These soils are also suited to trees and other less intensive uses.

It is important that pasture management provide a good plant cover to reduce runoff and to control further erosion. Grass and legume mixtures should be selected that produce adequate forage and ground cover and require the least frequent renovation. Periods are needed during which pasture is not grazed to permit regrowth of plants. Grazing should be regulated to maintain a minimum plant height of at least 3 inches.

CAPABILITY UNIT VIe-3

This unit consists only of Rockcastle silt loam, 20 to 30 percent slopes. This soil is on uplands. It is somewhat excessively drained and has a moderately deep rooting zone. Available moisture capacity is moderate, permeability is slow, and organic-matter content is low. Reaction is strongly acid to extremely acid.

The hazard of erosion makes this soil unsuited to cultivation. It is suited to pasture, but the kinds of grasses and legumes that grow well are limited. Kentucky 31 fescue and sericea lespedeza make suitable growth. This soil is also suited to trees and to other less intensive uses.

It is important that pasture management provide a good plant cover on these soils to reduce runoff and to help control erosion. Grass and legume mixtures should be selected that produce adequate forage and ground cover and require the least frequent renovation. Periods are needed during which pasture is not grazed to permit regrowth of plants. Grazing should be regulated to maintain a minimum plant height of at least 3 inches.

CAPABILITY UNIT VIs-1

This unit consists of rocky soils of the Dekalb, Frederick, Fredonia, Jefferson, and Talbott series and of areas of Rock outcrop that are intermingled with the Dekalb soil. These soils are on uplands. The Dekalb soils have a surface layer of sandy loam, and the other soils have a surface layer of silt loam. These soils are well drained and generally have a rooting zone that is 20 to 40 inches or more deep. Slopes are dominantly 6 to 30 percent, but in a few areas slopes range from 30 to 50 percent. Available moisture capacity is low to high, permeability is rapid to slow, and organic-matter content is low to medium. Reaction is medium acid to very strongly acid.

Rock outcrops and, in many areas, steepness make cultivation difficult, and these soils are not suited to cultivation. Areas that are free of rock outcrops are suited to pasture. The less steep soils can be used for hay where rocks are not too great a hindrance. Areas of Rock outcrop are too rocky for any use more intensive than wildlife habitat and a few trees. Among the suited grasses and legumes are Kentucky 31 fescue, orchardgrass, alfalfa, red clover, and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

It is important that pasture management provide a good plant cover to reduce runoff and to help control erosion. Grass and legume mixtures should be selected that produce adequate forage and ground cover and require the least frequent renovation. Periods are needed during which pasture is not grazed to permit regrowth of plants. Grazing should be regulated to maintain a minimum plant height of at least 3 inches.

CAPABILITY UNIT VIs-2

This unit consists of severely eroded, rocky soils of the Frederick, Fredonia, and Talbott series. These soils are on uplands and have a surface layer of silty clay loam. They are well drained and generally have a rooting zone of 20 inches or more, but in some areas it is less. Slopes are 6 to 20 percent. Available moisture capacity is moderate to high, permeability is moderate to slow, and organic-matter content is very low. Reaction is medium acid to very strongly acid.

Rock outcrop makes cultivation difficult, and these soils are not suited to cultivation. They are also droughty. They are better suited to pasture than to other uses, but some areas where rocks are few enough to allow mowing can be used for hay. Suitable plants are Kentucky 31

fescue and sericea lespedeza. These soils are also suited to trees and to other less intensive uses.

It is important that pasture management provide a good plant cover to reduce surface runoff and to help control further erosion. Grass and legume mixtures should be used that produce adequate forage and ground cover and require the least frequent renovation. Periods are needed during which pastures are not grazed to permit regrowth of plants. Grazing should be regulated to maintain a minimum plant height of at least 3 inches.

CAPABILITY UNIT VIIe-1

This unit consists of soils of the Garmon, Jefferson, Muse, Shelocta, and Trimble series. These soils are on uplands and toe slopes. They have a surface layer of sandy loam, loam, silt loam, or silty clay loam. Content of coarse fragments varies widely. The soils are well-drained, and all except the Garmon soil have a deep rooting zone. The Garmon soils have a moderately deep to deep rooting zone. Slopes are 20 to 80 percent. Available moisture capacity is moderate or high, and permeability is moderately rapid in the Garmon and Jefferson soils, moderately slow in the Muse soil, and moderate in the others. Organic-matter content is low or very low. Reaction is slightly acid to medium acid in the Garmon soils and strongly acid to very strongly acid in the other soils.

These soils are so steep that they are suited only to trees or pasture. Pasture production is limited even under good management. It is difficult and sometimes dangerous to use farm machinery where slopes are steep. If these soils are used for pasture, suitable plants are Kentucky 31 fescue and sericea lespedeza. These soils are also suited to wildlife habitat.

If these soils are used for pasture, periods are needed during which areas are not grazed to permit regrowth of plants. Grazing should be regulated to maintain a minimum plant height of at least 3 inches.

CAPABILITY UNIT VIIs-1

This unit consists of soils of the Brookside, Dekalb, Fredonia, and Jefferson series and Rock outcrop. These soils are on uplands and toe slopes. The texture of the surface layer and the content of coarse fragments vary widely. These soils are underlain by sandstone or limestone. They are well drained and have a moderately deep to deep rooting zone. Areas of Rock outcrop are intermingled with the Brookside and Dekalb soils. The Fredonia soil is very rocky. Slopes are 6 to 75 percent. Available moisture capacity is low in the Dekalb and Jefferson soils, moderate in the Fredonia soil, and high in the Brookside soil. Permeability is rapid to moderately rapid in the Dekalb and Jefferson soils, moderately slow in the Brookside soil, and moderate to slow in the Fredonia soil. Reaction is medium acid to neutral in the Brookside soil, strongly acid to very strongly acid in the Dekalb and Jefferson soils, and strongly acid to medium acid in the Fredonia soil.

These soils are not suited to cultivation. A few areas can be used for limited pasture, but numerous rock outcrops or steep slopes generally prevent the use of farm machinery and limit the use of these soils to trees or wildlife habitat. If areas are used for pasture, plants that grow well are Kentucky 31 fescue and sericea lespedeza.

Periods are needed during which pastures are not grazed to permit regrowth of plants. Grazing should be regulated to maintain a minimum plant height of at least 3 inches.

CAPABILITY UNIT VIIs-2

This unit consists only of Colyer silt loam, 20 to 50 percent slopes. This soil is on uplands, and hard shale is at a depth of 8 to 20 inches. It is somewhat excessively drained and has a very shallow to shallow rooting zone. Available moisture capacity is very low, permeability is slow, and organic-matter content is low. Reaction is very strongly acid to extremely acid.

This soil is so shallow to bedrock and so steep that it is not suited to cultivation and has very limited suitability for pasture. It is better suited to trees and wildlife habitat than to other uses. If this soil is used for pasture, suitable plants are Kentucky 31 fescue and sericea lespedeza.

Periods are needed during which pastures are not grazed to permit regrowth of plants. Grazing should be regulated to maintain a minimum plant height of at least 3 inches.

Estimated yields

The estimated average acre yields of the crops most commonly grown in Pulaski County, under two levels of management, are given in table 2. Yields for a medium level of management are shown in columns A, and those for a high level of management are shown in columns B.

The yields given are the average that can be expected over several years. Yields for one year may be affected adversely by extremes of weather, insects, diseases, or some other disaster, or they may be extremely high because of a combination of favorable factors.

The differences between yields in columns A and those in columns B represent the increases in yields that can be expected by improving management. No yields under a medium level of management are given for tobacco, because a high level of management is nearly always used.

A medium level of management is the management, including applications of fertilizer, that is generally considered the minimum that will keep the soil from deteriorating and produce sufficient crops for some profit.

A high level of management includes: (1) using adapted recommended varieties; (2) using proper seeding rates, inoculating legumes, planting at the right time and in the right way, and using efficient harvesting methods; (3) controlling weeds, insects, and plant diseases; (4) applying fertilizer at a rate equal to or higher than the current recommendations of the University of Kentucky Agricultural Experiment Station or equal to or higher than the need shown by properly interpreted soil tests; (5) using adequate applications of lime; (6) draining naturally wet soils that are feasible to drain; (7) using cropping systems that control erosion and maintain soil structure, tilth, and organic-matter content; (8) applying erosion-control measures, such as minimum tillage, interseeding winter crops in row crops, contour tillage, terracing, contour stripcropping, and sod waterways; (9) using cover crops or crop residue, or both, to increase supplies of organic matter and control erosion; (10) using all the applicable practices of pasture manage-

ment; and (11) using other practices that may be suggested by representatives of the Soil Conservation Service and the Agricultural Extension Service in this county.

A high level of management is not considered the highest level that can be attained, but it is one that many farmers find practical to reach if they apply the proper practices listed for a high level of management.

The failure to adequately apply one or more of the practices listed for a high level of management can cause the production level to drop and may result in some permanent damage to the soil. Inadequate drainage or only partial application of practices for controlling runoff and erosion are examples of deficiencies that relate to a medium level of management.

TABLE 2.—*Estimated average acre yields of principal crops under two levels of management*

[Yields in columns A are those expected under a medium level of management; those in columns B, under a high level of management. Absence of a yield figure indicates crop is seldom, if ever, grown on the soil at the specified level of management. Yields for tobacco are estimated only under a high level of management]

Soil	Corn		Wheat		Tobacco	Alfalfa and grass (hay)		Red clover and grass (hay)		Lespedeza [1] and grass (hay)		Pasture [2]	
	A	B	A	B	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lbs.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [3]	*Cow-acre-days* [3]
Allegheny loam, 2 to 6 percent slopes	80	110	30	45	2,800	3.0	4.0	2.0	3.0	2.6	3.8	150	230
Allegheny loam, 6 to 12 percent slopes	70	100	30	45	2,750	3.0	4.0	2.0	3.0	2.4	3.5	150	230
Ashton silt loam	90	130	35	50	3,200	3.5	5.0	3.0	4.0	2.9	4.2	175	285
Bedford silt loam, 0 to 2 percent slopes	70	95	30	40	2,450	----	----	2.0	3.0	2.6	3.9	125	200
Bedford silt loam, 2 to 6 percent slopes	70	95	30	40	2,700	2.5	3.5	2.0	3.0	2.6	3.9	125	200
Brookside-Rock outcrop complex, 30 to 75 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----
Chagrin loam	85	120	35	50	3,000	3.0	4.0	3.0	4.0	2.9	4.2	150	230
Chagrin gravelly silt loam	80	110	35	50	2,700	3.0	3.7	2.5	3.5	2.6	3.8	150	212
Colyer silt loam, 20 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	40	80
Cumberland silt loam, 2 to 6 percent slopes	80	115	35	50	3,100	4.0	5.5	3.0	4.0	2.9	4.2	200	315
Cumberland silt loam, 6 to 12 percent slopes	70	100	----	45	2,850	3.0	4.5	2.5	3.5	2.6	3.9	150	255
Cumberland cherty silt loam, 2 to 6 percent slopes	80	110	30	45	3,000	3.5	5.0	2.5	3.5	2.8	4.0	175	285
Cumberland cherty silt loam, 6 to 12 percent slopes	65	95	30	40	2,800	3.0	4.0	2.0	3.0	2.6	3.9	150	230
Cumberland cherty silt loam, 12 to 20 percent slopes	55	80	25	35	2,400	2.5	3.5	2.0	2.5	2.3	3.6	125	200
Cumberland cherty silty clay loam, 12 to 20 percent slopes, severely eroded	----	----	----	----	----	----	----	1.0	2.0	1.4	2.3	50	115
Dekalb sandy loam, 6 to 12 percent slopes	55	80	25	35	1,800	2.0	3.0	1.5	2.5	2.1	3.0	100	170
Dekalb-Rock outcrop complex, 12 to 20 percent slopes	----	----	----	----	----	----	----	1.0	1.5	----	----	50	85
Dekalb-Rock outcrop complex, 20 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	30	70
Etowah cherty silt loam, 2 to 6 percent slopes	80	110	35	50	3,000	3.5	5.0	2.5	3.5	2.8	4.0	175	285
Etowah cherty silt loam, 6 to 12 percent slopes	65	95	30	45	2,800	3.0	4.5	2.0	3.0	2.6	3.9	150	255
Frankstown cherty silt loam, 2 to 6 percent slopes	65	95	30	45	2,700	3.0	4.0	1.5	2.5	2.3	3.5	150	230
Frankstown cherty silt loam, 6 to 12 percent slopes	60	85	30	40	2,400	3.0	4.0	1.5	2.5	2.2	3.2	150	230
Frankstown cherty silt loam, 12 to 20 percent slopes	50	75	20	30	2,000	2.5	3.5	1.0	2.0	1.7	2.9	125	200
Frankstown cherty silt loam, 20 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	55	120
Frederick silt loam, 2 to 6 percent slopes	80	105	30	45	3,000	3.5	5.0	2.5	3.5	2.8	4.0	175	285
Frederick silt loam, 6 to 12 percent slopes	65	95	30	40	2,850	3.0	4.5	2.0	3.0	2.6	3.9	----	255
Frederick silt loam, 12 to 20 percent slopes	55	80	25	35	2,500	2.5	4.0	1.5	2.5	2.3	3.6	125	230
Frederick silt loam, 20 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	75	145
Frederick silty clay loam, 6 to 12 percent slopes, severely eroded	50	75	20	30	2,000	2.0	3.0	2.0	2.5	1.8	2.6	100	170
Frederick silty clay loam, 12 to 20 percent slopes, severely eroded	----	----	----	----	----	----	----	1.0	2.0	1.4	2.3	50	115
Frederick-Jefferson complex, 20 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	50	115
Fredonia-Frederick rocky silt loams, 6 to 20 percent slopes	----	----	----	----	----	2.5	3.5	1.5	2.0	1.7	2.6	125	200
Fredonia-Frederick rocky silty clay loams, 6 to 20 percent slopes, severely eroded	----	----	----	----	----	1.0	2.0	1.0	1.5	1.1	1.9	50	115
Fredonia very rocky soils, 6 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	40	80

See footnotes at end of table.

TABLE 2.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Corn		Wheat		Tobacco	Alfalfa and grass (hay)		Red clover and grass (hay)		Lespedeza [1] and grass (hay)		Pasture [2]	
	A	B	A	B	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lbs.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [3]	*Cow-acre-days* [3]
Garmon-Trimble complex, 30 to 80 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----
Gilpin silt loam, 12 to 20 percent slopes	50	75	20	30	1,500	2.0	3.0	1.5	2.0	----	----	100	170
Hartsells fine sandy loam, 6 to 12 percent slopes	65	95	30	40	2,600	2.5	3.5	1.5	2.5	1.9	3.2	125	200
Hartsells fine sandy loam, 12 to 20 percent slopes	55	80	25	35	2,100	2.0	3.0	1.5	2.0	1.4	2.6	100	170
Hartsells fine sandy loam, 20 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	55	120
Hartsells loam, 2 to 6 percent slopes	70	100	35	45	2,800	3.0	4.0	2.0	3.0	2.6	3.5	150	230
Huntington silt loam	95	130	35	50	3,200	3.5	5.0	3.0	4.0	2.9	4.2	175	285
Jefferson sandy loam, 20 to 40 percent slopes	----	----	----	----	----	----	----	----	----	----	----	50	100
Jefferson gravelly loam, 6 to 12 percent slopes	60	85	25	35	2,400	3.0	4.0	2.0	3.0	2.3	3.5	150	230
Jefferson gravelly loam, 12 to 20 percent slopes	50	75	20	30	2,000	2.5	3.5	2.0	2.5	2.6	2.9	125	200
Jefferson stony loam, 20 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	45	85
Jefferson stony loam, 30 to 65 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----
Lawrence silt loam	55	80	25	35	----	----	----	2.0	3.0	2.3	3.5	100	170
Lindside silt loam	85	120	30	40	2,900	3.0	4.0	2.0	3.0	2.9	4.2	150	230
Melvin silt loam	65	95	----	----	----	----	----	----	----	2.9	4.2	100	170
Monongahela loam, 2 to 6 percent slopes	65	90	30	40	2,400	2.0	3.0	2.0	3.0	2.6	3.9	125	170
Mountview silt loam, 2 to 6 percent slopes	75	100	30	45	2,800	3.0	4.0	2.0	3.0	2.8	4.0	150	230
Mountview silt loam, 6 to 12 percent slopes	65	90	30	45	2,700	3.0	4.0	2.0	3.0	2.6	3.8	150	230
Mountview silt loam, 12 to 20 percent slopes	55	80	25	35	2,200	2.5	3.5	2.0	2.5	2.2	3.5	125	200
Muse silt loam, 6 to 12 percent slopes	70	100	30	45	2,750	3.0	4.0	2.0	3.0	2.6	3.8	150	230
Muse silt loam, 12 to 20 percent slopes	55	80	25	35	2,300	2.5	3.5	2.0	2.5	2.2	3.2	125	200
Muse silty clay loam, 6 to 12 percent slopes, severely eroded	55	80	25	35	2,000	2.0	3.0	1.5	2.5	1.8	2.6	100	170
Muse silty clay loam, 12 to 20 percent slopes, severely eroded	----	----	----	----	----	----	----	1.0	2.0	----	----	50	115
Muse-Hartsells complex, 12 to 20 percent slopes	55	80	25	35	2,300	2.5	3.5	2.0	2.5	2.2	3.2	125	200
Muse-Shelocta complex, 12 to 20 percent slopes	55	80	25	35	2,300	2.5	3.5	2.0	2.5	2.2	3.2	125	200
Muse-Shelocta complex, 20 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	65	130
Muse-Shelocta complex, 20 to 30 percent slopes, severely eroded	----	----	----	----	----	----	----	----	----	----	----	35	80
Muse-Shelocta complex, 30 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	45	85
Needmore silty clay loam, 6 to 12 percent slopes, eroded	40	60	20	30	2,000	2.0	3.0	1.0	2.0	1.4	2.5	100	170
Needmore complex, 12 to 25 percent slopes	----	----	----	----	----	----	----	----	----	----	----	70	130
Newark silt loam	70	100	25	35	2,525	----	----	2.0	3.0	2.6	3.8	150	255
Newark gravelly silt loam	65	90	25	35	2,300	----	----	2.0	2.5	2.6	3.8	150	230
Nolichucky loam, 6 to 12 percent slopes	65	95	30	40	2,700	3.0	4.0	2.0	3.0	2.3	3.5	150	230
Nolichucky loam, 12 to 20 percent slopes	55	80	25	35	2,300	2.5	3.5	2.0	2.5	1.9	3.2	125	200
Nolin silt loam	85	120	35	50	3,200	3.5	5.0	3.0	4.0	2.9	4.2	175	285
Pembroke silt loam, 2 to 6 percent slopes	85	115	30	45	3,100	4.0	5.5	3.0	4.0	2.9	4.2	200	315
Pembroke silt loam, 6 to 12 percent slopes	75	105	30	40	2,900	3.0	4.5	2.5	3.5	2.6	3.9	150	255
Pope fine sandy loam	80	115	35	50	3,000	3.5	5.0	3.0	4.0	2.9	4.2	175	285
Robertsville silt loam	50	70	----	----	----	----	----	----	----	2.1	3.2	100	170
Rockcastle silt loam, 20 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	50	95
Shelocta gravelly silt loam, 6 to 12 percent slopes	65	90	30	40	2,400	3.0	4.0	2.0	3.0	2.3	3.5	150	230
Shelocta gravelly silt loam, 12 to 20 percent slopes	50	75	25	35	2,000	2.5	3.5	1.5	2.5	2.1	3.2	125	200
Shelocta-Jefferson complex, 12 to 20 percent slopes	50	75	20	30	1,950	2.5	3.5	1.5	2.5	2.1	3.2	125	200
Shelocta-Jefferson complex, 20 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	65	130
Shelocta-Jefferson complex, 30 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	45	85
Stendal loam	65	95	25	35	2,400	----	----	2.0	3.0	2.6	3.8	150	230
Strip mines	----	----	----	----	----	----	----	----	----	----	----	----	----
Talbott silty clay loam, 6 to 12 percent slopes, eroded	40	60	20	30	2,000	2.0	3.0	.8	1.5	1.4	2.5	100	170
Talbott rocky silt loam, 6 to 20 percent slopes	----	----	----	----	----	2.0	3.0	1.0	2.0	1.1	2.1	100	170
Talbott rocky silt loam, 20 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	35	90
Talbott rocky silty clay loam, 6 to 20 percent slopes, severely eroded	----	----	----	----	----	----	----	.6	1.2	----	----	55	120

TABLE 2.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Corn		Wheat		To-bacco	Alfalfa and grass (hay)		Red clover and grass (hay)		Lespedeza [1] and grass (hay)		Pasture [2]	
	A	B	A	B	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Lbs.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [3]	*Cow-acre-days* [3]
Tarklin cherty silt loam, 2 to 6 percent slopes	55	80	25	35	2, 200	------	------	2. 0	3. 0	2. 3	3. 3	100	170
Tarklin cherty silt loam, 6 to 12 percent slopes	50	70	20	30	1, 800	------	------	1. 5	2. 5	1. 8	3. 2	75	145
Trimble cherty silt loam, 2 to 6 percent slopes	65	95	30	45	2, 700	3. 0	4. 0	2. 0	3. 0	2. 6	3. 8	150	230
Trimble cherty silt loam, 6 to 12 percent slopes	55	80	30	40	1, 800	3. 0	4. 0	2. 0	3. 0	2. 6	3. 8	150	230
Trimble cherty silt loam, 12 to 20 percent slopes	50	70	20	30	1, 500	2. 0	3. 0	1. 5	2. 5	2. 2	3. 5	100	170
Trimble cherty silt loam, 20 to 30 percent slopes	----	----	----	----	------	------	------	------	------	------	------	50	115
Waynesboro loam, 2 to 6 percent slopes	80	110	35	50	3, 000	3. 5	5. 0	2. 5	3. 5	2. 8	4. 0	175	285
Waynesboro loam, 6 to 12 percent slopes	65	95	30	45	2, 800	3. 0	4. 5	2. 0	3. 0	2. 5	3. 7	150	230
Waynesboro loam, 12 to 20 percent slopes	55	80	30	40	2, 400	2. 5	4. 0	1. 5	2. 5	2. 2	3. 5	125	200
Waynesboro loam, 20 to 30 percent slopes	----	----	----	----	------	------	------	------	------	------	------	85	150
Waynesboro clay loam, 12 to 30 percent slopes, severely eroded	----	----	----	----	------	------	------	------	------	------	------	35	95
Whitley silt loam, 6 to 12 percent slopes	65	90	30	40	2, 400	3. 0	4. 0	2. 0	3. 0	2. 3	3. 5	150	230
Whitley silt loam, terrace, 0 to 2 percent slopes	85	120	35	50	3, 200	3. 5	5. 0	3. 0	4. 0	2. 9	4. 2	175	285
Whitley silt loam, terrace, 2 to 6 percent slopes	85	120	35	50	3, 200	3. 5	5. 0	3. 0	4. 0	2. 9	4. 2	175	285
Whitley silt loam, terrace, 6 to 12 percent slopes	75	105	30	45	2, 900	3. 0	4. 0	2. 5	3. 5	2. 6	3. 9	150	230
Whitley and Tilsit silt loams, 2 to 6 percent slopes	70	100	30	40	2, 600	2. 5	3. 5	2. 0	3. 0	2. 8	4. 0	125	200

[1] Korean or Kobe lespedeza and grass.
[2] Pasture yields are for tall fescue and a legume.
[3] Cow-acre-days is a term used to express the carrying capacity of pasture. It represents the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the pasture. An acre of pasture that provides 80 days of grazing for three cows has a carrying capacity of 240 cow-acre-days.

Use of the Soils as Woodland [3]

When Pulaski County was first settled, it was largely covered by a hardwood forest. The dominant species were oak, beech, chestnut, maple, hickory, and yellow-poplar. Farmers gradually cleared the land so that such crops as grain, hay, and pasture could be grown. In 1969 approximately 50 percent of the county, or about 210,000 acres, remained in woods.

Most of the timber in the county is in the southern pine, eastern redcedar-hardwoods, oak-pine, and central mixed hardwoods types. Upland oaks, hickory, and eastern redcedar are currently the main trees on the drier, well-drained sites. Associated with them are chestnut oak, black oak, and scarlet oak. On the cooler aspects of slopes, generally facing north and east, yellow-poplar, white oak, northern red oak, beech, sugar maple, black walnut, basswood, and white oak are the major species. Pin oak, sweetgum, red maple, elm, and ash grow mainly on the poorly drained soils on uplands, stream terraces, and bottom lands. Virginia pine, pitch pine, white pine, softleaf pine, and loblolly pine grow on all the soils in the survey area, except on the poorly drained soils. Presently, southern pine and oak-pine occupy about 13 percent of the woodland. Most of the soils in woods are steep, stony, or rocky, or all three.

The largest area of woodland is in the eastern and southeastern parts of the county and within the proclamation boundary of the Daniel Boone National Forest. The Forest Service administers about 24,000 acres of the 83,000 acres that are inside the proclamation boundary. The remaining 59,000 acres are privately owned. Other large areas of woodland are on the steep soils adjacent to Lake Cumberland and its tributaries, such as Wolf and Fishing Creeks.

Local markets for the products of a charcoal briquette plant, a flooring mill, and several sawmills provide an outlet for forest products. A small amount of pulpwood is harvested each year and shipped to mills outside the State. The harvesting of pulpwood could be increased to several times its present level.

Pulaski County has adequate forest fire protection.

Some of the most important soil characteristics that affect the growth of trees are available moisture capacity, effective rooting depth, aeration, thickness of the surface layer, texture, drainage, and aspect.

Most soils in Pulaski County have potential for producing wood at a faster rate and of better quality than is produced at present. To more nearly realize this potential, better management of woodland is generally needed. Such management should relate to the characteristics of the soils.

Woodland suitability grouping of soils

Soils influence the growth and management of trees. The soils in Pulaski County have been grouped according to soil productivity for the main tree species and on the degree and kind of limitation of the soils for woodland use. In this classification system soils are grouped at three levels: the class, which indicates soil productivity; the subclass, which indicates the dominant kind of limitation; and the suitability group, which reflects preferred trees species, and kind of woodland management needed.

[3] CHARLES A. FOSTER, woodland conservationist, and EDWARD V. HUFFMAN, assistant State soil scientist, Soil Conservation Service, helped to prepare this subsection.

Woodland classes, the broadest grouping, are designated by Arabic numerals 1 through 6. The numerals indicate progressively less productivity for woodland products of the tree species adapted to a specific kind of soil. Class 1 is the highest in potential productivity, and class 6 is the lowest.

Woodland subclasses are subdivisions within a class. They are designated by adding a small letter, *x*, *w*, *t*, *d*, *c*, *s*, *f*, *r*, or *o*, to the class numeral; for example, 3f. These subclasses are based on soil properties that cause limitations in management and are defined as follows: *x* indicates the soils have restrictions or limitations for woodland because of stones or rocks; *w* indicates the soils have limitations for woodland because of excessive wetness, either seasonal or year long. These soils have restricted drainage, a fluctuating to permanently high water table, or a hazard of flooding; *t* indicates the soils have, within the rooting zone, excessive alkalinity, acidity, sodium salts, or other toxic substances that limit or impede the development and functioning of root systems of desirable tree species; *d* indicates the soils have restrictions or limitations because of restricted rooting depth; *c* indicates the soils have restrictions or limitations because of the kind or amount of clay in the profile; *s* indicates the soils have restrictions or limitations because of the amount of coarse-textured material in the profile; *f* indicates the soils have restrictions or limitations because of large amounts of fragments between 2 millimeters and stone-size in the profile; *r* indicates the soils have restrictions or limitations because of steepness of slopes; and *o* indicates the soils have no significant restrictions or limitations.

Woodland suitability groups are subdivisions within the subclasses. The factors considered in placing each soil in a woodland suitability group are (1) potential productivity for several kinds of trees, (2) species to favor in managing existing woodland, (3) species preferred for planting, and (4) critical soil-related hazards and limitations to be considered in woodland management, such as hazard of erosion, equipment limitations, plant competition, and seedling mortality.

Woodland suitability groups are generally designated by adding an Arabic numeral to the subclass and class symbols; for example, 2w1. Thus, in one symbol the first Arabic numeral designates the class, or productivity potential; the small letter indicates the subclass, or kind of limitation; and the second Arabic numeral, assigned on a statewide basis, specifically identifies the woodland suitability group within each subclass. Not all of the groups in the State are in this county.

On some soils, higher productivity has been measured on north- and east-facing slopes than on south- and west-facing slopes. Generally, aspect differences are taken into account for soils that have slopes of 20 percent or more.

The aspect for south- and west-facing slopes is generally delineated as the azimuth range from 135 degrees to 315 degrees. North- and east-facing aspects are the remainder of the azimuth circle.

The potential productivity within each group is expressed as site index, or the expected height in feet that a tree species attains on a specified kind of soil or group of soils at a specified age. This age is 50 years for most species. These site index ratings show for each woodland suitability group are expressed as a range in height, generally of 10 feet or less.

For fast-growing species, such as yellow-poplar, pin oak, sweetgum, and cottonwood, class 1 soils have a site index of more than 95; class 2 soils have a site index between 85 and 95; class 3 soils have a site index between 75 and 85; class 4 soils have a site index between 65 and 75; class 5 soils have a site index between 55 and 65; and class 6 soils have a site index of less than 55.

For tree species that have a moderate growth rate, such as oak, Virginia pine, and shortleaf pine, class 1 soils have a site index of more than 85; class 2 soils have a site index between 75 and 85; class 3 soils have a site index between 65 and 75; class 4 soils have a site index between 55 and 65; class 5 soils have a site index between 45 and 55; and class 6 soils have a site index of less than 45.

For slow-growing species, such as redcedar, class 1 soils have a site index of more than 65; class 2 soils have a site index between 55 and 65; class 3 soils have a site index between 45 and 55; class 4 soils have a site index between 35 and 45; and class 5 soils have a site index of less than 35.

Many trees in this county and in adjacent areas were measured, and the soils at each site were described in the process of gathering data from which to determine the site indexes for wood crops. As nearly as possible, the studies were confined to well-stocked, naturally occurring, even-aged, essentially unmanaged stands that had not been damaged by fire, insects, disease, or overgrazing.

The average height and age measurements gathered for most species were converted to site index by using site index curves in published research *(3, 4, 5, 7, 9, 12)*. Unpublished field studies by the Tennessee Valley Authority of 271 plots were used to determine the site indexes for eastern redcedar.

Site index can be converted to a volumetric prediction of growth and yield that can be shown in wood measurements, such as board feet per acre.

Predictions of average yearly growth per acre are given in board feet (International ¼ inch scale) are based on published data *(8, 11, 13)* and on evaluations made by the Soil Conservation Service. Estimates were made for oak and yellow-poplar up to age 60 and for other species up to age 50.

Hazard of erosion is the degree of potential soil erosion that can occur following cutting operations and where the soil is exposed along roads, skid trails, fire lanes, and landing areas. It is assumed that the woodland is well managed and is protected from fire and grazing. Soil characteristics or properties considered in rating hazard of erosion include slope, rate of infiltration, permeability of the subsoil, water storage capacity, and resistance to detachment of soil particles by forces of rainfall and runoff. The following relative ratings are used to indicate the intensity of erosion-control measures needed to reduce erosion. *Slight* indicates that no special measures are needed. *Moderate* indicates that some attention needs to be given to control soil erosion. *Severe* indicates that intensive erosion-control measures are needed. Erosion can be kept to a minimum by taking care in locating,

constructing, and maintaining roads, trails, fire lanes, and landings and by using special techniques in management.

Equipment limitations are influenced by topographic features and soil characteristics, such as slope, drainage, soil texture, stoniness, and rockiness, that restrict the use of conventional wheeled or tracked equipment for harvesting and planting wood crops, constructing roads and controlling fire and unwanted vegetation. Topographic conditions or differences in soils may necessitate the use of different kinds of equipment and methods of operation, or may require varying the season when equipment is used. Generally, the limitation is *slight* if the slope is 20 percent or less and farm machinery can be operated efficiently without construction and maintenance of permanent roads and truck trails. The rating is *moderate* if the slope is 20 to 30 percent, if the use of ordinary farm machinery is limited, if track-type equipment is necessary for efficient harvesting, or if soil wetness prevents the use of logging vehicles for 2 to 6 months in a year. The rating is *severe* if the slope is more than 30 percent and track-type equipment is not adequate for harvesting, and power vehicles and other special equipment are needed, or if wetness prevents the use of vehicles for 6 months or more in a year.

Seedling mortality is the loss of naturally occurring or planted tree seedlings and is influenced by the kinds of soil or topographic conditions, if plant competition is assumed not to be a limiting factor. The rating is *slight* if expected mortality is 0 to 25 percent, *moderate* if expected mortality is 26 to 50 percent, and *severe* if mortality is more than 50 percent. If the rating is moderate or severe, replanting is likely to be needed to insure a fully stocked stand, and special preparation of the seedbed and special planting techniques are often necessary.

Plant competition is the invasion of unwanted trees, vines, shrubs, and other plants on a site where openings are made in the canopy. This competition hinders the establishment and normal development of desirable seedlings, whether they occur naturally or are planted. Plant competition is *slight* if unwanted plants do not prevent adequate natural regeneration, interfere with early growth, or restrict the normal development of planted stock. Competition is *moderate* if unwanted plants delay establishment and hinder the growth of either stock or naturally regenerated seedlings or if they retard the eventual development of a fully stocked stand. Competition is *severe* if unwanted plants prevent adequate restocking, either by natural regeneration or by planting, without intensive site preparation or special maintenance practices.

Table 3 gives the woodland suitability groups and a brief description of the group, potential productivity, management hazards or limitations, species suitability, and species to favor for planting. Detailed descriptions of the soils are provided in the section "Descriptions of the Soils."

Use of the Soils for Wildlife

This subsection deals with the suitability of the soils in Pulaski County for growing plants that furnish food and cover for wildlife. It describes the kinds and amounts of wildlife in the county, explains the relationship between wildlife management and soils, describes the different elements of wildlife habitat, defines the suitability ratings used to evaluate the soils for elements of wildlife habitat, describes the classes of wildlife, and includes a table that shows ratings of the soils for the elements of wildlife habitat and the kinds of wildlife.

The principal kinds of wildlife in Pulaski County are the cottontail rabbit, gray squirrel, fox squirrel, white-tailed deer, raccoon, opossum, skunk, red fox, gray fox, muskrat, mourning dove, bobwhite quail, ruffed grouse, and wild turkey.

The streams of the county contain the usual variety of warm-water game fish, pan fish, and rough fish commonly found throughout the State. Examples of these varieties are largemouth bass, bluegill, and bullhead, respectively. Most farm ponds have been stocked with largemouth bass and bluegill.

Wildlife populations vary from year to year, but rabbit, gray squirrel, opossum, gray fox, muskrat, and mourning dove are abundant. Fox squirrel, white-tailed deer, raccoon, skunk, red fox, bobwhite quail, ruffed grouse, and wild turkey are common. Although swamp rabbit, mink, duck, and geese live in the county or visit the areas occasionally, these species are scarce.

Game fish and pan fish are common in the streams of Pulaski County, and they outnumber rough fish, which are scarce. Game fish are also dominant in the ponds and lakes, although rough fish are common in Lake Cumberland.

Successful management of wildlife on any tract of land requires that food, cover, and water be available in a suitable combination. A lack of any one of these necessities, an unfavorable balance between them, or inadequate distribution of them can severely limit or account for the absence of desired wildlife species. Information on soils is valuable in creating, improving, or maintaining suitable food, cover, and water for wildlife.

Most wildlife habitats are managed by planting suitable vegetation, by manipulating existing vegetation so as to bring about natural establishment, by increasing or improving desired plants, or by combinations of such measures. The influence of a soil on the growth of many plants is known, and it can be inferred for other soils from a knowledge about the characteristics and behavior of the soil. In addition, soil information is useful in creating water areas or improving natural ones.

Soil interpretations for wildlife habitat aid in selecting the more suitable sites for various kinds of habitat management and serve as indicators of the level of management needed to achieve satisfactory results. They also serve as a means of showing why it may not generally be feasible to manage a particular area for a given kind of wildlife.

These interpretations can also serve in broad-scale planning of wildlife management areas, parks, and nature areas or in acquiring wildlife lands. By means of map overlay, suitabilities or groupings of individual habitat elements can be made.

The soil areas shown on the soil map are rated without regard to relationships to adjoining mapped areas. The size, shape, and location of the outlined areas do not affect the rating. The influences on habitats of certain

factors, such as elevation and aspect, must be appraised at the site.

In table 4, the soils of Pulaski County are rated on the basis of their relative suitability for the creation, maintenance, and improvement, of eight wildlife habitat elements and for three main classes of wildlife. These ratings are based on limitations imposed by the characteristics or behavior of the soils. Three levels of suitability are recognized. It also is recognized that certain adverse conditions render a site unsuited to a particular habitat element.

For specific details on characteristics of the soils, refer to the section "Descriptions of the Soils."

In table 4, a rating of *well suited* indicates soil limitations are negligible in the management of the designated habitat element. Generally, only management of low intensity is needed for the creation, maintenance, or improvement of the specified habitat element, and satisfactory results can be expected. A rating of *suited* indicates soil limitations moderately affect the management of the designated habitat element. Fairly frequent attention and moderate management are required for satisfactory results. Soils rated *poorly suited* have severe limitations. The creation, maintenance, or improvement of the designated habitat element is difficult, is possibly expensive, and requires intensive effort for satisfactory results. A rating of *unsuited* is given where the soil limitations are so extreme that it is highly impractical, if not impossible, to successfully manage the soil for the designated habitat element.

The eight elements of wildlife habitat rated in table 4 are briefly described in the following paragraphs.

Grain and seed crops are farm grains or seed-producing annuals that are planted to produce food for wildlife. Suitable plants are corn, sorghum, wheat, oats, millet, buckwheat, soybeans, and sunflower.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are established by planting and that furnish wildlife food and cover. Examples are fescue, bromegrass, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, clover trefoil, alfalfa, and panicgrass.

Wild herbaceous upland plants are native or introduced perennial grasses and forbs (weeds) that provide food and cover principally to upland forms of wildlife and that are established mainly through natural processes. Examples are bluestem, indiangrass, wheatgrass, wild ryegrass, oatgrass, pokeweed, strawberry, lespedeza, beggarweed, wild bean, nightshade, goldenrod, and dandelion.

Hardwood woody plants are nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs (browse), or foliage used extensively as food by wildlife. These plants commonly are established through natural processes but also may be planted. Examples are oak, beech, cherry, hawthorn, dogwood, viburnum, maple, birch, poplar, grape, honeysuckle, blueberry, brier, greenbrier, autumn-olive, and multiflora rose.

Coniferous woody plants are cone-bearing trees and shrubs that are important to wildlife mainly as cover, but also can furnish food in the form of browse, seeds, or fruitlike cones. These plants commonly are established through natural processes but also may be planted. Examples of these plants are pines, hemlock, and redcedar.

Considerable evidence indicates that under situations of *slow* growth and *delayed* canopy closure, coniferous habitats support larger numbers and varieties of wildlife than where growth and canopy closure are rapid. For this reason, soil properties that tend to promote rapid growth and canopy closure are classed as limitations for producing the coniferous woods for wildlife habitat. Soils that are well suited to coniferous wildlife habitat are those on which plants grow slowly and in which closure of the canopy is delayed. In general, soils favorable to quick establishment of conifers and their rapid growth require more intensive management if results for long-term use by wildlife are to be satisfactory. Therefore, on soils rated as *poorly suited* for coniferous woody plants, a temporary or short-term value as wildlife habitat can be easy to establish.

Wetland food and cover plants are annual and perennial, wild herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics, that produce food or cover that is extensively and dominantly used by wetland wildlife. Examples are smartweed, wild millet, bulrush, spike-sedge, rushes, sedges, burreeds, wildrice, rice cutgrass, mannagrass, and cattails.

Shallow-water developments are areas of water in impoundments or excavations that generally do not exceed 6 feet in depth. Examples of structures are low dikes, levees, shallow dugouts, level ditches, and devices for controlling the water level in marshy drainageways or channels.

Excavated ponds are dug-out areas or combinations of dug-out ponds and low dikes or dams that hold enough water of suitable quality and depth to support fish or other wildlife. Examples are ponds of one-fourth acre that are built on nearly level soils and have an average depth of 6 feet at least one-fourth of their area. A dependable high water table or other source of water is needed.

The ratings in table 4 for the main classes of wildlife are based upon weighted values of selected habitat elements that show the relative value of a soil for each class. These classes are defined as follows.

Openland wildlife consists of birds and mammals that normally frequent cropland, pastures, meadows, lawns, and areas overgrown with grasses, herbs, and shrubby plants. Examples are quail, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck.

Woodland wildlife consists of birds and mammals that normally frequent woodland made up of hardwood trees and shrubs, coniferous trees and shrubs, or mixtures of such plants. Examples are ruffed grouse, woodcock, thrush, vireo, scarlet tanager, gray squirrel, gray fox, white-tailed deer, raccoon, and wild turkey.

Wetland wildlife consists of birds and mammals that normally inhabit wet areas, such as ponds, marshes, and swamps. Examples are duck, geese, heron, shore birds, mink, muskrat, and beaver.

TABLE 3.—*Woodland interpretations by*

[Rock outcrop in units BrF, DrD, and DrE and Strip mines (St) were not placed in a woodland

Woodland suitability groups and soil symbols	Potential productivity			Management hazards or limitations		
	Species	Site index	Average annual growth	Hazard of erosion	Equipment limitations	Seedling mortality
			Bd. ft. per acre			
1o1: Nearly level to sloping, deep, mainly well-drained soils on flood plains, terraces, and uplands; very high potential productivity. As; Cg, Ch; Hu; Ld; No; PeB, PeC; Po; SgC; WlA.	Upland oaks	85+	350+	Slight	Slight	Slight
	Yellow-poplar	95+	500+			
	Shortleaf pine	85+	820+			
	Virginia pine	85+	650+			
1w2: Nearly level, somewhat poorly drained and poorly drained soils on flood plains, uplands, and terraces; very high potential productivity. Me; Ne, Ng; Ro; Sn.	Lowland oaks	95+	450+	Slight	Severe	Severe
	Sweetgum	95+	500+			
	Loblolly pine	95+	920+			
	Upland oaks	85+	350+			
2o1: Gently sloping to strongly sloping, deep or moderately deep, mainly well-drained soils on uplands and terraces; high potential productivity. AlB, AlC; EtB, EtC; FcB, FcC, FcD; HaC, HaD, HrB[1]; JfC, JfD; MnB; MnC; MnD; NkC, NkD; SgD, ShD; TrB, TrC, TrD; WaB, WaC, WaD; WhC, WlB, WlC, WtB[1].	Upland oaks	75–85	240–350	Slight	Slight	Slight
	Yellow-poplar	85–95	380–500			
	Virgina pine	75–85	540–650			
2c1: Gently sloping to strongly sloping, deep or moderately deep, well-drained soils that have a clayey subsoil; high potential productivity. CuB, CuC, CvB, CvC, CvD, FdB, FdC, FdD, MoC, MoD, MtD, MuD.[2]	Upland oaks	75–85	240–350	Slight	Moderate	Slight
	Yellow-poplar	85–95	380–500			
	Virginia pine	75–85	540–650			
	Shortleaf pine	75–85	670–820			
2c2: Dominantly steep, deep, well-drained soils that have a clayey subsoil; mainly on north and east aspects; high potential productivity. BrF, FdE, FfE[3]; MuE, MuF.[3]	Upland oak	75–85	240–350	Moderate to severe.	Severe.	Severe
	Yellow-poplar	85–95	380–500			
	Virginia pine	75–85	540–650			
	Shortleaf pine	75–85	670–820			
	Redcedar	55–65				
2r1: Moderately steep or steep, deep or moderately deep, well-drained soils that have a loamy subsoil; mainly on north and east aspects; high potential productivity. DrE; FcE; HaE; JeE, JlE, JlF; ShE, ShF; TrE; WaE.	Upland oaks	75–85	240–350	Slight to moderate.	Moderate to severe.	Slight
	Yellow-poplar	85–95	380–500			
	Virginia pine	75–85	540–650			
	Shortleaf pine	75–85	670–820			
2w1: Nearly level, somewhat poorly drained soil; fragipan at depth of about 22 inches; high potential productivity. La.	Upland oaks	75–85	240–350	Slight	Moderate	Slight
	Yellow-poplar	85–95	380–500			
	Shortleaf pine	75–85	670–820			
	Sweetgum	85–95	380–500			
3o1: Sloping or strongly sloping, moderately deep, well-drained soils; moderate potential productivity. DeC, DrD; GnD.	Upland oaks	65–75	160–240	Slight	Slight	Slight
	Yellow-poplar	75–85	280–390			
	Virginia pine	65–75	450–540			
	Shortleaf pine	65–75	540–670			

See footnotes at end of table.

woodland suitability groups

suitability group, because properties of these land types are variable, and onsite examination is needed]

Management hazards or limitations—Continued		Species suitability			Species to favor for planting
Plant competition		Most desirable	Acceptable	Least desirable	
Conifers	Hardwoods				
Severe	Moderate	Yellow-poplar, black walnut, white ash, cottonwood, red oak, white oak.	Sweetgum, black oak, scarlet oak, pin oak, Virginia pine, sycamore, hickory, black locust.	Red maple, elm, blackgum, hackberry, sassafras.	Yellow-poplar, black walnut, white ash, sweetgum, white pine, shortleaf pine, black locust, loblolly pine, cottonwood.
Severe	Severe	Sweetgum, white ash, yellow-poplar, cottonwood, white oak.	Pin oak, sycamore, hickory.	Red maple, blackgum, river birch, willow, hackberry.	Sweetgum, sycamore, loblolly pine, cottonwood.
Severe	Moderate	Black walnut, yellow-poplar, white oak, red oak, white ash.	Basswood, scarlet oak, elm, shortleaf pine, Virginia pine, hickory.	Red maple, blackgum, red cedar, buckeye.	Black walnut, yellow-poplar, white ash, black locust, white pine, shortleaf pine, loblolly pine, Virginia pine, white oak, red oak.
Severe	Moderate	Yellow-poplar, black walnut, red oak, white oak, white ash.	Scarlet oak, black oak, basswood, black locust shortleaf pine, Virginia pine, hickory.	Beech,red maple, blackgum, buckeye, redcedar, elm.	Black walnut, yellow-poplar, white pine, shortleaf pine, black locust, loblolly pine, red oak, white oak, white ash.
Severe	Moderate	Yellow-poplar, black walnut, white oak, red oak, white ash.	Scarlet oak, black oak, basswood, Virginia pine, shortleaf pine, black locust, hickory.	Beech, red maple, blackgum, redcedar, buckeye, elm.	Yellow-poplar, black walnut, white ash, white pine, shortleaf pine, black locust, loblolly pine, white oak, red oak.
Severe	Moderate	Yellow-poplar, black walnut, white oak, red oak, white ash.	Basswood, black oak, scarlet oak, black locust, Virginia pine, shortleaf pine, hickory.	Beech, red maple, sugar maple, blackgum, buckeye, elm.	Yellow-poplar, black walnut, white ash, white pine, shortleaf pine, Virginia pine, black locust, loblolly pine, white oak, red oak.
Severe	Severe	Yellow-poplar, red oak, white oak, white ash, sweetgum.	Black oak, southern red oak, shortleaf pine, pitch pine, post oak, hickory.	Red maple, blackgum, beech, elm.	Yellow-poplar, sweetgum, white ash, loblolly pine.
Moderate	Slight	Yellow-poplar, red red oak, white oak, black oak, shortleaf pine.	Scarlet oak, Virginia pine, hickory, black locust, chestnut oak, white ash.	Beech, elm, red maple, sugar maple, sassafras, persimmon, redcedar.	White pine, shortleaf pine, loblolly pine, black locust, red oak, white oak, white ash, Virginia pine.

TABLE 3.—*Woodland interpretations by*

[Rock outcrop in units BrF, DrD, and DrE and Strip mines (St) were not placed in a woodland

Woodland suitability groups and soil symbols	Potential productivity			Management hazards or limitations		
	Species	Site index	Average annual growth	Hazard of erosion	Equipment limitations	Seedling mortality
			Bd. ft. per acre			
3r1: Moderately steep or steep, well-drained, loamy soils; mainly on south and west aspects; moderate potential productivity. DrE; JeE, JlE, JlF; ShE, ShF.	Upland oaks Virginia pine Shortleaf pine	65–75 65–75 65–75	160–240 450–540 540–670	Slight to moderate.	Moderate to severe.	Slight
3c1: Strongly sloping or sloping, moderately deep to deep, well-drained soils that have a dominantly clayey subsoil; mainly eroded or severely eroded; moderate potential productivity. CwD3; FeC3, FeD3, FkD[4]; MsC3, MsD3; NcC2; TaC2, TbD; WbE3.	Upland oaks Yellow-poplar Shortleaf pine Virginia pine	65–75 75–85 65–75 65–75	160–240 280–390 540–670 450–540	Slight to moderate.	Moderate	Slight
3c2: Moderately steep or steep, deep, well-drained soils that mainly have a dominantly clayey subsoil; mainly on south and west aspects; moderate potential productivity. BrF; MuE, MuE3, MuF.[5]	Upland oaks Shortleaf pine Virginia pine Redcedar	65–75 65–75 65–75 35–45	160–240 540–670 450–540	Moderate to severe.	Severe	Slight to moderate.
3w1: Nearly level to sloping, deep, moderately well drained soils; fragipan at depth of 20 to 30 inches; moderate potential productivity. BeA, BeB; MgB; TkB, TkC.	Upland oaks Yellow-poplar Shortleaf pine Virginia pine	65–75 75–85 65–75 65–75	160–240 280–390 540–670 450–540	Slight	Moderate	Slight
3x2: Sloping to moderately steep, moderately deep, rocky to very rocky, clayey soils; moderate to low potential productivity. FrE; TbE.	Upland oaks Redcedar	55–70 35–50	90–195	Severe	Severe	Moderate
4r1: Steep, dominantly very shallow to moderately deep soils; low to very low potential productivity. CoE; GmF.[6]	Upland oaks Virginia pine Redcedar	45–65 45–65 30–45	50–160 310–450	Severe	Severe	Slight
4c1: Dominantly sloping to strongly sloping; moderately deep, mainly severely eroded soils that have a clayey subsoil; low potential productivity. FlD3[7]; NdD; TcD3.	Upland oaks Virginia pine Shortleaf pine	55–65 55–65 55–65	90–160 370–450 420–540	Slight to moderate.	Moderate	Slight to moderate.
4c2: Moderately steep, moderately deep, slowly permeable soils; low potential productivity. RsE.	Upland oaks Virginia pine Shortleaf pine	55–65 55–65 55–65	90–160 370–450 420–540	Severe	Severe	Moderate

[1] Hartsells soils are moderately deep over bedrock. Tilsit soils in WtB are moderately deep over a fragipan and are moderately well drained.

[2] Hartsells soils in MtD and Shelocta soils in MuD have a loamy subsoil and slight equipment limitation. The Hartsells soils are moderately deep over bedrock.

[3] Jefferson soils in FfE and Shelocta soils in MuE and MuF have a loamy subsoil.

woodland suitability groups—Continued

suitability group, because properties of these land types are variable, and onsite examination is needed]

Management hazards or limitations—Continued		Species suitability			Species to favor for planting
Plant competition		Most desirable	Acceptable	Least desirable	
Conifers	Hardwoods				
Moderate	Slight	Red oak, white oak, black oak, shortleaf pine.	Scarlet oak, chestnut oak, Virginia pine, redcedar, hickory.	Maple, blackgum, blackjack oak, sourwood.	Shortleaf pine, loblolly pine, Virginia pine.
Moderate	Slight	Yellow-poplar, white oak, red oak, shortleaf pine.	Virginia pine, scarlet oak, hickory, chestnut oak.	Sugar maple, red maple, elm, beech.	Black locust, shortleaf pine, loblolly pine, Virginia pine, redcedar.
Moderate	Slight	White oak, red oak, shortleaf pine, post oak.	Virginia pine, scarlet oak, hickory, chestnut oak, redcedar.	Red maple, sugar maple, beech, sourwood, sassafras.	Shortleaf pine, Virginia pine, loblolly pine, redcedar.
Moderate	Slight	Yellow-poplar, white oak, red oak, white ash.	Sweetgum, basswood, Virginia pine, black walnut, black locust, shortleaf pine, hickory, post oak.	Sugar maple, red maple, beech, elm, redcedar.	White pine, black locust, shortleaf pine, loblolly pine, Virginia pine, red oak, white oak.
Moderate	Slight	Red oak, white oak, black oak.	Redcedar, black locust, scarlet oak, Virginia pine, shortleaf pine, post oak, hickory.	Red maple, blackgum, blackjack, oak.	Shortleaf pine, lobilly pine, Virginia pine, black locust, white pine, redcedar.
Slight	Slight	Red oak, white oak, black oak, shortleaf pine, Virginia pine.	Scarlet oak, chestnut oak, redcedar, maple, hickory, post oak.	Blackgum, sourwood, blackjack oak.	Shortleaf pine, loblolly pine, Virginia pine, redcedar.
Slight	Slight	Shortleaf pine, Virginia pine, white oak, black oak, scarlet oak.	Chestnut oak, redcedar, hickory.	Blackgum, blackjack oak, sourwood.	Shortleaf pine, loblolly pine, Virginia pine, redcedar.
Slight	Slight	Shortleaf pine, Virginia pine, white oak, black oak, scarlet oak.	Chestnut oak, redcedar, hickory.	Blackgum, blackjack oak, sourwood.	Shortleaf pine, loblolly pine, Virginia pine, redcedar.

[4] Frederick soils in FkD have high potential productivity.
[5] Shelocta soils in MuE, MuE3, and MuF have a loamy subsoil.
[6] Trimble soils in GmF are deep and have high potential productivity.
[7] Frederick soils in FlD3 are deep and have moderate potential productivity.

TABLE 4.—*Suitability of soils for elements of*

Soil	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Allegheny loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Allegheny loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Ashton silt loam	Well suited	Well suited	Well suited	Well suited
Bedford silt loam, 0 to 2 percent slope	Suited	Well suited	Well suited	Well suited
Bedford silt loam, 2 to 6 percent slope	Suited	Well suited	Well suited	Well suited
Brookside-Rock outcrop complex, 30 to 75 percent slopes. For interpretations of Rock outcrop part, refer to Rock outcrop.	Unsuited	Unsuited	Well suited	Well suited
Chagrin loam	Well suited	Well suited	Well suited	Well suited
Chagrin gravelly silt loam	Suited	Well suited	Well suited	Suited
Colyer silt loam, 20 to 50 percent slopes	Unsuited	Poorly suited	Poorly suited	Poorly suited
Cumberland silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Cumberland silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Cumberland cherty silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Cumberland cherty silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Cumberland cherty silt loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Cumberland cherty silty clay loam, 12 to 20 percent slopes, severely eroded.	Unsuited	Suited	Suited	Well suited.
Dekalb sandy loam, 6 to 12 percent slopes	Poorly suited	Suited	Suited	Poorly suited.
Dekalb-Rock outcrop complex, 12 to 20 percent slopes. For interpretations of Rock outcrop part, refer to Rock outcrop.	Unsuited	Suited	Suited	Poorly suited
Dekalb-Rock outcrop complex, 20 to 50 percent slopes. For interpretations of Rock outcrop part, refer to Rock outcrop.	Poorly suited	Suited	Suited	Poorly suited
Etowah cherty silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Etowah cherty silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Frankstown cherty silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Frankstown cherty silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Frankstown cherty silt loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Frankstown cherty silt loam, 20 to 30 percent slopes	Unsuited	Suited	Well suited	Well suited
Frederick silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Frederick silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Frederick silt loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Frederick silt loam, 20 to 30 percent slopes	Unsuited	Suited	Well suited	Well suited
Frederick silty clay loam, 6 to 12 percent slopes, severely eroded.	Poorly suited	Suited	Suited	Well suited

wildlife habitat and for kinds of wildlife

Elements of wildlife habitat—Continued				Kinds of wildlife		
Coniferous woody plants	Wetland food and cover plants	Shallow-water developments	Excavated ponds	Openland	Woodland	Wetland
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Poorly suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Poorly suited	Poorly suited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Unsuited	Poorly suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Poorly suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Suited	Poorly suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.

TABLE 4.—*Suitability of soils for elements of*

Soil	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Frederick silty clay loam, 12 to 20 percent slopes, severely eroded.	Unsuited	Suited	Suited	Well suited
Frederick-Jefferson complex, 20 to 50 percent slopes	Unsuited	Suited	Well suited	Well suited
Fredonia-Frederick rocky silt loams, 6 to 20 percent slopes:				
Fredonia soil	Poorly suited	Suited	Well suited	Suited
Frederick soil	Poorly suited	Suited	Well suited	Well suited
Fredonia-Frederick rocky silty clay loams, 6 to 20 percent slopes, severely eroded:				
Fredonia soil	Unsuited	Poorly suited	Suited	Suited
Frederick soil	Unsuited	Suited	Suited	Well suited
Fredonia very rocky soils, 6 to 30 percent slopes	Unsuited	Poorly suited	Suited	Suited
Garmon-Trimble complex, 30 to 80 percent slopes:				
Garmon soil	Unsuited	Poorly suited	Well suited	Suited
Trimble soil	Unsuited	Poorly suited	Well suited	Well suited
Gilpin silt loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Suited
Hartsells fine sandy loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Suited
Hartsells fine sandy loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Suited
Hartsells fine sandy loam, 20 to 30 percent slopes	Unsuited	Suited	Well suited	Suited
Hartsells loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Suited
Huntington silt loam	Well suited	Well suited	Well suited	Well suited
Jefferson sandy loam, 20 to 40 percent slopes	Unsuited	Suited	Well suited	Well suited
Jefferson gravelly loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Jefferson gravelly loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Jefferson stony loam, 20 to 30 percent slopes	Unsuited	Suited	Suited	Suited
Jefferson stony loam, 30 to 65 percent slopes	Unsuited	Poorly suited	Suited	Suited
Lawrence silt loam	Suited	Suited	Well suited	Well suited
Lindside silt loam	Suited	Well suited	Well suited	Well suited
Melvin silt loam	Poorly suited	Suited	Suited	Well suited
Monongahela loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Mountview silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Mountview silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Mountview silt loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Muse silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Muse silt loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Muse silty clay loam, 6 to 12 percent slopes, severely eroded.	Poorly suited	Suited	Suited	Well suited
Muse silty clay loam, 12 to 20 percent slopes, severely eroded.	Unsuited	Suited	Suited	Well suited

wildlife habitat and for kinds of wildlife—Continued

Elements of wildlife habitat—Continued				Kinds of wildlife		
Coniferous woody plants	Wetland food and cover plants	Shallow-water developments	Excavated ponds	Openland	Woodland	Wetland
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited Poorly suited	Unsuited Unsuited	Unsuited Unsuited	Unsuited Unsuited	Suited Suited	Suited Suited	Unsuited. Unsuited.
Suited Poorly suited	Unsuited Unsuited	Unsuited Unsuited	Unsuited Unsuited	Poorly suited Poorly suited	Suited Suited	Unsuited. Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Suited Poorly suited	Unsuited Unsuited	Unsuited Unsuited	Unsuited Unsuited	Poorly suited Poorly suited	Suited Suited	Unsuited. Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Poorly suited	Suited	Suited	Well suited	Suited	Suited.
Poorly suited	Poorly suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Suited	Suited	Suited	Poorly suited	Suited	Well suited	Suited.
Poorly suited	Poorly suited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.

TABLE 4.—*Suitability of soils for elements of*

Soil	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Muse-Hartsells complex, 12 to 20 percent slopes:				
Muse soil	Poorly suited	Suited	Well suited	Well suited
Hartsells soil	Poorly suited	Suited	Well suited	Suited
Muse-Shelocta complex, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Muse-Shelocta complex, 20 to 30 percent slopes	Unsuited	Suited	Well suited	Well suited
Muse-Shelocta complex, 20 to 30 percent slopes, severely eroded:				
Muse soil	Unsuited	Poorly suited	Suited	Well suited
Shelocta soil	Unsuited	Suited	Well suited	Well suited
Muse-Shelocta complex, 30 to 50 percent slopes	Unsuited	Poorly suited	Well suited	Well suited
Needmore silty clay loam, 6 to 12 percent slopes, eroded	Poorly suited	Suited	Suited	Suited
Needmore complex, 12 to 25 percent slopes	Poorly suited	Suited	Suited	Suited
Newark silt loam	Suited	Suited	Well suited	Well suited
Newark gravelly silt loam	Suited	Suited	Well suited	Well suited
Nolichucky loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Nolichucky loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Nolin silt loam	Well suited	Well suited	Well suited	Well suited
Pembroke silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Pembroke silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Pope fine sandy loam	Well suited	Well suited	Well suited	Well suited
Robertsville silt loam	Poorly suited	Suited	Suited	Well suited
Rockcastle silt loam, 20 to 30 percent slopes	Unsuited	Suited	Suited	Poorly suited
Rock outcrop	Unsuited	Unsuited	Poorly suited	Poorly suited
Shelocta gravelly silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Shelocta gravelly silt loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Shelocta-Jefferson complex, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Shelocta-Jefferson complex, 20 to 30 percent slopes	Unsuited	Suited	Well suited	Well suited
Shelocta-Jefferson complex, 30 to 50 percent slopes:				
Shelocta soil	Unsuited	Poorly suited	Well suited	Well suited
Jefferson soil	Unsuited	Poorly suited	Well suited	Well suited
Stendal loam	Suited	Suited	Well suited	Well suited
Strip mines	Unsuited	Poorly suited	Suited	Poorly suited
Talbott silty clay loam, 6 to 12 percent slopes, eroded	Poorly suited	Suited	Suited	Suited
Talbott rocky silt loam, 6 to 20 percent slopes	Unsuited	Suited	Suited	Suited

wildlife habitat and for kinds of wildlife—Continued

Elements of wildlife habitat—Continued				Kinds of wildlife		
Coniferous woody plants	Wetland food and cover plants	Shallow-water developments	Excavated ponds	Openland	Woodland	Wetland
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Poorly suited	Suited	Suited	Well suited	Suited	Suited.
Poorly suited	Poorly suited	Suited	Suited	Well suited	Suited	Suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Poorly suited	Well suited	Well suited	Suited	Suited	Suited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited.
Poorly suited	Unsuited	Unsuited	Well suited	Well suited	Unsuited	Unsuited.
Poorly suited	Unsuited	Unsuited	Suited	Suited	Unsuited	Unsuited.
Poorly suited	Unsuited	Unsuited	Suited	Suited	Unsuited	Unsuited.
Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited	Unsuited.
Poorly suited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited	Unsuited.
Poorly suited	Unsuited	Unsuited	Suited	Suited	Unsuited	Unsuited.
Poorly suited	Suited	Suited	Well suited	Well suited	Suited	Suited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.

TABLE 4.—*Suitability of soils for elements of*

Soil	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Talbott rocky silt loam, 20 to 30 percent	Unsuited	Suited	Suited	Suited
Talbott rocky silty clay loam, 6 to 20 percent slopes, severely eroded.	Unsuited	Poorly suited	Suited	Suited
Tarklin cherty silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Suited
Tarklin cherty silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Suited
Trimble cherty silt loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Trimble cherty silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Trimble cherty silt loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Trimble cherty silt loam, 20 to 30 percent slopes	Unsuited	Suited	Well suited	Well suited
Waynesboro loam, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Waynesboro loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Waynesboro loam, 12 to 20 percent slopes	Poorly suited	Suited	Well suited	Well suited
Waynesboro loam, 20 to 30 percent slopes	Unsuited	Suited	Well suited	Well suited
Waynesboro clay loam, 12 to 30 percent slopes, severely eroded.	Unsuited	Suited	Suited	Well suited
Whitley silt loam, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Whitley silt loam, terrace, 0 to 2 percent slopes	Well suited	Well suited	Well suited	Well suited
Whitley silt loam, terrace, 2 to 6 percent slopes	Suited	Well suited	Well suited	Well suited
Whitley silt loam, terrace, 6 to 12 percent slopes	Suited	Well suited	Well suited	Well suited
Whitley and Tilsit silt loams, 2 to 6 percent slopes:				
Whitley soil	Suited	Well suited	Well suited	Well suited
Tilsit soil	Suited	Well suited	Well suited	Suited

Engineering Uses of the Soils [4]

This section provides information of special interest to engineers, contractors, farmers, and others who use soil as structural material or as foundation material. In this section are discussed those properties of the soils that affect construction and maintenance of roads and airports, pipelines, building foundations, water storage facilities, erosion control structures, drainage systems, and sewage disposal systems. Among the soil properties most important in engineering are permeability, shear strength, density, shrink-swell potential, available moisture capacity, grain-size distribution, plasticity, and reaction. Depth to seasonal high water table and depth to bedrock are also important.

Information concerning these and related soil properties are furnished in tables 5, 6, and 7. The information about soil properties in these tables can be used in:

1. Planning and designing of agricultural drainage systems, farm ponds, irrigation systems, diversion terraces, and other structures for controlling water and conserving soil.
2. Selecting potential locations for highways, airports, pipelines, and underground cables.
3. Locating probable sources of sand, gravel, or rock suitable for use as construction material.
4. Selecting potential industrial, commercial, residential, and recreational areas.

The engineering interpretations do not eliminate the need for sampling and testing at the site of specific engineering works that involve heavy loads and where the excavations are deeper than the depths of layers reported here. Even in these situations, however, the soil map is useful in planning more detailed field investigations and for indicating the kinds of problems that can be expected.

The soil or soils represented by a map symbol can be reasonably expected to make up the major part of a delineated area, but small areas of other soils were included in mapping in some places.

Some of the terms used in this soil survey have special meaning to soil scientists that is not known to all engi-

[4] JAMES H. DICKINSON, area engineer, Soil Conservation Service, assisted in the preparation of this section.

wildlife habitat and for kinds of wildlife—Continued

Elements of wildlife habitat—Continued				Kinds of wildlife		
Coniferous woody plants	Wetland food and cover plants	Shallow-water developments	Excavated ponds	Openland	Woodland	Wetland
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Well suited	Suited	Unsuited.

neers. The Glossary defines many of these terms commonly used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soil horizons for engineering are the AASHO system (*1*, *10*), adopted by the American Association of State Highway Officials, and the Unified system (*10*, *18*), used by the Soil Conservation Service, the Department of Defense and other agencies.

The AASHO system is used to classify soils according to those properties that affect use in highway construction. In this system, a soil is placed in one of seven basic groups that range from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation), and in group A–7 are clay soils that have low strength when wet. The best soils for subgrade are therefore classified as A–1, the next best A–2, and so on to class A–7, the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are subdivided as follows: A–1–a, A–1–b; A–2–4, A–2–5, A–2–6, A–2–7; and A–7–5, A–7–6. If soil material is near a classification boundary it is given a symbol showing both classes; for example, A–2 or A–4. Within each group, the relative engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest.

In the Unified system, soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH and OH; and one class of highly organic soils identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CH or MH. A dual symbol, such as ML–CL, indicates that the plastic index and liquid limit intersect within 2 points of the "A" line on the "A" line chart.

The AASHO and Unified classifications for tested soils are shown in table 7. The estimated classifications for both systems for all the soils in the survey area are shown in table 5.

TABLE 5.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear in the first column of this table. The symbol > means more than; the symbol

Soil series and map symbols	Depth to—		Depth from surface	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified [1]	AASHO [1]
	Ft.	*Ft.*	*In.*			
Allegheny: AlB, AlC	>5	>6	0–8	Loam	ML	A–4
			8–45	Clay loam	ML–CL or CL	A–6
			45–55	Gravelly clay loam	ML–CL, GC, or SC	A–1, A–2, A–4, or A–6
Ashton: As	>5	[2] >4	0–7	Silt loam	ML	A–4
			7–48	Silt loam	ML or ML–CL	A–4 or A–6
			48–64	Silt loam	ML	A–4
Bedford: BeA, BeB	>5	[2] 1½–2	0–8	Silt loam	ML or ML–CL	A–4
			8–24	Silty clay loam	ML–CL or CL	A–4 or A–6
			24–59	Silt loam (fragipan)	ML–CL or CL	A–6
			59–65	Silty clay	CL or CH	A–6 or A–7
Brookside: BrF. Properties of Rock outcrop part are too variable to be estimated.	[3] >6	>6	0–4	Silt loam	ML or ML–CL	A–4 or A–6
			4–29	Silty clay loam	CL or ML–CL	A–6 or A–7
			29–56	Silty clay	CL or MH–CH	A–7
			56–66	Channery silty clay	CL or MH–CH	A–7
Chagrin:						
Cg	>5	[2] >4	0–48	Loam	SM or ML	A–4
			48–60	Gravelly loam	GM or SM	A–2 or A–4
Ch	>5	[2] >4	0–60	Gravelly silt loam	ML or GM	A–2 or A–4
Colyer: CoE	½–1½	>6	0–6	Silt loam	ML or ML–CL	A–4 or A–6
			6–12	Shaly silty clay loam	SC, GC, MH, or CL	A–7
Cumberland:						
CuB, CuC	>6	>6	0–9	Silt loam	ML or ML–CL	A–4 or A–6
			9–18	Silty clay loam	CL or ML–CL	A–6 or A–7
			18–65	Silty clay	CL or CH	A–7
CvB, CvC, CvD, CwD3	>6	>6	0–8	Cherty silt loam	ML or ML–CL	A–4 or A–6
			8–12	Cherty silty clay loam	CL or GC	A–6 or A–7
			12–35	Cherty silty clay	CL, ML–CL, or GC	A–7
			35–65	Silty clay	CL or CH	A–7
Dekalb: DeC, DrD, DrE. Properties of Rock outcrop in DrD and DrE are too variable to be estimated.	[3] 1½–3½	>6	0–27	Sandy loam	SM	A–1, A–2, or A–4
			27–37	Sandy loam	SM	A–1, A–2, or A–4
Etowah: EtB, EtC	>6	>6	0–9	Cherty silt loam	SM or ML	A–4
			9–14	Cherty silty clay loam	ML–CL	A–4 or A–6
			14–55	Cherty silty clay loam	CL or ML–CL	A–4 or A–6
			55–60	Silty clay	CL or MH	A–6 or A–7
Frankstown: FcB, FcC, FcD, FcE	2½–5	> 6	0–18	Cherty silt loam	GM or ML	A–4
			18–36	Cherty silty clay loam	GM–GC, GC, or CL	A–4 or A–6
*Frederick: FdB, FdC, FdD, FdE, FeC3, FeD3, FfE. For properties of Jefferson part of FfE, refer to JlE of the Jefferson series.	>6	>6	0–8	Silt loam	ML	A–4
			8–14	Silty clay loam	CL or ML–CL	A–7
			14–108	Silty clay	MH–CH or CL	A–7

See footnotes at end of table.

significant to engineering

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for
< means less than. Dashes indicate absence of coarse fragments greater than 3 inches, or no estimates were made]

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
Pct.					*In. per hr.*	*In. per in. of soil*	*pH*	
----------	95–100	90–100	75–90	50–75	0. 6–2. 0	0. 14–0. 18	5. 5–6. 5	Low.
----------	95–100	90–100	75–90	55–75	0. 6–2. 0	0. 14–0. 18	4. 5–5. 5	Low.
----------	60–80	50–75	35–60	25–55	2. 0–6. 3	0. 11–0. 14	4. 5–5. 0	Low.
----------	90–100	90–100	85–100	75–90	0. 6–2. 0	0. 19–0. 23	6. 1–6. 5	Low.
----------	90–100	90–100	85–100	75–90	0. 6–2. 0	0. 19–0. 23	5. 6–7. 3	Low.
----------	90–100	90–100	85–100	65–90	0. 6–2. 0	0. 19–0. 23	6. 1–7. 3	Low.
----------	100	100	90–100	80–90	0. 6–2. 0	0. 19–0. 23	5. 1–5. 5	Low.
----------	100	100	95–100	85–95	0. 6–2. 0	0. 16–0. 19	<4. 5–5. 0	Low.
----------	100	100	90–100	80–90	0. 06–0. 2	0. 10–0. 15	<4. 5–5. 0	Low.
----------	90–100	90–100	85–100	80–95	0. 2–0. 6	0. 10–0. 15	<4. 5–5. 0	Moderate.
5–15	90–100	85–100	80–100	70–95	0. 6–2. 0	0. 17–0. 21	5. 6–7. 3	Low.
5–15	90–100	85–100	80–100	75–95	0. 6–2. 0	0. 14–0. 17	5. 6–7. 3	Low.
5–15	90–100	85–100	80–100	75–95	0. 2–0. 6	0. 13–0. 15	5. 6–7. 3	Moderate.
20–30	90–100	85–100	80–100	75–95	0. 2–0. 6	0. 11–0. 13	5. 6–7. 3	Moderate.
----------	95–100	90–100	85–95	45–75	0. 6–2. 0	0. 13–0. 16	5. 6–6. 5	Low.
----------	60–75	55–70	50–65	30–40	2. 0–6. 3	0. 10–0. 13	6. 1–6. 5	Low.
----------	55–75	50–70	45–65	30–60	2. 0–6. 3	0. 10–0. 13	5. 6–6. 5	Low.
----------	95–100	95–100	95–100	80–90	0. 6–2. 0	0. 19–0. 23	<4. 5–5. 0	Low.
----------	50–80	45–75	45–75	35–70	0. 06–0. 2	0. 10–0. 14	<4. 5–5. 0	Low to moderate.
----------	95–100	95–100	90–100	75–85	0. 6–2. 0	0. 19–0. 23	6. 6–7. 3	Low.
----------	95–100	95–100	95–100	80–95	0. 6–2. 0	0. 16–0. 19	6. 6–7. 3	Moderate.
----------	95–100	95–100	95–100	85–95	0. 6–1. 0	0. 15–0. 18	5. 1–6. 0	Moderate.
----------	65–80	60–75	55–70	50–60	0. 6–2. 0	0. 16–0. 19	6. 6–7. 3	Low.
----------	55–80	50–75	50–70	45–65	0. 6–2. 0	0. 12–0. 16	6. 6–7. 3	Low.
----------	55–80	50–75	50–70	45–65	0. 6–1. 0	0. 11–0. 15	5. 1–6. 0	Moderate.
----------	95–100	95–100	90–100	80–95	0. 6–1. 0	0. 15–0. 18	5. 1–6. 0	Moderate.
----------	85–100	75–100	30–70	20–45	>6. 3	0. 08–0. 12	4. 5–5. 5	Low.
----------	80–100	75–100	25–75	20–40	>6. 3	0. 07–0. 10	4. 5–5. 5	Low.
----------	70–80	65–75	60–75	40–55	0. 6–2. 0	0. 15–0. 18	6. 6–7. 3	Low.
----------	70–80	65–75	60–75	55–70	0. 6–2. 0	0. 11–0. 15	4. 5–7. 3	Low.
----------	70–85	65–80	65–80	60–70	0. 6–2. 0	0. 12–0. 16	4. 5–5. 5	Low.
----------	80–95	75–95	75–95	65–85	0. 6–2. 0	0. 10–0. 15	4. 5–5. 0	Moderate.
0. 5	55–90	50–85	45–80	35–60	0. 6–2. 0	0. 14–0. 18	5. 1–6. 0	Low.
0. 5	55–90	50–85	50–75	45–70	0. 6–2. 0	0. 11–0. 13	4. 5–5. 5	Low.
----------	85–100	75–100	70–95	55–80	0. 6–2. 0	0. 19–0. 23	5. 6–6. 0	Low.
----------	85–100	80–100	75–100	70–90	0. 6–2. 0	0. 16–0. 19	4. 5–5. 5	Low.
----------	85–100	80–100	80–100	75–95	0. 6–1. 0	0. 13–0. 16	4. 5–5. 5	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to— Bedrock	Depth to— Seasonal high water table	Depth from surface	Classification: USDA texture	Classification: Unified [1]	Classification: AASHO [1]
	Ft.	*Ft.*	*In.*			
*Fredonia: FkD, FlD3, FrE. For properties of Frederick part of FkD and FlD3, refer to Frederick series.	[3] 1½–3½	>6	0–6	Silt loam	ML–CL	A–4 or A–6
			6–13	Silty clay loam	ML–CL or CL	A–7
			13–18	Silty clay	CL or MH–CH	A–7
			18–27	Clay	CH	A–7
*Garmon: GmF. For properties of Trimble part, refer to Trimble series.	1½–3½	>6	0–6	Silt loam	ML	A–4
			6–22	Shaly silt loam	GM, ML, or ML–CL	A–4
			22–24	Very shaly silty clay loam.	GW–GM, GM, GC, ML–CL, or CL	A–1, A–2, A–4, or A–6
Gilpin: GnD	1½–3½	>6	0–10	Silt loam	ML	A–4
			10–22	Silty clay loam	ML–CL or CL	A–6 or A–7
			22–24	Very gravelly silt loam	GM or GW–GM	A–1 or A–2
Hartsells: HaC, HaD, HaE	1½–3½	>6	0–12	Fine sandy loam	SM	A–2 or A–4
			12–25	Clay loam	ML, SC, or SM	A–6 or A–4
			25–31	Loamy sand	SM	A–1 or A–2
HrB	1½–3½	>6	0–13	Loam	ML	A–4
			13–24	Clay loam	CL or ML–CL	A–6
			24–26	Loam	ML	A–4
Huntington: Hu	>5	[3] >4	0–12	Silt loam	ML	A–4
			12–65	Silt loam	ML or ML–CL	A–4 or A–6
Jefferson: JeE:	3–5	>6	0–12	Gravelly sandy loam or sandy loam.	SM or ML	A–2 or A–4
			12–26	Loam or gravelly loam	SM, ML–CL, or CL	A–4 or A–6
			26–38	Clay	MH or CH	A–7
JfC, JfD, JlE, JlF	>5	>6	0–19	Loam	ML or SM	A–4 or A–2
			19–28	Gravelly loam	ML–CL or GM	A–4 or A–2
			28–42	Clay loam	ML–CL, CL, or GC	A–4 or A–6
			42–50	Clay loam or clay	ML–CL, GC, or MH	A–6 or A–7
Lawrence: La	>5	[3] ½–1½	0–8	Silt loam	ML	A–4
			8–22	Silt loam	ML or ML–CL	A–4 or A–6
			22–58	Silt loam (fragipan)	ML or ML–CL	A–6
			58–65	Silty clay loam	ML–CL or CL	A–7
Lindside: Ld	>5	[3] 1½–2	0–7	Silt loam	ML	A–4
			7–30	Silt loam	ML or ML–CL	A–4 or A–6
			30–60	Silt loam (stratified in places).	ML, ML–CL, SM, or SM–SC	A–2, A–4, or A–6

See footnotes at end of table.

significant to engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Permeability	Available moisture capacity	Reaction	Shrink-swell potential
Pct.					*In. per hr.*	*In. per in. of soil*	*pH*	
----------	95–100	95–100	90–100	85–95	0. 6–2. 0	0. 18–0. 23	6. 6–7. 3	Low.
----------	95–100	95–100	90–100	85–95	0. 6–2. 0	0. 19–0. 21	5. 1–6. 6	Low.
----------	95–100	95–100	90–100	85–95	0. 2–0. 6	0. 15–0. 18	5. 1–6. 0	Moderate.
----------	95–100	95–100	90–100	85–95	0. 2–0. 6	0. 12–0. 15	5. 6–7. 3	Moderate.
----------	90–95	85–95	85–95	70–85	0. 6–2. 0	0. 17–0. 21	5. 1–5. 5	Low.
----------	60–85	50–75	50–75	40–60	2. 0–6. 3	0. 13–0. 16	5. 6–6. 5	Low.
----------	20–80	15–75	15–75	10–65	2. 0–6. 3	0. 03–0. 12	6. 1–6. 5	Low.
----------	80–100	75–100	70–85	55–75	0. 6–2. 0	0. 18–0. 22	5. 1–6. 0	Low.
----------	80–100	75–100	70–95	65–85	0. 6–2. 0	0. 15–0. 18	<4. 5–5. 5	Low.
----------	20–50	15–45	15–45	10–30	>6. 3	0. 03–0. 06	<4. 5–5. 5	Low.
0–5	85–100	85–100	70–85	30–45	2. 0–6. 3	0. 13–0. 16	5. 1–6. 5	Low.
0–5	85–100	85–100	80–95	45–70	2. 0–6. 3	0. 13–0. 16	<4. 5–5. 5	Low.
0–5	95–100	90–100	50–100	15–25	>6. 3	0. 06–0. 18	<4. 5–5. 0	Low.
----------	90–100	90–100	80–95	50–70	2. 0–6. 3	0. 15–0. 18	6. 1–6. 5	Low.
----------	90–100	90–100	80–90	60–70	2. 0–6. 3	0. 13–0. 16	<4. 5–5. 5	Low.
----------	90–100	90–100	80–95	50–75	2. 0–6. 3	0. 15–0. 18	<4. 5	Low.
----------	95–100	90–100	85–100	75–85	0. 6–2. 0	0. 19–0. 23	6. 6–7. 3	Low.
----------	95–100	90–100	85–100	80–90	0. 6–8. 0	0. 19–0. 23	5. 6–7. 3	Low.
0–20	60–80	50–75	40–65	25–55	2. 0–6. 3	0. 10–0. 12	5. 6–6. 0	Low.
0–5	60–80	50–75	45–70	35–55	2. 0–6. 3	0. 09–0. 11	4. 5–5. 5	Low.
----------	95–100	95–100	90–100	85–95	0. 2–0. 6	0. 15–0. 18	5. 6–7. 3	Moderate.
5–30	55–100	50–100	40–85	30–70	2. 0–6. 3	0. 05–0. 12	4. 5–5. 5	Low.
5–15	60–100	50–100	40–90	30–70	2. 0–6. 3	0. 05–0. 12	4. 5–5. 5	Low.
5–10	60–90	55–85	50–80	35–60	2. 0–6. 3	0. 08–0. 12	4. 5–5. 5	Low.
0–10	60–95	55–90	50–90	35–85	0. 2–6. 3	0. 08–0. 15	4. 5–5. 5	Low to moderate.
----------	100	100	95–100	70–90	0. 6–2. 0	0. 19–0. 23	6. 1–6. 5	Low.
----------	100	100	95–100	75–90	0. 6–2. 0	0. 19–0. 23	4. 5–5. 5	Low.
----------	100	100	95–100	80–85	0. 06–0. 2	0. 10–0. 15	4. 5–5. 5	Low.
----------	100	100	95–100	85–95	0. 2–0. 6	0. 10–0. 15	4. 5–5. 5	Low.
----------	95–100	90–100	85–100	70–85	0. 6–2. 0	0. 19–0. 23	6. 1–6. 5	Low.
----------	95–100	90–100	85–100	75–90	0. 6–2. 0	0. 19–0. 23	5. 6–6. 5	Low.
----------	85–100	80–100	75–100	30–90	0. 6–6. 3	0. 14–0. 20	5. 6–6. 5	Low.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to— Bedrock	Depth to— Seasonal high water table	Depth from surface	Classification: USDA texture	Classification: Unified [1]	Classification: AASHO [1]
	Ft.	*Ft.*	*In.*			
Melvin: Me	>5	[2] 0–½	0–8	Silt loam	ML	A–4
			8–40	Silt loam	ML or ML–CL	A–4 or A–6
			40–60	Silt loam (stratified in places).	ML, ML–CL, SM, or SM–SC	A–4 or A–6
Monongahela: MgB	>5	[2] 1½–2	0–21	Loam	ML or SM	A–4
			21–27	Clay loam	CL or ML–CL	A–6
			27–54	Loam (fragipan)	ML, ML–CL, or SM	A–4 or A–6
			54–65	Clay loam	ML–CL or CL	A–6
Mountview: MnB, MnC, MnD	>6	>6	0–10	Silt loam	ML	A–4
			10–30	Silty clay loam	ML–CL	A–6
			30–36	Silty clay	ML–CL or CL	A–7
			36–75	Silty clay	CL or MH–CH	A–7
*Muse: MoC, MoD, MsC3, MsD3, MtD, MuD, MuE, MuE3, MuF. For properties of Hartsells part of MtD, refer to Hartsells series; for properties of Shelocta part of MuD, MuE, MuE3, and MuF, refer to Shelocta series.	>3½	>6	0–6	Silt loam	ML, SM, or GM	A–4
			6–12	Silty clay loam	ML–CL or CL	A–6
			12–48	Silty clay	CL or MH–CH	A–7 or A–6
Needmore: NcC2, NdD	1½–4	>6	0–8	Silty clay loam	ML–CL	A–4 or A–6
			8–26	Silty clay	MH–CH or CL	A–7
			26–40	Clay	MH–CH or CH	A–7
Newark:						
Ne	>5	[2] ½–1½	0–9	Silt loam	ML	A–4
			9–65	Silt loam	ML–CL or ML	A–4 or A–6
Ng	>5	[2] ½–1½	0–60	Gravelly silt loam	GM, ML, or ML–CL	A–4
Nolichucky: NkC, NkD	>5	>6	0–8	Loam	ML or SM	A–4
			8–70	Clay loam	ML–CL or CL	A–6
Nolin: No	>5	[2] >4	0–9	Slit loam	ML	A–4
			9–65	Silt loam	ML–CL or ML	A–4 or A–6
Pembroke: PeB, PeC	>5	>6	0–11	Silt loam	ML	A–4
			11–66	Silty clay loam	CL or ML–CL	A–6
			66–75	Silty clay	MH or MH–CH	A–7
Pope: Po	>5	[2] >4	0–18	Fine sandy loam	SM	A–2 or A–4
			18–70	Sandy loam	SM	A–1, A–2, or A–4

See footnotes at end of table.

significant to engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
Pct.					*In. per hr.*	*In. per in. of soil*	*pH*	
----------	95–100	90–100	85–100	70–90	0. 6–2. 0	0. 19–0. 23	6. 1–6. 5	Low.
----------	95–100	90–100	85–100	75–90	0. 6–2. 0	0. 17–0. 21	5. 6–6. 5	Low.
----------	85–100	80–100	75–100	40–90	0. 6–6. 3	0. 12–0. 20	5. 6–6. 5	Low.
----------	95–100	90–100	80–90	45–70	0. 6–2. 0	0. 15–0. 18	4. 5–6. 5	Low.
----------	95–100	90–100	80–90	55–75	0. 6–2. 0	0. 15–0. 18	4. 5–5. 5	Low.
----------	95–100	90–100	80–90	45–75	0. 06–0. 2	0. 10–0. 15	4. 5–5. 5	Low.
----------	95–100	90–100	80–90	65–75	0. 2–0. 6	0. 10–0. 15	4. 5–5. 5	Low.
----------	90–100	90–100	90–100	75–95	0. 6–2. 0	0. 19–0. 23	6. 1–6. 5	Low.
----------	90–100	90–100	90–100	75–95	0. 6–2. 0	0. 16–0. 19	4. 5–5. 5	Low.
----------	90–100	90–100	85–100	80–95	0. 6–2. 0	0. 15–0. 18	4. 5–5. 5	Low.
----------	90–100	90–100	85–100	80–95	0. 2–0. 6	0. 15–0. 18	4. 5–5. 5	Moderate.
----------	65–100	55–100	55–100	40–90	0. 6–2. 0	0. 19–0. 23	5. 1–6. 5	Low.
----------	90–100	85–100	80–100	75–90	0. 6–2. 0	0. 16–0. 19	4. 5–5. 5	Moderate.
----------	90–100	85–100	80–100	75–95	0. 2–0. 6	0. 15–0. 18	4. 5–5. 5	Moderate.
----------	100	100	95–100	85–95	0. 2–0. 6	0. 16–0. 19	5. 1–5. 5	Low.
----------	100	100	95–100	90–95	0. 2–0. 6	0. 15–0. 18	4. 5–5. 5	Moderate.
----------	95–100	90–100	90–100	85–95	0. 2–0. 6	0. 14–0. 17	5. 6–7. 3	Moderate.
----------	90–100	90–100	85–100	75–90	0. 6–2. 0	0. 19–0. 23	6. 1–6. 5	Low.
----------	90–100	90–100	90–100	75–95	0. 6–2. 0	0. 19–0. 23	5. 6–6. 5	Low.
----------	55–85	50–75	45–70	40–65	2. 0–6. 3	0. 12–0. 16	5. 6–6. 5	Low.
----------	90–100	85–100	75–90	45–70	0. 6–2. 0	0. 15–0. 18	5. 1–7. 8	Low.
----------	90–100	85–100	75–90	50–75	0. 6–2. 0	0. 15–0. 18	4. 5–5. 5	Low.
----------	90–100	90–100	85–100	75–85	0. 6–2. 0	0. 19–0. 23	6. 1–6. 5	Low.
----------	90–100	90–100	90–100	75–90	0. 6–2. 0	0. 19–0. 23	5. 6–6. 5	Low.
----------	90–100	90–100	85–100	75–95	0. 6–2. 0	0. 19–0. 23	6. 1–6. 5	Low.
----------	90–100	90–100	90–100	80–95	0. 6–2. 0	0. 16–0. 19	4. 5–5. 5	Low.
----------	90–100	90–100	90–100	80–95	0. 2–0. 6	0. 15–0. 18	4. 5–5. 5	Moderate.
----------	80–100	75–100	60–90	30–50	2. 0–6. 3	0. 13–0. 16	5. 1–7. 8	Low.
----------	80–100	75–100	45–80	25–45	2. 0–6. 3	0. 08–0. 12	4. 5–5. 5	Low.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified [1]	AASHO [1]
	Ft.	*Ft.*	*In.*			
Robertsville: Ro	>5	[2] 0–½	0–18	Silt loam	ML or ML–CL	A–4 or A–6
			18–62	Silt loam (fragipan)	ML–CL or CL	A–6
			62–65	Silty clay	CL or MH–CH	A–7
Rockcastle: RsE	1½–3½	>6	0–6	Silt loam	ML–CL	A–4
			6–22	Silty clay loam	ML–CL or CL	A–6 or A–7
			22–40	Clay	CL or MH–CH	A–7
*Shelocta: SgC, SgD, ShD, ShE, ShF. For properties of Jefferson part of ShD, ShE, and ShF, refer to Jefferson series.	>4	>6	0–18	Silt loam	GM or ML	A–4
			18–43	Silty clay loam	GM–GC or ML–CL	A–4 or A–6
			43–56	Clay, silty clay loam, or silt loam.	MH, CH, or ML–CL	A–7 or A–6
Stendal: Sn	>5	[2] ½–1½	0–6	Loam	ML	A–4
			6–26	Sandy loam	SM	A–2 or A–4
			26–42	Gravelly sandy loam	GM or SM	A–1, A–2, or A–4
Strip mines: St. Properties too variable to be estimated.						
Talbott: TaC2, TbD, TbE, TcD3	[3] 1½–3½	>6	0–7	Silt loam	ML–CL	A–4 or A–6
			7–28	Silty clay	MH or CH	A–7
			28–31	Clay	MH or CH	A–7
Tarklin: TkB, TkC	>5	1½–2	0–8	Cherty silt loam	GM or ML	A–4
			8–23	Cherty silty clay loam	GM–GC or ML–CL	A–4
			23–50	Cherty silty clay loam (fragipan).	GM–GC or ML–CL	A–4
Tilsit. Mapped only with Whitley soils.	3½–5	1½–2	0–16	Silt loam	ML	A–4
			16–21	Silty clay loam	ML–CL	A–4 or A–6
			21–29	Loam (fragipan)	ML–CL or ML	A–6 or A–4
			29–42	Silty clay loam	ML–CL	A–6
Trimble: TrB, TrC, TrD, TrE	>5	>6	0–8	Cherty silt loam	GM or ML	A–4
			8–68	Cherty silt loam	GM or ML	A–4
			68–72	Cherty silty clay loam	GM–GC or ML–CL	A–4 or A–6
Waynesboro: WaB, WaC, WaD, WaE, WbE3.	>6	>6	0–9	Loam	SM or ML	A–4
			9–90	Clay loam	CL	A–7
*Whitley:						
WhC, WtB	3½–5	>6	0–12	Silt loam	ML	A–4
			12–40	Silty clay loam	ML–CL	A–6 or A–4
For Tilsit part of WtB, refer to Tilsit series.						
WlA, WlB, WlC	>6	[2] >5	0–14	Silt loam	ML	A–4
			14–36	Silty clay loam	ML–CL	A–6
			36–65	Silt loam	ML–CL or ML	A–6 or A–4

[1] Estimates are based on all material less than 3 inches in diameter.
[2] Some areas are subject to flooding.

significant to engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve—				Permeability	Available moisture capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
Pct.					*In. per hr.*	*In. per in. of soil*	*pH*	
----------	95–100	90–100	85–100	80–90	0. 6–2. 0	0. 19–0. 23	<4. 5–5. 5	Low.
----------	95–100	90–100	85–100	80–90	0. 06–0. 2	0. 10–0. 15	<4. 5–5. 5	Low.
----------	95–100	90–100	85–100	80–95	0. 2–0. 6	0. 10–0. 15	6. 1–6. 5	Moderate.
----------	100	100	95–100	85–95	0. 6–2. 0	0. 19–0. 23	5. 6–6. 0	Low.
----------	100	100	95–100	85–95	0. 6–2. 0	0. 16–0. 19	<4. 5–5. 5	Low.
----------	100	100	100	95–100	0. 06–0. 2	0. 10–0. 15	4. 5–6. 0	Moderate.
0–10	60–90	55–90	50–85	40–75	0. 6–2. 0	0. 15–0. 19	4. 5–5. 5	Low.
0–5	55–90	50–90	50–85	40–80	0. 6–2. 0	0. 09–0. 12	4. 5–5. 5	Low.
----------	85–100	80–100	75–100	70–95	0. 2–2. 0	0. 14–0. 17	5. 1–5. 5	Moderate.
----------	95–100	95–100	70–85	50–70	2. 0–6. 3	0. 15–0. 18	4. 5–5. 0	Low.
----------	95–100	95–100	50–80	30–45	2. 0–6. 3	0. 08–0. 12	4. 5–5. 5	Low.
----------	55–100	50–100	20–70	15–45	>6. 3	0. 05–0. 08	4. 5–5. 5	Low.
----------	85–100	85–100	80–100	75–95	0. 6–2. 0	0. 18–0. 23	5. 6–6. 0	Low.
----------	100	95–100	90–100	85–95	0. 06–2. 0	0. 15–0. 18	5. 1–6. 0	Moderate.
----------	100	95–100	95–100	90–100	0. 06–2. 0	0. 14–0. 17	5. 6–7. 3	Moderate.
----------	55–85	50–75	45–70	35–65	0. 6–2. 0	0. 15–0. 18	5. 1–5. 5	Low.
----------	55–85	50–75	45–75	40–70	0. 6–2. 0	0. 13–0. 15	<4. 5–5. 5	Low.
----------	55–85	50–75	45–75	40–70	0. 06–0. 2	0. 08–0. 12	<4. 5–5. 5	Low.
----------	95–100	90–100	85–100	70–90	0. 6–2. 0	0. 17–0. 21	<4. 5–5. 0	Low.
----------	95–100	90–100	85–100	80–90	0. 6–2. 0	0. 16–0. 19	<4. 5–5. 5	Low.
----------	95–100	90–100	85–90	60–75	0. 06–0. 2	0. 10–0. 15	<4. 5–5. 5	Low.
----------	95–100	90–100	85–100	75–90	0. 2–0. 6	0. 10–0. 15	<4. 5–5. 5	Low.
----------	55–85	50–75	40–70	35–60	0. 6–2. 0	0. 15–0. 18	6. 1–6. 5	Low.
----------	55–85	50–75	45–70	35–65	0. 6–2. 0	0. 12–0. 15	4. 5–5. 5	Low.
----------	55–85	50–75	50–75	45–70	0. 6–2. 0	0. 10–0. 12	4. 5–5. 5	Low.
----------	80–100	75–100	65–90	45–70	0. 6–2. 0	0. 15–0. 18	5. 6–6. 0	Low.
----------	80–100	75–100	70–95	50–75	0. 6–2. 0	0. 15–0. 18	4. 5–5. 5	Low.
----------	90–100	90–100	85–100	65–90	0. 6–2. 0	0. 19–0. 23	4. 5–5. 0	Low.
----------	95–100	90–100	90–100	80–95	0. 6–2. 0	0. 16–0. 19	4. 5–5. 5	Low.
----------	95–100	95–100	90–100	80–90	0. 6–2. 0	0. 19–0. 23	5. 6–6. 5	Low.
----------	95–100	95–100	90–100	85–95	0. 6–2. 0	0. 16–0. 19	4. 5–5. 5	Low.
----------	95–100	95–100	90–100	85–95	0. 6–2. 0	0. 19–0. 23	4. 5–5. 5	Low.

[3] Most areas are rocky, and Rock outcrop covers 3 to 15 percent of the soil surface.

TABLE 6.—*Interpretations of engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
	Topsoil	Road fill	Highway location	Farm ponds	
				Reservoir areas	Embankments
Allegheny: AlB, AlC	Fair: clay loam subsoil.	Fair to poor: A-4 and A-6.	Some slopes of more than 6 percent.	Pervious substratum.	Medium compressibility.
Ashton: As	Good	Fair to poor: A-4 or A-6.	Some areas subject to flooding.	Moderate permeability.	Fair stability; poor compaction; subject to piping.
Bedford: BeA, BeB	Fair: seasonal high water table at depth of 1½ to 2 feet.	Fair to poor: A-4 or A-6; seasonal high water table at depth of 1½ to 2 feet.	Seasonal high water table at depth of 1½ to 2 feet; some areas subject to flooding.	No unfavorable features.	Fair to good stability and compaction; medium compressibility.
*Brookside: BrF. For interpretations of Rock outcrop part, refer to Rock outcrop.	Poor: rock outcrops and stones on surface; steep; clayey subsoil.	Poor: A-6 or A-7; slopes of more than 20 percent.	Steep; stony; rocky.	Steep	Fair to poor compaction; medium to high compressibility; rock outcrops and stones.
Chagrin:					
Cg	Good	Fair: A-4	Subject to flooding.	Pervious material; subject to flooding.	Subject to piping; fair stability; fair to poor compaction.
Ch	Poor: 15 to 35 percent gravel.	Good to fair: A-2 or A-4.	Subject to flooding.	Pervious material; subject to flooding.	Subject to piping; fair to poor compaction; fair stability.
Colyer: CoE	Poor: shaly subsoil; shale at depth of ½ foot to 1½ feet.	Poor: A-7; suitable material less than 1½ feet thick; slope.	Shale at depth of ½ foot to 1½ feet; slope.	Shale at depth of ½ foot to 1½ feet; slope.	Shale at depth of ½ foot to 1½ feet.
Cumberland:					
CuB, CuC	Fair to poor: clayey subsoil.	Poor: A-6 or A-7.	Sinkholes; slopes of 2 to 12 percent.	Subject to seepage through sinkholes; moderate permeability.	Fair to good stability and compaction; medium to high compressibility.
CvB, CvC, CvD, CwD3	Fair to poor: clayey subsoil; cherty.	Poor: A-7	Sinkholes; slopes of 2 to 12 percent.	Subject to seepage through sinkholes; moderate permeability.	Medium to high compressibility.
*Dekalb: DeC, DrD, DrE. For interpretations of Rock outcrop part of DrD and DrE, refer to Rock outcrop.	Fair to poor: sandy loam; rocky and droughty in most places.	Fair: some A-4; many slopes of more than 12 percent.	Hard sandstone at depth of 1½ to 3½ feet; slope; rocky.	Pervious material; rocky in most areas; slopes in some areas.	Subject to piping; bedrock at depth of 1½ to 3½ feet; rocky; fair stability; fair compaction.

properties of the soils

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions of in the first column of this table]

Soil features affecting—Continued					
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings	Pipeline construction and maintenance
Well drained	No unfavorable features.	No unfavorable features.	No unfavorable features.	Medium compressibility; some slopes of more than 6 percent.	No unfavorable features.
Well drained	No unfavorable features.	Nearly level	Subject to flooding in some areas.	Subject to flooding in some areas.	Subject to flooding in some areas.
Fragipan at depth of 1½ to 2½ feet.	Fragipan at depth of 1½ to 2½ feet; slow permeability.	Seasonal high water table at depth of 1½ to 2 feet.	Fragipan at depth of 1½ to 2½ feet.	Seasonal high water table at depth of 1½ to 2 feet; medium compressibility.	Bedrock at a depth of more than 5 feet.
Well drained	Steep	Slopes of more than 8 percent.	Steep; rocky; erodible.	Steep; moderate shrink-swell potential.	Steep; rocky; stony.
Well drained	No unfavorable features.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding	Subject to flooding.
Well drained	No unfavorable features.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding	Subject to flooding.
Somewhat excessively drained.	Slope; shale at depth of ½ foot to 1½ feet; slow permeability.	Slopes of more than 8 percent.	Shale at depth of ½ foot to 1½ feet; erodible; slope; slow permeability.	Shale at depth of ½ foot to 1½ feet; slope.	Shale at depth of ½ foot to 1½ feet; slope.
Well drained	No unfavorable features.	Some slopes of more than 8 percent; karst topography in places.	Slopes of 2 to 12 percent.	Moderate shrink-swell potential.	Clayey subsoil.
Well drained	Some slopes of more than 12 percent.	Some slopes of more than 8 percent; karst topography in places.	Slopes of 2 to 20 percent.	Moderate shrink-swell potential.	Clayey subsoil; slope.
Well drained	Bedrock at depth of 1½ to 3½ feet; rocky; slope; rapid permeability.	Most slopes more than 8 percent; rocky.	Erodible; droughty	Bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth of 1½ to 3½ feet; slope.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
				Farm ponds	
	Topsoil	Road fill	Highway location	Reservoir areas	Embankments
Etowah: EtB, EtC	Fair: silty clay loam subsoil; cherty.	Fair to poor: mostly A-4 or A-6.	Sinkholes; slopes in some areas.	Sinkholes and seepage cracks in bedrock in places; moderate permeability.	Fair to good stability; medium compressibility.
Frankstown: FcB, FcC, FcD, FcE.	Fair to poor: cherty; some slopes of more than 20 percent.	Fair to poor: some A-6; material less than 4 feet thick in places; slope.	Bedrock at depth of 2½ to 5 feet; slopes of 2 to 30 percent.	Moderate permeability; subject to seepage through bedrock.	Fair to good stability; bedrock at depth of 2½ to 5 feet.
*Frederick: FdB, FdC, FdD, FdE, FeC3, FeD3, FfE. For interpretations for Jefferson part of FfE, refer to JlE of the Jefferson series.	Fair to poor: silty clay loam to silty clay subsoil; slopes as much as 50 percent.	Poor: A-7; slopes of 2 to 50 percent.	Sinkholes in places; slopes of 2 to 50 percent.	Pervious bedrock in places.	Fair to good stability; fair to good compaction; medium to high compressibility.
*Fredonia: FkD, FlD3, FrE. For interpretations for Frederick part of FkD and FlD3, refer to Frederick series.	Poor: silty clay subsoil; rock outcrops.	Poor: A-7; rock outcrops.	Bedrock at depth of 1½ to 3½ feet; rock outcrops; slope.	Bedrock at depth of 1½ to 3½ feet; subject to cracking.	Bedrock at depth of 1½ to 3½ feet; rock outcrops; high compressibility; fair to good stability.
*Garmon: GmF. For interpretations for Trimble part, refer to Trimble series.	Poor: slope; shaly.	Poor: slope; material less than 4 feet thick.	Bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth of 1½ to 3½ feet; moderately rapid permeability; slope.	Bedrock at depth of 1½ to 3½ feet; limited volume of material; slope.
Gilpin: GnD	Fair: silty clay loam subsoil.	Poor: A-6 or A-7.	Bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth of 1½ to 3½ feet; pervious substratum.	Bedrock at depth of 1½ to 3½ feet; limited volume of material; rapid permeability in substratum.
Hartsells: HaC, HaD, HaE	Fair: clay loam subsoil.	Fair to poor: A-1 to A-6; some slopes of more than 20 percent.	Bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth of 1½ to 3½ feet; pervious substratum.	Bedrock at depth of 1½ to 3½ feet; limited volume of material; fair stability; subject to piping.
HrB	Fair: clay loam subsoil.	Fair to poor: A-4 or A-6.	Bedrock at depth of 1½ to 3½ feet.	Bedrock at depth of 1½ to 3½ feet; moderately rapid permeability.	Bedrock at depth of 1½ to 3½ feet; limited volume of material; substratum subject to piping.
Huntington: Hu	Good	Fair to poor: A-4 or A-6.	Subject to flooding.	Pervious substratum.	Subject to piping; fair stability; poor compaction.

properties of the soils—Continued

Soil features affecting—Continued					
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings	Pipeline construction and maintenance
Well drained	No unfavorable features.	Karst topography in places.	Cherty; moderate available moisture capacity.	Medium compressibility; some slopes of more than 6 percent.	Some slopes of more than 6 percent; silty clay loam subsoil.
Well drained	Slopes of 2 to 30 percent.	Slopes of 2 to 30 percent.	Erodible in some areas.	Bedrock at depth of 2½ to 5 feet; slope.	Bedrock at depth of 2½ to 5 feet; slope.
Well drained	Some slopes of 2 to 50 percent.	Some slopes of 2 to 50 percent.	Slopes of 2 to 50 percent.	Slopes in places; medium to high compressibility; moderate shrink-swell potential.	Clayey subsoil; slope.
Well drained	Rocky; moderately slow permeability.	Rock outcrop on surface; bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth of 1½ to 3½ feet; rock outcrops; erodible.	Bedrock at depth of 1½ to 3½ feet; rock outcrops; moderate shrink-swell potential.	Bedrock at depth of 1½ to 3½ feet; rock outcrops; clay subsoils; slope.
Well drained	Moderately rapid permeability; slope.	Steep slopes	Steep slopes; erodible.	Bedrock at depth of 1½ to 3½ feet; steep.	Bedrock at depth of 1½ to 3½ feet; slope.
Well drained	Bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth of 1½ to 3½ feet; erodible.	Bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth of 1½ to 3½ feet; slope.
Well drained	Bedrock at depth of 1½ to 3½ feet; some slopes of more than 12 percent; moderately rapid permeability.	Bedrock at depth of 1½ to 3½ feet; slopes of more than 8 percent.	Bedrock at depth of 1½ to 3½ feet; erodible.	Bedrock at depth of 1½ to 3½ feet; slope.	Bedrock at depth to 1½ to 3½ feet; slope; loamy sand below depth of 2 feet.
Well drained	Bedrock at depth of 1½ to 3½ feet; moderately rapid permeability.	Bedrock at depth of 1½ to 3½ feet.	Bedrock at depth of 1½ to 3½ feet.	Bedrock at depth of 1½ to 3½ feet; medium compressibility.	Bedrock at depth of 1½ to 3½ feet
Well drained	No unfavorable features.	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding	Subject to flooding.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir areas	Farm ponds: Embankments
Jefferson:					
JeE	Fair to poor: gravelly; clay loam subsoil.	Good to poor: A-2, A-4, or A-6; A-7 below depth of 2 feet; slope.	Bedrock at depth of 3 to 5 feet; slope.	Slope	Fair stability; fair to poor compaction.
JfC, JfD, JlE, JlF	Poor: stony; gravelly.	Poor: stony; slope.	Slope; stony	Pervious material; steep; stony.	Fair to good stability; fair to good compaction; stony.
Lawrence: La	Fair: seasonal high water table at depth of ½ foot to 1½ feet.	Fair to poor: A-4 or A-6; seasonal high water table at depth of ½ foot to 1½ feet.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Nearly level	Fair to poor stability; fair to poor compaction.
Lindside: Ld	Fair: seasonal high water table at depth of 1½ to 2 feet.	Fair to poor: A-4 or A-6; seasonal high water table at depth of 1½ to 2 feet.	Subject to flooding; seasonal high water table at depth of 1½ to 2 feet.	Pervious substratum.	Subject to piping; fair stability; fair to poor compaction.
Melvin: Me	Poor: seasonal high water table at depth of 0 to ½ foot.	Poor: A-4 or A-6; seasonal high water table at depth of 0 to ½ foot.	Subject to flooding; seasonal high water table at depth of 0 to ½ foot.	Pervious substratum; creviced bedrock in places.	Subject to piping; fair stability; fair compaction.
Monongahela: MgB	Fair: seasonal high water at depth of 1½ to 2 feet.	Fair to poor: A-4 or A-6.	Seasonal high water table at depth of 1½ to 2 feet; subject to to flooding in places.	Pervious layers in substratum in places; seasonal high water table at depth of 1½ to 2 feet.	Fair stability; fair compaction.
Mountview: MnB, MnC, MnD.	Fair: silty clay loam subsoil.	Poor: A-6 or A-7.	Slopes in places	Moderate permeability in upper part of subsoil.	Fair to poor stability; fair to poor compaction; medium to high compressibility.
*Muse: MoC, MoD, MsC3, MsD3, MtD, MuD, MuE, MuE3, MuF. For interpretations of Hartsells part of MtD, refer to HaD of the Hartsells series; for interpretations of Shelocta part of MuD, MuE, MuE3, and MuF, refer to Shelocta series.	Fair to poor: silty clay loam to silty clay subsoil.	Poor: A-6 or A-7; some slopes of more than 12 percent.	Steep in places; subject to slides; bedrock at depth of more than 3½ feet.	Steep in places; bedrock at depth of 3½ feet in places.	Fair stability; poor compaction; high compressibility.
Needmore: NcC2, NdD	Poor: clayey subsoil.	Poor: A-7	Bedrock at depth of 1½ to 4 feet.	Bedrock at depth of 1½ to 4 feet.	Bedrock at depth of 1½ to 4 feet; fair stability; high compressibility; poor compaction.

properties of the soils—Continued

Soil features affecting—Continued					
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings	Pipeline construction and maintenance
Well drained	Slope	Too steep in places	Erodible; steepness	Medium to high compressibility; slope; moderate shrink-swell potential.	Bedrock at depth of 3 to 5 feet; slope.
Well drained	Slopes in places; stony.	Slopes in places; stony.	Slopes in places; stony; erodible.	Slopes in places; stony.	Slopes in places; stony.
Seasonal high water table at depth of ½ foot to 1½ feet; fragipan at depth of 1½ to 2½ feet; slow permeability.	Seasonal high water table at depth of ½ foot to 1½ feet; slow permeability in fragipan.	Seasonal high water table at depth of ½ foot to 1½ feet.	Seepage; somewhat poorly drained.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding in places.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.
Seasonal high water table at depth of 1½ to 2 feet; subject to flooding.	Seasonal high water table at depth of 1½ to 2 feet.	Nearly level; on flood plains.	Occupies flood plains.	Seasonal high water table at depth of 1½ to 2 feet; subject to flooding.	Subject to flooding; moderately well drained.
Seasonal high water table at depth of 0 to ½ foot; subject to flooding.	Seasonal high water table at depth of 0 to ½ foot; subject to flooding.	Nearly level; on flood plains.	Occupies flood plains.	Seasonal high water table at depth of 0 to ½ foot; subject to flooding.	Seasonal high water table subject to flooding.
Slow permeability in fragipan at depth of 1½ to 2½ feet.	Seasonal high water table at depth of 1½ to 2 feet; low permeability in fragipan.	Fragipan at depth of 1½ to 2½ feet; seasonal high water table at depth of 1½ to 2 feet.	Fragipan at depth of 1½ to 2 feet; seepage above fragipan.	Seasonal high water table at depth of 1½ to 2 feet; subject to flooding in places.	Seasonal high water table at depth of 1½ to 2 feet; subject to flooding in places.
Well drained	Some slopes of more than 12 percent.	Slopes of 2 to 20 percent.	Erodible in places	Medium to high compressibility.	Silty clay texture below depth of 3 feet.
Well drained	Most slopes are more than 12 percent.	Most slopes are more than 12 percent.	Erodible where sloping or steeper.	Steep in places; bedrock at depth of more than 3½ feet; moderate shrink-swell potential.	Steep; shaley bedrock at depth of more than 3½ feet; clayey subsoil.
Well drained	Moderately slow permeability; bedrock at depth of 1½ to 4 feet.	Bedrock at depth of 1½ to 4 feet; slope.	Erodible; difficult to establish vegetation.	Shale at depth of 1½ to 4 feet; moderate shrink-swell potential.	Bedrock at depth of 1½ to 4 feet; clayey subsoil.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
				Farm ponds	
	Topsoil	Road fill	Highway location	Reservoir areas	Embankments
Newark:					
Ne	Fair: seasonal high water table at depth of ½ foot to 1½ feet.	Fair to poor: A-4 or A-6; somewhat poorly drained.	Subject to flooding; seasonal high water table at depth of ½ foot to 1½ feet.	Pervious substratum.	Subject to piping; fair stability; fair compaction; moderate permeability.
Ng	Poor: seasonal high water table at depth of ½ foot to 1½ feet; 15 to 35 percent gravel.	Fair: A-4; somewhat poorly drained.	Subject to flooding; seasonal high water table at depth of ½ foot to 1½ feet.	Pervious substratum.	Subject to piping; fair stability; fair compaction; moderate permeability.
Nolichucky: NkC, NkD	Fair: clay loam subsoil.	Poor: A-6	Slopes in places	Moderate permeability; pervious substratum in places.	Medium compressibility.
Nolin: No	Good	Fair to poor: A-4 or A-6.	Subject to flooding.	Pervious substratum.	Fair to poor compaction; subject to piping.
Pembroke: PeB, PeC	Fair: silty clay loam subsoil.	Poor: A-6 or A-7.	Slopes in places	Sinkholes subject to seepage in places.	Fair to good stability; fair to good compaction; medium compressibility.
Pope: Po	Good to fair: sandy loam subsoil.	Good to fair: A-1, A-2, or A-4.	Subject to flooding.	Pervious material; subject to flooding.	Subject to piping; fair stability; moderate permeability.
Robertsville: Ro	Poor: seasonal high water table at depth of 0 to ½ foot.	Poor: A-6 or A-7; seasonal high water table at depth of 0 to ½ foot.	Seasonal high water table at depth of 0 to ½ foot; subject to flooding.	Seasonal high water table at depth of 0 to ½ foot; nearly level.	Fair stability; fair compaction; medium compressibility.
Rockcastle: RsE	Fair to poor: silty clay loam to clay subsoil.	Poor: A-6 or A-7; slopes of more than 20 percent.	Soft shale at depth of 1½ to 3½ feet; subject to slides; slope.	Slope	Fair to poor stability; fair to poor compaction; high compressibility.
Rock outcrop. Mapped only with Brookside and Dekalb soils.	Poor: rock outcrops; limited volume of material.	Poor: limited volume of material; rock outcrops.	Rock outcrops on surface or at shallow depth.	Rock outcrops on surface or at shallow depth.	Rocks on surface or at shallow depth.
*Shelocta: SgC, SgD, ShD, ShE, ShF. For interpretations of Jefferson part of ShD, ShE, and ShF, refer to JlE in Jefferson series.	Fair to poor: gravelly; silty clay loam subsoil.	Fair to poor: A-4 or A-6; slopes of more than 20 percent in places.	Slopes in many places.	Moderate permeability; pervious substratum in places.	Fair stability; fair compaction; fair resistance to piping.

properties of the soils—Continued

Soil features affecting—Continued					
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings	Pipeline construction and maintenance
Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Nearly level; on flood plains.	Occupies flood plains.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.
Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Nearly level; on flood plains.	Nearly level; on flood plains.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.
Well drained	Some slopes of more than 12 percent.	Slope	Erodible	No unfavorable features.	Slope; clay loam subsoil.
Well drained	Subject to flooding	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding	Subject to flooding.
Well drained	Slopes of 2 to 12 percent.	Slopes in places; karst topography in places.	Erodible where sloping.	Medium compressibility; slopes in places.	Silty clay loam subsoil.
Well drained	Subject to flooding	Nearly level; on flood plains.	Nearly level; on flood plains.	Subject to flooding	Subject to flooding.
Slow permeability in fragipan; seasonal high water table at depth of 0 to ½ foot.	Slow permeability in fragipan; seasonal high water table at depth of 0 to ½ foot.	Nearly level in most places.	Seasonal high water table at depth of 0 to ½ foot; seepage; nearly level.	Seasonal high water table at depth of 0 to ½ foot; subject to flooding.	Seasonal high water table at depth of 0 to ½ foot; subject to flooding; clayey below a depth of 5 feet.
Somewhat excessively drained.	Slope; slow permeability.	Slope	Slope; erodible	Moderate shrink-swell potential; subject to slides; medium to high compressibility.	Shale at depth of 1½ to 3½ feet; clayey below depth of 2 feet.
Well drained; steep.	Rock outcrops; steep.	Rocks on surface or at shallow depth; steep.	Rocks on surface or at shallow depth; steep.	Rocks on surface or at shallow depth; steep.	Rocks on surface or at shallow depth; steep.
Well drained	Slopes in many places.	Slopes in many places.	Erodible; slope	Slopes in many places.	Clay below depth of 3½ feet; slopes in many places.

TABLE 6.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
	Topsoil	Road fill	Highway location	Farm ponds: Reservoir areas	Farm ponds: Embankments
Stendal: Sn	Fair: sandy loam subsoil; seasonal high water table at depth of ½ foot to 1½ feet.	Fair: A-1, A-2, or A-4; seasonal high water table at depth of ½ foot to 1½ feet.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Pervious material; subject to flooding; seasonal high water table at depth of ½ foot to 1½ feet.	Fair stability; fair compaction; hazard of piping.
Strip mines: St. Properties too variable for interpretations to be made.					
Talbott: TaC2, TbD, TbE, TcD3.	Poor: rocky; clayey subsoil.	Poor: A-7; slopes of more than 20 percent in places.	Bedrock at depth of 1½ to 3½ feet; slope; rocky.	Bedrock at depth of 1½ to 3½ feet where creviced.	Fair stability; poor compaction; high compressibility; rock outcrops; limited volume of material.
Tarklin: TkB, TkC	Poor: seasonal high water table at depth of 1½ to 2 feet; cherty.	Fair: A-4	Seasonal high water table at depth of 1½ to 2 feet.	Pervious substratum in places.	Fair stability; fair compaction.
Tilsit. Mapped only with Whitley soils.	Fair: seasonal high water table at depth of 1½ to 2 feet; silty clay loam subsoil.	Poor to fair: A-6 or A-4.	Seasonal high water table at depth of 1½ to 2 feet; bedrock at depth of 3½ to 5 feet.	Seasonal high water table at depth of 1½ to 2 feet; bedrock at depth of 3½ to 5 feet.	Fair stability; fair compaction.
Trimble: TrB, TrC, TrD, TrE.	Fair to poor: chert ranges from 15 to 35 percent.	Fair to poor: A-4 or A-6; some slopes more than 20 percent.	Slopes in some places.	Slopes; moderate permeability.	Fair stability; fair compaction; moderate permeability.
Waynesboro: WaB, WaC, WaD, WaE, WbE3.	Fair: clay loam subsoil.	Poor: A-7; some slopes more than 20 percent.	Slopes in some places.	Moderate permeability.	Fair to good stability; medium to high compressibility.
*Whitley: WhC, WtB. For interpretations of Tilsit part of WtB, refer to Tilsit series.	Fair: silty clay loam subsoil.	Fair to poor: A-4 or A-6.	Bedrock at depth of 3½ to 5 feet.	Bedrock at depth of 3½ to 5 feet; moderate permeability.	Fair to good stability; fair to good compaction: medium compressibility.
WIA, WIB, WIC	Fair: silty clay loam subsoil.	Poor: mostly A-6.	Subject to flooding in a few areas; slopes in places.	Moderate permeability.	Fair to good stability; fair to good compaction; medium compressibility.

properties of the soils—Continued

Soil features affecting—Continued					
Agricultural drainage	Irrigation	Terraces and diversions	Grassed waterways	Foundations for low buildings	Pipeline construction and maintenance
Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Nearly level; on flood plains.	Nearly level; on flood plains.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.	Seasonal high water table at depth of ½ foot to 1½ feet; subject to flooding.
Well drained	Rock outcrop; slopes in places; severe erodibility in places.	Most slopes are more than 8 percent; rocky.	Rocky; erodible; slope.	Bedrock at depth of 1½ to 3½ feet; moderate shrink-swell potential; high compressibility; slope.	Bedrock at depth of 1½ to 3½ feet; clayey subsoil.
Slow permeability in fragipan at depth of 1½ to 2½ feet; seasonal high water table at depth of 1½ to 2 feet.	Slow permeability in fragipan at depth of 1½ to 2½ feet.	Seasonal high water table at depth of 1½ to 2 feet.	Fragipan at depth of 1½ to 2½ feet; cherty; seepage above fragipan.	Seasonal high water table at depth of 1½ to 2 feet.	Seasonal high water table at depth of 1½ to 2 feet; cherty.
Slow permeability in fragipan at depth of 1½ to 2½ feet.	Slow permeability in fragipan at depth of 1½ to 2½ feet; seasonal high water table at depth of 1½ to to 2 feet.	Seasonal high water table at depth of 1½ to 2 feet; fragipan at depth of 1½ to 2½ feet.	Fragipan at depth of 1½ to 2 ½ feet; seasonal high water table at depth of 1½ to 2 feet; seepage above fragipan.	Seasonal high water at depth of 1½ to 2 feet; bedrock at depth of 3½ to 5 feet.	Seasonal high water table at depth of 1½ to 2 feet; bedrock at depth of 3½ to 5 feet.
Well drained	Some slopes of more than 12 percent.	Most slopes of more than 8 percent.	Cherty; slope; erodible.	Slopes in places	Cherty.
Well drained	Slopes in places	Most slopes of more than 8 percent.	Erodible; sloping or steeper in places.	Slope; high compressibility in places.	Clay loam subsoil; slopes in places.
Well drained	Bedrock at depth of 3½ to 5 feet.	Slopes in places	Erodible where sloping.	Bedrock at depth of 3½ to 5 feet; slopes in places.	Bedrock at depth of 3½ to 5 feet.
Well drained	No unfavorable features.	Slopes in places	Erodible where sloping.	Subject to flooding in a few places.	Subject to flooding in a few places.

TABLE 7.—*Engineering*

[Tests made by the Kentucky Department of Highway Research Laboratory.

Soil name, sample number, and location	Parent material	Depth from surface	Mechanical analysis [2]					
			Moisture density [1]		Percentage passing sieve [3]—			
			Maximum dry density	Optimum moisture	1½ in.	1 in.	¾ in.	⅜ in.
		Inches	*Lb./cu. ft.*	*Pct.*				
Hartsells fine sandy loam: S65Ky-100-16; 0.25 mile southwest of Little Lick Campground. (The 6- to 11-inch layer contains more gravel than is typical for the series.)	Sandstone.	6–11	111	13	96	92	91	88
		15–22	116	14	------	------	------	100
		28–34	110	15	------	------	------	------
Shelocta silt loam: S65Ky-100-14; Conrad, Ky., 20 yards up from road. (The 5- to 16-inch and 23- to 32-inch layers contain more sand than is typical for the series.)	Colluvium from sandstone and shale.	5–16	105	18	97	94	91	84
		23–32	113	15	99	93	88	82
		63–84	110	16	------	------	100	99
Tilsit silt loam: S65Ky-100-6; 1 mile from county road on Forest Service Road 122B. (More sandy throughout than is typical for the series.)	Sandstone and shale.	4–14	111	15	------	------	------	------
		28–40	112	16	100	99	99	98
		40–52	102	23	------	------	100	99
Whitley silt loam: S65Ky-100-8; south of Mount Victory. (The 4- to 10-inch layer contains slightly more sand and gravel than is typical for the series.)	Shale, siltstone, and sandstone.	4–10	115	12	------	100	97	95
		21–28	----------	----------	------	------	100	98
		38–42	103	20	100	99	99	97

[1] Based on AASHO Designation T 99–57 (*1*).
[2] Mechanical analyses according to AASHO Designation T 88–57 (*1*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes of soils.

Estimated soil properties significant to engineering

Table 5 provides estimates of soil properties important to engineering. The properties are shown for a representative profile of each soil series. A complete description of each soil is given in the section "Descriptions of the Soils." The estimates are based on field classification and descriptions, on test data from comparable soils in adjacent areas, and on field experience. Although the information strictly applies only to soil depths indicated in table 5, it is reasonably reliable to a depth of about 6 feet for most soils and more than 6 feet for some soils.

Some of the properties shown in the table need no explanation. Others are defined in the Glossary or explained as follows:

Seasonal high water table refers to the highest annual level of saturation by water in the soil profile, either as perched water that is separated from the ground water by a nearly impervious soil layer or as part of the ground water.

USDA texture (*16*) is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter.

Permeability, as used in table 5, relates only to movement of water downward through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, surface crusts, and other properties that result from use of the soils are not considered.

Available moisture capacity is the capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point. It is expressed as inches of water per inch of soil.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH value and relative terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential indicates the volume change to be expected when moisture content of soil material changes. The shrinking and swelling of soils greatly damages foundations, roads, and other structures. A high shrink-swell potential indicates hazards to the maintenance of structures constructed in, on, or with soil material.

test data

Absence of an entry indicates that no determination was made]

Mechanical analysis[2]—Continued									Liquid limit	Plasticity index	Classification		
Percentage passing sieve[3]—Continued					Percentage smaller than—						AASHO[4]	Unified	Specific gravity[5]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.26 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.					
									Pct.				
87	86	83	80	40	25	18	11	9	[6] NP	[6] NP	A-4(1)	SM	2.64
99	99	98	98	50	40	28	18	15	NP	NP	A-4(3)	SM	2.63
--------	--------	--------	100	25	19	14	9	7	NP	NP	A-2-4(0)	SM	2.69
77	70	66	65	60	53	37	20	11	33	8	A-4(5)	ML-CL	2.68
75	66	59	57	47	43	32	18	13	27	7	A-4(3)	ML-CL	2.72
98	98	95	94	88	83	62	36	26	31	7	A-4(8)	ML-CL	2.66
--------	100	95	92	71	62	46	27	18	23	3	A-4(7)	ML	2.61
97	96	93	90	71	64	49	32	26	25	5	A-4(7)	ML-CL	2.65
99	98	97	95	78	71	57	42	37	40	12	A-6(9)	ML	2.69
91	88	87	86	67	59	39	17	9	19	2	A-4(7)	ML	2.62
97	95	93	92	83	75	60	42	35	40	9	A-4(8)	ML	2.72
95	93	90	89	81	60	39	32	22	34	9	A-4(8)	ML-CL	2.71

[3] Material larger than 3 inches discarded from sample.
[4] Based on AASHO Designation M 145-49 (*1*).
[5] Based on AASHO Designation T 100-60 (*1*).
[6] NP=Nonplastic.

Interpretations of engineering properties

Table 6 contains selected information useful to engineers and others who plan to use soil material in constructing highways, farm facilities, buildings, and pipelines. Detrimental or undesirable features are emphasized. The ratings and other interpretations in this table are based on estimated engineering properties of the soils indicated in table 5; on available test data; and on field experience.

Topsoil is soil material used to cover or resurface an area where vegetation is to be established and maintained. The ratings indicate suitability for such use.

Road fill is soil material used to build road embankments. The ratings indicate performance of soil material moved from borrow areas for this purpose.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. The soil features are the principal ones that affect geographic location of highways.

Farm pond reservoir areas are affected mainly by seepage loss of water, and the soil features are those that influence such seepage. Slope affects storage capacity.

Farm pond embankments serve as dams. The features of disturbed soils are considered for this purpose, and properties of both the subsoil and the substratum are evaluated.

Drainage for crops and pasture is influenced by features of the undisturbed soil that affect the installation and performance of surface and subsurface drainage installations.

Irrigation is affected by features of undisturbed soil that influences soil-moisture relations and the potential of a soil to produce specific crops. Before an irrigation project is planned, a feasibility study made by a qualified consultant is desirable.

Terraces and diversions are affected by soil features that influence their stability or hinder layout and construction. Diversions are also affected by hazards of sedimentation in channels and the difficulty of establishing and maintaining cover.

Grassed waterways are affected by soil features that influence the establishment, growth, and maintenance of plants or affect layout and construction.

Foundations for low buildings are affected chiefly by

features of the undisturbed soil that influence its capacity to support low buildings that have normal foundation loads. Specific values of bearing strength are not assigned.

Pipeline construction and maintenance are affected by depth to rock, hazard of flooding, and high water table.

The soils are not rated for suitability as a source of sand and gravel, because no known suitable sources are in the county.

Engineering test data

Table 7 contains the results of engineering test performed by the Kentucky Department of Highway Research Laboratory on several important soils in Pulaski County. The table shows the specific location where samples were taken, the depth to which sampling was done, and the results of tests to determine particle-size distribution and other properties significant to soil engineering.

Maximum dry density is the maximum unit dry weight of the soil when it has been compacted with optimum moisture by the prescribed method of compaction. The moisture content that gives the highest dry unit weight is called the *optimum moisture content* for the specific method of compaction.

Mechanical analyses show the percentages, by weight, of soil particles that pass through sieves of specified sizes. Sand and other coarse materials do not pass the No. 200 sieve. Silt and clay pass the No. 200 sieve. Silt is that material larger than 0.002 millimeter in diameter that passes the No. 200 sieve, and clay is that fraction passing the No. 200 sieve that is smaller than 0.002 millimeter in diameter. The clay fraction was determined by the hydrometer method, rather than by the pipette method used by most soil scientists to determine the clay in soil samples.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a solid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from solid to plastic. The liquid limit is the moisture content at which the material changes from plastic to liquid. The *plasticity index* is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

The AASHO and Unified classifications have been explained earlier in the engineering section.

Specific gravity is the weight of the soil solids, excluding pore space, compared to the weight of an equal volume of water at a specified temperature.

Use of the Soils for Town and Country Planning

Soils are an important consideration in planning most town and country developments. The interpretations in this section point out soil-related limitations and problems expected to be encountered in such uses. The most severe limitations listed can be overcome if the cost involved can be justified. The information in this section is not intended to eliminate the need for onsite investigations of the soils for specific uses but, rather, to serve as a guide in screening sites and in planning more detailed investigations.

Table 8 shows the estimated degree of limitation and the kinds of limitation to use of the soils for selected town and country purposes. A rating of *slight* indicates that limitations, if any, are minor and are easy to overcome. A rating of *moderate* indicates that limitations are of a magnitude to require careful planning, design, and management. Cost of corrective measures is an important consideration. A rating of *severe* indicates that soil properties are so unfavorable that limitations are difficult and costly to overcome, and use of the soil for the intended purpose generally is not practical.

In table 8 the kinds of limitations, expressed in terms of soil characteristics or properties, are shown only if the degree of limitation is more than slight.

The criteria used to rate the soil limitations vary somewhat in accordance with the intended use. The ratings in table 8 are based on the following factors:

Septic tank filter fields.—Ratings for this use are based on soil permeability, depth to seasonal high water table, depth to bedrock, surface rockiness and stoniness, slope, and hazard of flooding. Possible pollution hazards to a water supply source are not considered in table 8, but such hazards would be a severe limitation.

Sewage lagoons.—Sewage lagoons are shallow ponds that are used for disposal of sewage by oxidation. Ratings for this use are based on such soil properties as permeability (basin floor), slope, depth to bedrock, quantity of coarse fragments (less than 10 inches in diameter), surface stoniness, kind of soil material at site, hazard of flooding, and content of organic matter in the soil.

Homesites or service buildings.—This use includes dwellings and service buildings limited to three stories or less with or without basements. Ratings are based on such soil properties as depth to seasonal water table, depth to bedrock, slope, surface rockiness and stoniness, hazard of flooding, frost action, and shrink-swell potential. Slope is more restrictive for subdivision locations than for other areas.

Camp areas.—Ratings for this intensive use are based on such soil properties as depth to bedrock, permeability, depth to seasonal high water table, surface rockiness and stoniness, texture of surface layer, and hazard of flooding. Slope is more restrictive for trailer parks than for tent areas.

Streets and low-cost roads.—Ratings for this use are based on such soil properties as depth to seasonal high water table, slope, depth to rock, surface rockiness and stoniness, and hazard of flooding.

Playgrounds.—This intensive use for such sports as baseball, football, and volley ball generally requires a nearly level finished area that will be subject to heavy foot traffic. Ratings are based on such soil properties as depth to seasonal high water table, permeability, slope depth to bedrock, surface rockiness and stoniness, texture of the surface layer, and hazard of flooding.

Picnic areas.—These areas are subject to less intensive use than playgrounds. The ratings are based on such soil

properties as depth to seasonal high water table, slope, depth to bedrock, surface stoniness and rockiness, texture of the surface layer, and hazard of flooding. These factors are less restrictive for picnic areas than for playgrounds.

Paths and trails.—These areas are intended for nonintensive uses, such as cross-country hiking and bridle paths, that allow random movement of people. It is assumed that the areas will be used as they occur in nature. Ratings are based on such soil properties as wetness, slope, surface rockiness and stoniness, texture of the surface layer, and hazard of flooding.

Lawns, landscaping, and golf fairways.—The soils are rated for these uses under the assumption that soil material at the site will be used, rather than trucked-in fill or topsoil. The ratings are based on depth to seasonal high water table, slope, depth to bedrock, surface stoniness and rockiness, texture of the surface layer, and hazard of flooding.

Cemeteries.—Cemeteries considered are of the community type. It is assumed that soil material at the site will be used, rather than trucked-in fill or topsoil. The ratings are based on such soil properties as depth to seasonal high water table, slope, permeability, depth to bedrock, surface rockiness and stoniness, texture of the surface layer, and hazard of flooding.

Sanitary landfill.—The soils are rated in terms of suitability for use as disposal areas for trash and garbage. It is assumed that the operation will be by the trench method. No importation of fill or cover material is considered in the ratings. The ratings are based on such soil properties as depth to seasonal high water table, permeability, slope, depth to bedrock, surface stoniness and rockiness, texture of the surface layer, and hazard of flooding.

Formation and Classification of Soils

This section describes the factors of soil formation and their relationship to the soils in Pulaski County. The current system of soil classification is explained, and the soil series in the county are placed in some categories of that system and of the former system.

Formation of Soils

The characterstics of the soil at any given point depend on the physical and chemical composition of parent material, on climate, plant and animal life, relief, and time. Soil is formed by the interaction of these five factors. The relative importance of each factor differs from one area to another. In some areas one factor may dominate in the formation of soil characteristics, and in other areas another factor may dominate. Climate and plant and animal life are not likely to vary much in an area the size of a county, but there may be many local differences in relief and parent material.

Because the interrelationships among the five factors of soil formation are complex, the effects of any one factor are hard to determine. Some of the ways that each of these factors has influenced soil formation in Pulaski County are described in the following paragraphs.

Parent material

Parent material is the unconsolidated mass in which a soil formed. The soils in Pulaski County formed mostly in residual material weathered from the underlying rock, in alluvium washed from uplands and deposited along streams and in depressions, and in colluvium moved a relatively short distance from a higher position to a lower position. Most of the parent material weathered from rock formations that consist mainly of limestone, sandstone, and shale. For example, Cumberland and Pembroke soils formed in material weathered from limestone, Hartsells soils in material weathered from sandstone, and Muse soils in material weathered mostly from shale. Nolin soils formed in alluvium, and Shelocta and Jefferson soils formed in colluvium.

The chemical composition, mineral content, and texture of the soils in the county have been influenced greatly by the kind of parent material in which the soils formed. For example, Dekalb soils, which formed in material weathered from sandstone, are coarser textured than Frederick soils, which formed in material weathered mostly from limestone. Nolin soils and other alluvial soils have the same general composition as the surrounding soils on uplands from which the soil material was derived.

Climate

Climate affects the physical, chemical, and biological relationships in the soil. It influences the kind and number of plants and animals, the weathering of rocks and minerals, erosion, and the rate of soil formation.

The soils of Pulaski County formed in a temperate, moist climate. Because the soils were moist and were subject to leaching during formation, the soluble bases have been largely leached out of the solum, and clay minerals have moved from the surface layer into the subsoil. As a result, such soils as Frederick, Muse, and Waynesboro soils are acid and have a high content of clay in the subsoil. Climate has been a relatively uniform factor within the county and accounts for only very slight differences among soils.

Plant and animal life

The vegetation that grows in an area influences the kind of soil that forms. Soils in Pulaski County formed mostly under hardwood trees, and almost all have the relatively thin, light-colored surface layer that is typical of soils that formed under trees. Examples are Frederick and Mountview soils, which have a brown surface layer about 8 inches thick.

The organisms that live in the soil serve an important function in soil formation by breaking down plant and animal residue. When this residue is broken down, minerals are released, and humus, which aids in building soil structure, is formed.

Man has some influence in the formation of soils. He affects the future course of soil development by such practices as cultivation, irrigation, and drainage; introduction of new vegetation; and removal of part of the original soil.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Allegheny:					
AlB	Slight	Severe: moderately rapid permeability in substratum.	Slight	Slight	Slight
AlC	Moderate: slope	Severe: moderately rapid permeability in substratum.	Slight	Slight	Moderate: slope
Ashton: As	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Moderate: hazard of flooding.
Bedford:					
BeA	Severe: slow permeability; some areas subject to flooding.	Generally slight. Severe where there is a hazard of flooding.	Generally moderate: seasonal high water table. Severe where there is a hazard of flooding.	Generally moderate: seasonal high water table. Severe where there is a hazard of flooding.	Moderate: slow permeability.
BeB	Severe: slow permeability; some areas subject to flooding.	Generally moderate: slope. Severe where there is a hazard of flooding.	Generally moderate: seasonal high water table. Severe where there is a hazard of flooding.	Generally moderate: seasonal high water table. Severe where there is a hazard of flooding.	Moderate: slow permeability.
Brookside: BrF.					
Brookside soil.	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.	Severe: slope; shallow to bedrock.	Severe: slope; shallow to bedrock.	Severe: slope; shallow to bedrock; extremely rocky.	Severe slope; shallow to bedrock; extremely rocky.	Severe: slope; extremely rocky.
Chagrin:					
Cg	Severe: hazard of flooding.	Severe: hazard of flooding; moderately rapid permeability in substratum.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Ch	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Colyer: CoE	Severe: shallow to hard shale; slope; slow permeability.	Severe: shallow to hard shale; slope.	Severe: shallow to hard shale; slope.	Severe: shallow to hard shale; slope.	Severe: slope

See footnote at end of table.

for town and country planning

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill[1]
Moderate: most soil material is ML or CL.	Moderate: slope.	Slight	Slight	Slight	Slight	Severe: moderately rapid permeability in substratum.
Moderate: slope; most soil material is ML or CL.	Severe: slope	Moderate: slope.	Slight	Moderate: slope.	Moderate: slope.	Severe: moderately rapid permeability in substratum.
Severe: hazard of flooding.	Severe: hazard of flooding.	Slight	Slight	Moderate: hazard of flooding.	Severe: hazard of flooding.	Severe: subject to flooding.
Generally moderate: seasonal high water table; ML or CL soil material. Severe where there is a hazard of flooding.	Moderate: slow permeability.	Slight	Slight	Generally slight. Severe where there is a hazard of flooding.	Severe: slow permeability; hazard of flooding in some areas.	Generally moderate: seasonal high water table. Severe where there is a hazard of flooding.
Generally moderate: seasonal high water table; ML or CL soil material. Severe where there is a hazard of flooding.	Moderate: slow permeability; slope.	Slight	Slight	Generally slight. Severe where there is a hazard of flooding.	Severe: slow permeability; hazard of flooding in some areas.	Generally slight. Severe where there is a hazard of flooding.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope; shallow to bedrock; surface is rocky.	Severe: slope; shallow to bedrock; rocky.	Severe: slope; rocky.	Severe: slope; rocky.	Severe: slope; shallow to bedrock; rocky.	Severe: slope; shallow to bedrock; rocky.	Severe: shallow to bedrock; slope; rocky.
Moderate: hazard of flooding.	Severe: hazard of flooding.	Moderate: hazard of flooding.	Slight	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Severe: hazard of flooding.	Severe: coarse fragments on surface; hazard of flooding.	Moderate: hazard of flooding; coarse fragments on surface.	Moderate: coarse fragments on surface.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Severe: shallow to hard shale; slope.	Severe: shallow to hard shale; slope.	Severe: slope	Severe: slope	Severe: shallow to hard shale; slope.	Severe: shallow to hard shale; slope.	Severe: shallow to hard shale; slope.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Cumberland:					
CuB	Moderate: moderate permeability.	Moderate: slope; moderate permeability.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Slight
CuC	Moderate: slope; moderate permeability.	Severe: slope	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Moderate: slope; coarse fragments.
CvB	Moderate: moderate permeability.	Moderate: slope; coarse fragments; moderate permeability.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Slight to moderate: coarse fragments.
CvC	Moderate: slope; moderate permeability.	Severe: slope	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Moderate: slope; coarse fragments.
CvD	Severe: slope	Severe: slope	Moderate: slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Severe: slope
CwD3	Severe: slope	Severe: slope	Moderate: slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Severe: slope
Dekalb:					
DeC	Severe: moderately deep to bedrock.	Severe: rapid permeability; moderately deep to bedrock; slope.	Severe: moderately deep to bedrock.	Severe: moderately deep to bedrock.	Moderate: slope
DrD:					
Dekalb soil	Severe: moderately deep to bedrock; slope.	Severe: rapid permeability; moderately deep to bedrock; slope.	Severe: moderately deep to bedrock.	Severe: moderately deep to bedrock.	Severe: slope
Rock outcrop	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock.	Severe: shallow to bedrock.	Severe: slope
DrE:					
Dekalb	Severe: moderately deep to bedrock; slope.	Severe: rapid permeability; moderately deep to bedrock; slope.	Severe: moderately deep to bedrock; slope.	Severe: moderately deep to bedrock; slope.	Severe: slope
Rock outcrop.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope.	Severe: slope
Etowah:					
EtB	Slight	Moderate: slope; coarse fragments.	Slight	Slight	Slight to moderate; coarse fragments on surface.
EtC	Moderate: slope	Severe: slope	Slight	Slight	Moderate: coarse fragments; slope.

See footnote at end of table.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill[1]
Moderate to severe: CL or CH.	Moderate: slope.	Slight	Slight	Slight	Slight	Severe: clayey.
Moderate to severe: CL to CH.	Severe: slope	Moderate: slope; coarse fragments.	Moderate: coarse fragments.	Moderate: slope.	Moderate: slope.	Severe: clayey.
Moderate to slight: CL or GC.	Moderate to severe: slope; coarse fragments on surface.	Slight to moderate: coarse fragments on surface.	Slight to moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Slight	Severe: clayey.
Moderate: CL or GC; slope.	Severe: slope	Moderate: slope.	Slight to moderate: coarse fragments on surface.	Moderate: slope.	Moderate: slope.	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Moderate: coarse fragments on surface.	Severe: slope	Severe: slope	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Moderate: coarse fragments on surface; texture.	Severe: slope; erodible.	Severe: slope; erodible.	Severe: clayey.
Severe: moderately deep to bedrock.	Severe: slope	Moderate: slope.	Slight	Moderate: moderately deep to bedrock; slope.	Severe: moderately deep to bedrock.	Severe: rapid permeability; moderately deep to bedrock.
Severe: moderately deep to bedrock; slope.	Severe: slope	Severe: slope	Moderate: slope; rocky.	Severe: slope; rocky.	Severe: moderately deep to bedrock; slope; rocky.	Severe: rapid permeability; moderately deep to bedrock; rocky.
Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope; rocky.	Severe: slope	Moderate: rockiness.	Severe: shallow to bedrock; slope; rocky.	Severe: shallow to bedrock; slope; rocky.	Severe: shallow to bedrock; rocky.
Severe: moderately deep to bedrock; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope; rocky.	Severe: moderately deep to bedrock; slope; rocky.	Severe: rapid permeability; moderately deep to bedrock; slope; rocky.
Severe: shallow to bedrock; slope.	Severe: shallow to bedrock; slope; rocky.	Severe: slope	Severe: slope	Severe: shallow to bedrock; slope; rocky.	Severe: shallow to bedrock; slope; rocky.	Severe: shallow to bedrock; slope; rocky.
Moderate: CL or ML-CL.	Moderate to severe: coarse fragments on surface; slope.	Slight to moderate: coarse fragments on surface.	Slight to moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Slight	Slight.
Moderate: slope; CL or ML-CL.	Severe: coarse fragments on surface; slope.	Moderate: coarse fragments; slope.	Slight to moderate: coarse fragments on surface.	Moderate: coarse fragments on surface; slope.	Moderate: slope.	Slight.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Frankstown:					
FcB	Severe: moderately deep to deep to bedrock.	Moderate: moderately deep to deep to bedrock; slope.	Moderate: moderately deep to deep to bedrock.	Slight to moderate: moderately deep to deep to bedrock.	Slight to moderate: coarse fragments on surface.
FcC	Severe: moderately deep to deep to bedrock.	Severe: slope	Severe: moderately deep to deep to bedrock.	Moderate to severe: moderately deep to deep to bedrock.	Moderate: slope
FcD	Severe: moderately deep to deep to bedrock; slope.	Severe: slope	Severe: moderately deep to deep to bedrock.	Moderate to severe: moderately deep to deep to bedrock.	Severe: slope
FcE	Severe: moderately deep to deep to bedrock.	Severe: slope	Severe: moderately deep to deep to bedrock; slope.	Severe: slope	Severe: slope
Frederick:					
FdB	Moderate: moderate permeability.	Moderate: slope	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Slight
FdC	Moderate: moderate permeability; slope.	Severe: slope	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Moderate: slope
FdD	Severe: slope	Severe: slope	Moderate: slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Severe: slope
FdE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
FeC3	Moderate: moderate permeability; slope.	Severe: slope	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Moderate: slope
FeD3	Severe: slope	Severe: slope	Moderate: slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Severe: slope
FfE For Jefferson part, refer to Jefferson series, JeE.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

See footnote at end of table.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill [1]
Moderate: moderately deep to deep to bedrock; GC or CL.	Moderate to severe: coarse fragments on surface; slope.	Slight to moderate: coarse fragments on surface.	Slight to moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate to severe: moderately deep to deep to bedrock.	Severe: moderately deep to deep to bedrock.
Moderate: moderately deep to deep to bedrock; slope; GC or CL.	Severe: coarse fragments on surface; slope.	Moderate: slope.	Slight to moderate: coarse fragments on surface.	Moderate: coarse fragments on surface; slope.	Moderate to severe: moderately deep to deep to bedrock.	Severe: moderately deep to deep to bedrock.
Severe: slope	Severe: coarse fragments on surface; slope.	Severe: slope	Moderate: coarse fragments on surface; slope.	Severe: slope	Severe: moderately deep to deep to bedrock; slope.	Severe: moderately deep to deep to bedrock.
Severe: slope	Severe: coarse fragments on surface; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: moderately deep to deep to bedrock; slope.	Severe: moderately deep to deep to bedrock; slope.
Moderate: CL or MH-CH.	Moderate: slope.	Slight	Slight	Slight	Slight	Severe: clayey.
Moderate: slope; CL or MH-CH.	Severe: slope	Moderate: slope.	Slight	Moderate: slope.	Moderate: slope.	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Severe: slope	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; clayey.
Moderate: slope; CL or MH-CH.	Severe: slope	Moderate: slope.	Slight	Severe: slope; erodible.	Severe: slope; erodible.	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope; erodible.	Severe: slope; erodible.	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; clayey.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Fredonia:					
FkD:					
Fredonia soil.	Severe: moderately deep over bedrock; slope; moderately slow permeability.	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock; slope.	Moderate to severe: slope; rocky.
Frederick soil.	Severe to moderate: slope.	Severe: slope	Moderate: slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Moderate to severe: slope; rocky.
FlD3:					
Fredonia soil.	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock; slope.	Moderate to severe: slope.
Frederick soil.	Severe to moderate: slope.	Severe: slope	Moderate: slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Moderate to severe: slope; rocky.
FrE	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope; surface is rocky.	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Severe: surface is rocky; slope.
Garmon: GmF.					
Garmon soil	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Severe: slope	Severe: slope.
Trimble soil	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Gilpin: GnD	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope; rapid permeability.	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock; slope.	Severe: slope

See footnotes at end of table.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill [1]
Severe: moderately deep over bedrock; surface is rocky; CH in some places.	Severe: slope	Moderate to severe: slope.	Moderate to slight: slope.	Severe to moderate: slope.	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; surface is rocky; clayey.
Moderate to severe: slope; CL or MH–CH.	Severe: slope	Moderate to severe: slope.	Slight to moderate: slope.	Moderate to severe: slope.	Moderate to severe: slope.	Severe: clayey; rocky.
Severe: moderately deep over bedrock; surface is rocky; CH in some places.	Severe: slope	Moderate to severe: slope.	Moderate: surface is rocky; surface soil texture.	Severe: slope; erodible.	Severe: moderately deep over bedrock; slope; erodible.	Severe: moderately deep over bedrock; surface is rocky; clayey.
Moderate to severe: slope; CL or MH–CH.	Severe: slope	Moderate to severe: slope.	Slight to moderate: slope.	Severe: slope; erodible.	Severe: slope; erodible.	Severe: clayey.
Severe: moderately deep over bedrock; surface is rocky; CH in some places.	Severe: slope; surface is rocky.	Severe: slope	Severe to moderate: slope.	Severe: slope	Severe: moderately deep over bedrock; surface is rocky.	Severe: moderately deep over bedrock; slope.
Severe: moderately deep over bedrock; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; rapid permeability.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Hartsells:					
HaC	Severe: moderately deep over bedrock.	Severe: rapid permeability in substratum; moderately deep over bedrock; slope.	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock; slope.	Moderate: slope
HaD	Severe: moderately deep over bedrock; slope.	Severe: rapid permeability in substratum; moderately deep over bedrock; slope.	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock; slope.	Severe: slope
HaE	Severe: moderately deep over bedrock; slope.	Severe: rapid permeability in substratum; moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Severe: slope
HrB	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock: moderately rapid permeability.	Severe: moderately deep over bedrock.	Moderate: moderately deep over bedrock.	Slight
Huntington: Hu	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Jefferson:					
JeE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
JfC	Moderate: slope. Severe where permeability is moderately slow.	Severe: slope	Slight	Slight	Moderate: slope; coarse fragments.
JfD	Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope
JlE	Severe: slope	Severe: moderately rapid permeability; slope; coarse fragments.	Severe: slope; stoniness.	Severe: slope; stoniness.	Severe: slope
JlF	Severe: slope	Severe: moderately rapid permeability; slope; coarse fragments.	Severe: slope; stoniness.	Severe: slope; stoniness.	Severe: slope
Lawrence: La	Severe: slow permeability; subject to flooding in places; seasonal high water table.	Generally slight to moderate: slope. Severe where there is a hazard of flooding.	Severe: seasonal high water table; subject to flooding in places.	Severe: seasonal high water table; subject to flooding in places.	Moderate: wetness; slow permeability.

See footnote at end of table.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill [1]
Severe: moderately deep over bedrock.	Severe: slope	Moderate: slope.	Slight	Moderate: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock; rapid permeability in substratum.
Severe: moderately deep over bedrock; slope.	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; rapid permeability in substratum.
Severe: moderately deep over bedrock; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope; rapid permeability in substratum.
Severe: moderately deep over bedrock.	Moderate: moderately deep over bedrock; slope.	Slight	Slight	Moderate: moderately deep over bedrock.	Severe; moderately deep over bedrock.	Severe: moderately deep over bedrock; moderately rapid permeability.
Severe: hazard of flooding.	Severe: hazard of flooding.	Moderate: hazard of flooding.	Slight	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: moderately deep over bedrock; slope.
Moderate: slope; ML or CL in places.	Severe: slope; coarse fragments.	Moderate: slope.	Moderate: coarse fragments.	Moderate: slope.	Moderate: slope.	Severe: moderately rapid permeability.
Severe: slope	Severe: slope; coarse fragments.	Severe: slope	Moderate: slope; coarse fragments.	Severe: slope	Severe: slope	Severe: moderately rapid permeability.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; stoniness.	Severe: slope; stoniness.	Severe: slope; moderately rapid permeability.
Severe: slope	Severe: slope; stoniness.	Severe: slope	Severe: slope	Severe: slope; stoniness.	Severe: slope; stoniness.	Severe: slope; stoniness; moderately rapid permeability.
Generally moderate; seasonal high water table; ML or ML–CL. Severe where there is a hazard of flooding.	Moderate: wetness; slow permeability; subject to flooding in places.	Moderate: wetness.	Moderate: wetness.	Moderate: seasonal high water table; subject to flooding in places.	Severe: seasonal high water table; slow permeability; subject to flooding in places.	Severe to moderate: seasonal high water table; subject to flooding in places.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Lindside: Ld	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Melvin: Me	Severe: seasonal high water table; hazard of flooding.	Severe: hazard of flooding.	Severe: seasonal high water table; hazard of flooding.	Severe: seasonal high water table; hazard of flooding.	Severe: wetness; hazard of flooding.
Monongahela: MgB	Severe: slow permeability; subject to flooding in places; seasonal high water table.	Generally moderate: slope; SM or ML in places. Severe where there is hazard of flooding.	Generally moderate: seasonal high water table. Severe where there is hazard of flooding.	Generally moderate: seasonal high water table. Severe where there is hazard of flooding.	Moderate: slow permeability.
Mountview: MnB	Severe: moderately slow permeability in lower part of subsoil.	Moderate: slope	Slight	Slight	Slight
MnC	Severe: slope; moderately slow permeability in lower part of subsoil.	Severe: slope	Slight	Slight	Moderate: slope
MnD	Severe: slope; moderately slow permeability in lower part of subsoil.	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope
Muse: MoC	Severe: moderately slow permeability.	Severe: slope	Moderate to severe: moderately deep over bedrock; moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Moderate: slope
MoD	Severe: moderately slow permeability; slope.	Severe: slope	Moderate to severe: moderately deep over bedrock; slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Severe: slope
MsC3	Severe: moderately slow permeability.	Severe: slope	Moderate to severe: moderately deep over bedrock; moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.	Moderate: slope
MsD3	Severe: moderately slow permeability; slope.	Severe: slope	Moderate to severe: moderately deep over bedrock; slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Severe: slope

See footnote at end of table.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill [1]
Severe: hazard of flooding.	Severe: hazard of flooding.	Moderate: hazard of flooding.	Slight	Severe: hazard of flooding.	Severe: seasonal high water table; hazard of flooding.	Severe: hazard of flooding.
Severe: seasonal high water table; hazard of flooding.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: seasonal high water table; hazard of flooding.	Severe: seasonal high water table; hazard of flooding.	Severe: seasonal high water table; hazard of flooding.
Generally moderate: seasonal high water table; ML or CL. Severe where there is hazard of flooding.	Moderate: slow permeability; slope.	Slight	Slight	Generally slight; Severe where there is hazard of flooding.	Severe: slow permeability; hazard of flooding in places.	Slight.
Moderate: ML or CL.	Moderate: slope.	Slight	Slight	Slight	Slight	Slight.
Moderate: slope; ML or CL.	Severe: slope	Moderate: slope.	Slight	Moderate: slope.	Moderate: slope.	Slight.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Severe: slope	Moderate slope.
Moderate: slope; moderately deep over shale; ML-CL or CL.	Severe: slope	Moderate: slope.	Slight	Moderate: slope.	Moderate: slope; moderately deep over bedrock.	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Severe: slope	Severe: clayey.
Moderate: slope; moderately deep over shale; ML-CL or CL.	Severe: slope	Moderate: slope.	Moderate: silty clay loam surface layer.	Severe: slope; erodible.	Severe: slope; erodible.	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope; silty clay loam surface layer.	Severe: slope; erodible.	Severe: slope; erodible.	Severe: clayey.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
MtD:					
Muse soil	Severe: moderately slow permeability; slope.	Severe: slope	Moderate to severe: moderately deep over bedrock; slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Severe: slope
Hartsells soil	Severe: moderately deep over bedrock; slope.	Severe: moderately rapid permeability; moderately deep over bedrock; slope.	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock.	Severe: slope
MuD:					
Muse soil	Severe: moderately slow permeability; slope.	Severe: slope	Moderate to severe: moderately deep over bedrock; slope; moderate shrink-swell potential.	Moderate: slope; moderate shrink-swell potential.	Severe: slope
Shelocta soil	Severe: slope	Severe: slope	Moderate: less than 5 feet deep over bedrock in places; slope.	Moderate: slope	Severe: slope
MuE, MuF:					
Muse soil	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shelocta soil	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
MuE3:					
Muse soil	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shelocta soil	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Needmore:					
NcC2	Severe: moderately slow permeability; moderately deep over bedrock.	Severe: slope; moderately deep over bedrock.	Moderate to severe: moderately deep over bedrock; moderate shrink-swell potential.	Moderate to severe: moderately deep over bedrock; moderate shrink-swell potential.	Moderate: moderately slow permeability; slope; silty clay loam surface layer.
NdD	Severe: moderately slow permeability; moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Moderate to severe: moderately deep over bedrock; slope.	Severe: silty clay surface layer in places; slope.
Newark:					
Ne	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding.	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding.
Ng	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding; moderately rapid permeability.	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding.

See footnote at end of table.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill [1]
Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope	Severe: slope	Severe: clayey.
Severe: moderately deep over bedrock; slope.	Severe: slope	Severe: slope	Moderate: slope	Severe: slope	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; moderately rapid permeability.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope	Severe: slope	Severe: clayey.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope; coarse fragments in some places.	Severe: slope	Severe: slope	Moderate: less than 5 feet deep over bedrock in places; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; clayey.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; erodible.	Severe: slope; erodible.	Severe: slope; clayey.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; erodible.	Severe: slope; erodible.	Severe: slope.
Moderate to severe: moderately deep over shale; MH-CH, CL, or CH.	Severe: slope	Moderate: silty clay loam surface layer; slope.	Moderate: silty clay loam surface layer.	Moderate: slope	Moderate to severe: moderately deep over bedrock.	Severe: moderately deep over bedrock; clayey.
Severe: slope; MH-CH or CH in some places	Severe: silty clay surface layer in places; slope.	Severe: silty clay surface layer in places; slope.	Severe: silty clay surface layer in places.	Severe: slope	Severe: slope; silty clay surface layer in places; moderately deep over bedrock.	Severe: moderately deep over bedrock; clayey.
Severe: hazard of flooding.	Severe: hazard of flooding.	Moderate: wetness; hazard of flooding.	Moderate: wetness.	Severe: hazard of flooding.	Severe: seasonal high water table; hazard of flooding.	Severe: seasonal high water table; subject to flooding.
Severe: hazard of flooding.	Severe: coarse fragments on surface; hazard of flooding.	Moderate: wetness; hazard of flooding; coarse fragments on surface.	Moderate: wetness; coarse fragments on surface.	Severe: hazard of flooding.	Severe: seasonal high water table; hazard of flooding.	Severe: seasonal high water table; subject to flooding.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Nolichucky:					
NkC	Moderate: slope	Severe: slope	Slight	Slight	Moderate: slope
NkD	Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope
Nolin: No	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Pembroke:					
PeB	Slight	Moderate: moderate permeability; slope.	Slight	Slight	Slight
PeC	Moderate: slope	Severe: slope	Slight	Slight	Moderate: slope
Pope: Po	Severe: hazard of flooding.	Severe: moderately rapid permeability; hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: hazard of flooding.
Robertsville: Ro	Severe: seasonal high water table; slow permeability; hazard of flooding in some places.	Slight where there is no hazard of flooding. Severe where there is a hazard of flooding.	Severe: seasonal high water table; hazard of flooding in some places.	Severe: seasonal high water table; hazard of flooding in some places.	Severe: wetness
Rockcastle: RsE	Severe: slow permeability; moderately deep over soft shale.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shelocta:					
SgC	Moderate: slope	Severe: slope	Slight	Slight	Moderate: slope; coarse fragments on surface.
SgD	Severe: slope	Severe: slope	Moderate: less than 5 feet deep over bedrock in some places; slope.	Moderate: slope	Severe: slope
ShD:					
Shelocta soil	Severe: slope	Severe: slope	Moderate: less than 5 feet deep over bedrock in places; slope.	Moderate: slope	Severe: slope
Jefferson soil	Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope

See footnote at end of table.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill[1]
Moderate: slope; ML–CL or CL in some places.	Severe: slope	Moderate: slope.	Slight	Moderate: slope.	Moderate: slope.	Moderate: clay loam.
Severe: slope	Severe: slope	Severe: slope	Moderate: slope.	Severe: slope	Severe: slope	Moderate: slope; clay loam.
Severe: hazard of flooding.	Severe: hazard of flooding.	Moderate: hazard of flooding.	Slight	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: subject to flooding.
Moderate: ML or ML–CL	Moderate: slope.	Slight	Slight	Slight	Slight	Moderate: silty clay loam.
Moderate: slope; ML or ML–CL	Severe: slope	Moderate: slope.	Slight	Moderate: slope.	Moderate: slope.	Moderate: silty clay loam.
Severe: hazard of flooding.	Severe: hazard of flooding.	Moderate: hazard of flooding.	Slight	Severe: hazard of flooding.	Severe: hazard of flooding.	Severe: subject to flooding.
Severe: seasonal high water table; hazard of flooding in some places.	Severe: wetness	Severe: wetness	Severe: wetness	Severe: seasonal high water table; hazard of flooding in some places.	Severe: seasonal high water table; slow permeability; hazard of flooding in some places.	Severe: seasonal high water table; hazard of flooding in some places.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; slow permeability.	Severe: slope; clayey.
Moderate: slope; ML–CL in some places.	Severe: slope; coarse fragments on surface.	Moderate: slope; coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: slope; coarse fragments on surface.	Moderate: slope.	Slight.
Severe: slope	Severe: slope; coarse fragments on surface.	Severe: slope	Moderate: slope; coarse fragments on surface.	Severe: slope	Severe: slope	Moderate to severe: less than 5 feet deep over bedrock in some places; slope.
Severe: slope	Severe: slope; coarse fragments on surface.	Severe: slope	Moderate: slope; coarse fragments on surface.	Severe: slope	Severe: slope	Moderate: less than 5 feet deep over bedrock in some places; slope.
Severe: slope	Severe: slope; coarse fragments on surface.	Severe: slope	Moderate: slope; coarse fragments on surface.	Severe: slope	Severe: slope	Moderate: slope.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Shelocta—Continued					
ShE, ShF; Shelocta soil	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Jefferson soil	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Stendal: Sn	Severe: hazard of flooding; seasonal high water table.	Severe: moderately rapid permeability; hazard of flooding.	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding.
Strip mines: St. Too variable to be rated.					
Talbott:					
TaC2	Severe: mostly slow permeability; moderately deep over bedrock.	Severe: slope	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock.	Moderate: mostly slow permeability; slope; silty clay loam surface layer.
TbD	Severe: mostly slow permeability; moderately deep over bedrock; slope.	Severe: slope	Severe: moderately deep over bedrock.	Severe: moderately deep over bedrock.	Moderate to severe: slope.
TbE	Severe: mostly slow permeability; moderately deep over bedrock; slope.	Severe: slope	Severe: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock; slope.	Severe: slope
TcD3	Severe: mostly slow permeability; moderately deep to bedrock; slope.	Severe: slope	Severe: moderately deep to bedrock.	Severe: moderately deep to bedrock.	Moderate to severe: slope.
Tarklin:					
TkB	Severe: slow permeability.	Moderate: slope; coarse fragments.	Moderate: seasonal high water.	Moderate: seasonal high water table.	Moderate: slow permeability; coarse fragments on surface.
TkC	Severe: slow permeability.	Severe: slope	Moderate: seasonal high water table.	Moderate: seasonal high table.	Moderate: slow permeability; coarse fragments on surface; slope.
Trimble:					
TrB	Slight	Moderate: slope; coarse fragments; ML–GM in places; moderately slow permeability.	Slight	Slight	Slight to moderate: coarse fragments on surface.

See footnote at end of table.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill[1]
Severe: slope	Severe: slope; coarse fragments on surface.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: less than 5 feet deep over bedrock in some places; slope.
Severe: slope	Severe: slope; coarse fragments on surface.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: hazard of flooding.	Severe: hazard of flooding.	Moderate: wetness; hazard of flooding.	Moderate: wetness.	Severe: hazard of flooding.	Severe: seasonal high water table; hazard of flooding.	Severe: seasonal high water table; hazard of flooding.
Severe: moderately deep over bedrock; MH or CH.	Severe: slope	Moderate: slope; silty clay loam surface layer.	Moderate: silty clay loam surface layer.	Moderate: moderately deep to bedrock; slope.	Severe: moderately deep to bedrock; mostly slow permeability.	Severe: moderately deep over bedrock; clayey.
Severe: moderately deep over bedrock; MH or CH slope.	Severe: slope	Moderate to severe: slope.	Slight to moderate: slope.	Moderate to severe: slope.	Severe: moderately deep over bedrock; mostly slow permeability; slope.	Severe: moderately deep over bedrock; surface is rocky; clayey.
Severe: moderately deep over bedrock; MH or CH slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: moderately deep over bedrock; mostly slow permeability; slope.	Severe: moderately deep over bedrock; slope; surface is rocky; clayey.
Severe: moderately deep to bedrock; MH or CH; slope.	Severe: slope	Moderate to severe: slope.	Moderate: silty clay loam surface layer; slope.	Severe: slope; erodible.	Severe: moderately deep to bedrock; mostly slow permeability; slope.	Severe: moderately deep to bedrock; surface is rocky; clayey.
Moderate: seasonal high water table.	Severe: coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Severe: slow permeability.	Moderate: seasonal high water table.
Moderate: seasonal high water table; slope.	Severe: slope; coarse fragments on surface.	Moderate: slope; coarse fragments on surface.	Moderate: coarse fragments on surface.	Moderate: slope; coarse fragments on surface.	Severe: slow permeability.	Slight.
Generally slight: moderate where material is ML.	Moderate to severe: slope; coarse fragments on surface.	Slight to moderate: coarse fragments on surface.	Slight to moderate: coarse fragments on surface.	Moderate: coarse fragments on surface.	Slight	Slight.

TABLE 8.—*Estimated degree of soil limitations*

Soil series and map symbols	Estimated degree of limitation for—				
	Sewage disposal		Homesites or service buildings		Camp areas
	Septic tank filter fields	Sewage lagoons	With basement	Without basement	
Trimble—Con.					
TrC	Moderate: slope	Severe: slope	Slight	Slight	Moderate: slope; coarse fragments on surface.
TrD	Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope
TrE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Waynesboro:					
WaB	Slight	Moderate: moderate permeability; slope.	Slight	Slight	Slight
WaC	Moderate: slope	Severe: slope	Slight	Slight	Moderate: slope
WaD	Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope
WaE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
WbE3	Severe: slope	Severe: slope	Moderate to severe: slope.	Moderate to severe: slope.	Severe: slope
Whitley:					
WhC	Moderate: moderately deep over bedrock; slope.	Severe: slope	Moderate: moderately deep over bedrock; slope.	Slight	Moderate: slope
WlA	Generally slight. Severe where there is a hazard of flooding.	Generally moderate: moderate permeability. Severe where there is a hazard of flooding.	Generally slight. Severe where there is a hazard of flooding.	Generally slight. Severe where there is a hazard of flooding.	Slight
WlB	Slight	Moderate: moderate permeability; slope.	Slight	Slight	Slight
WlC	Moderate: slope	Severe: slope	Slight	Slight	Moderate: slope
WtB:					
Whitley soil	Moderate: moderately deep over bedrock.	Moderate: moderate permeability; slope.	Moderate: moderately deep over bedrock.	Slight	Slight
Tilsit soil	Severe: slow permeability.	Moderate: slope	Moderate: seasonal high water table; moderately deep over bedrock.	Moderate: seasonal high water table.	Moderate: slow permeability.

[1] Onsite studies of the underlying strata, water table, and hazards of aquifer pollution and drainage into ground water need to be made for landfill deeper than 5 or 6 feet.

for town and country planning—Continued

Estimated degree of limitation for—Continued						
Streets and low-cost roads	Playgrounds (intensive use)	Picnic areas	Paths and trails	Lawns, landscaping, and golf fairways	Cemeteries	Sanitary landfill[1]
Moderate: slope; ML in some places.	Severe: slope; coarse fragments on surface.	Moderate: slope.	Slight to moderate: coarse fragments on surface.	Moderate: slope; coarse fragments on surface.	Moderate: slope.	Slight.
Severe: slope.	Severe: slope; coarse fragments on surface.	Severe: slope.	Moderate: slope; coarse fragments on surface.	Severe: slope.	Severe: slope.	Moderate: slope.
Severe: slope.	Severe: slope; coarse fragments on surface.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Moderate: CL in places.	Moderate: slope.	Slight.	Slight.	Slight.	Slight.	Slight.
Moderate: CL in places.	Severe: slope.	Moderate: slope.	Slight.	Moderate: slope.	Moderate: slope.	Moderate: clay loam.
Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Severe: slope.	Moderate: slope; clay loam.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Severe: slope.	Severe: slope.	Severe: slope.	Moderate to severe: slope.	Severe: slope; erodible.	Severe: slope; erodible.	Moderate to severe: slope.
Moderate: moderately deep over bedrock; ML–CL; slope.	Severe: slope.	Moderate: slope.	Slight.	Moderate: slope.	Moderate: moderately deep over bedrock; slope.	Severe: moderately deep over bedrock.
Generally moderate: ML–CL. Severe where there is a hazard of flooding.	Slight.	Slight.	Slight.	Slight.	Slight.	Generally slight. Severe where there is a hazard of flooding.
Moderate: ML–CL.	Moderate: slope.	Slight.	Slight.	Slight.	Slight.	Slight.
Moderate: slope; ML–CL.	Severe: slope.	Moderate: slope.	Slight.	Moderate: slope.	Moderate: slope.	Moderate: slope.
Moderate: moderately deep over bedrock; ML–CL.	Moderate: slope.	Slight.	Slight.	Slight.	Moderate: moderately deep over bedrock.	Onsite investigations needed to determine hardness of rock.
Moderate: seasonal high water table; moderately deep over bedrock; ML–CL.	Moderate: slow permeability; slope.	Slight.	Slight.	Slight.	Severe: slow permeability.	Severe: moderately deep over bedrock.

Relief

The western two-thirds of the county generally is gently rolling to undulating, but there are some areas of very steep valley walls. This area is underlain mostly by limestone, but there are some areas of sandstone. Areas that have narrow ridgetops and short side slopes generally have deep, well-drained soils, such as those of the Frederick, Waynesboro, and Mountview series. Where the ridgetops are broad and nearly level to gently sloping, fragipan soils that have restricted drainage formed; examples are Bedford, Lawrence, and Robertsville soils. Garmon soils formed on very step valley walls and are only moderately deep over bedrock and contain coarse fragments in the subsoil.

The eastern and southeastern parts of the county are steep; the side slopes are long, and the valley and ridgetops are narrow. This area is underlain mostly by sandstone and shale, but there are some areas of limestone on the lower side slopes. Soils on ridgetops, such as the Dekalb and Hartsells soils, formed in material weathered from sandstone. These soils are moderately deep and coarse textured. Soils on side slopes, such as the Jefferson, Shelocta, and Muse soils, formed in colluvial material and underlying material weathered from shale. These soils are deep and contain varying amounts of coarse fragments. The deep, well-drained, nearly level to undulating Allegheny, Shelocta, and Chagrin soils in the narrow valleys are the result of erosion acting on the steep side slopes. Differences among soils in Pulaski County are largely the results of differences in relief and parent material.

Time

The effects of the active factors of soil formation—climate and plants and animals—depend largely on the length of time the processes of soil formation have been in progress. Because of the influence of parent material and relief, the length of time may be difficult to determine. If the influence of the active factors has been fairly uniform, the relative age of a soil can be determined by the degree of development of its genetic horizons.

Such soils as Nolin and Newark soils, which formed in depressions and on flood plains, are subject to varying degrees of flooding and can receive new sediment with each flooding. These soils have only weak soil structure and weak color differences between horizons, and they are considered young soils. Such soils as Frederick, Cumberland, and Mountview soils have well-developed soil horizons and are considered mature soils.

Classification of the Soils

Soils are classified so that we can more readily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation (*6*). First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

In classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*15*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 (*17*). The current system is under continual study (*14*). Therefore, readers interested in developments of the current system should search the latest literature available.

In table 9 the soil series of Pulaski County are placed in some categories of the current system and in great soil groups according to the 1938 classification. The classes in the current system are briefly defined in the paragraphs that follow.

ORDER.—Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, Entisols and Histosols, occur in many different climates.

Table 9 shows the four soil orders in Pulaski County—Ultisols, Inceptisols, Mollisols, and Alfisols. Ultisols are soils that are highly developed but still contain some weatherable minerals. Inceptisols are soils that have weakly expressed horizons or the beginnings of such horizons. Mollisols have a thick, soft, friable surface layer that has been darkened by organic matter. Alfisols have a clay-enriched B horizon that is high in base saturation.

SUBORDER.—Each order is divided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences that result from the climate or vegetation.

GREAT GROUP.—Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and their features. The horizons used to make separations are those in which clay, iron, or humus has accumulated or those that have pans interfering with growth of roots or movement of water. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown separately in table 9, because it is the last word in the name of the subgroup.

SUBGROUP.—Great groups are divided into subgroups, one that represents the central (typic) segment of the group, and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Hapludults.

FAMILY.—Families are separated within a subgroup primarily on the basis of properties important to the

TABLE 9.—*Soil series classified according to the current system of classification and the revised 1938 system*

Series	Current classification			Great soil group of the 1938 classification
	Family	Subgroup	Order	
Allegheny	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Ashton [1]	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Alluvial soils.
Bedford	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils that have a fragipan.
Brookside	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Chagrin [2]	Fine-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Colyer [3]	Clayey-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols.
Cumberland [4]	Fine, mixed, thermic	Rhodic Paleudalfs	Alfisols	Reddish-Brown Lateritic soils.
Dekalb [3]	Loamy-skeletal, mixed, mesic	Typic Drystrochrepts	Inceptisols	Sols Bruns Acides.
Etowah [4]	Fine-loamy, mixed, thermic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Frankstown [5]	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Frederick	Clayey, kaolinitic, mesic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Fredonia	Fine, mixed, mesic	Ultic Hapludalfs	Alfisols	Red-Yellow Podzolic soils.
Garmon	Fine-loamy, mixed, mesic	Dystric Eutrochrepts	Inceptisols	Gray-Brown Podzolic soils.
Gilpin	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Hartsells [4]	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Huntington	Fine-silty, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Jefferson	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Lawrence [6]	Fine-silty, mixed, mesic	Aquic Fragiudalfs	Alfisols	Planosols that have a fragipan.
Lindside	Fine-silty, mixed, mesic	Aquic Fluventic Eutrochrepts	Inceptisols	Alluvial soils.
Melvin	Fine-silty, mixed, nonacid, mesic	Typic Fluvaquents	Entisols	Alluvial soils.
Monongahela	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Gray-Brown Podzolic soils.
Mountview [4]	Fine-silty, siliceous, thermic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Muse	Clayey, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Needmore	Fine, mixed, mesic	Ultic Hapludalfs	Alfisols	Red-Yellow Podzolic soils.
Newark [7]	Fine-silty, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols	Alluvial soils intergrading toward Low-Humic Gley soils.
Nolichucky	Fine-loamy, siliceous, mesic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Nolin	Fine-silty, mixed, mesic	Dystric Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Pembroke	Fine-silty, mixed, mesic	Mollic Paleudalfs	Alfisols	Red-Yellow Podzolic soils intergrading toward Reddish-Brown Lateritic soils.
Pope	Coarse-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Robertsville	Fine-silty, mixed, mesic	Typic Fragiaqults	Ultisols	Planosols that have a fragipan.
Rockcastle	Fine, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Shelocta	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.

See footnotes at end of table.

TABLE 9.—*Soil series classified according to the current system of classification and the revised 1938 system*—Continued

Series	Current classification			Great soil group of the 1938 classification
	Family	Subgroup	Order	
Stendal [8]	Fine-silty, mixed, acid, mesic (fine-loamy).	Aeric Fluvaquents	Entisols	Alluvial soils.
Talbott [4]	Fine, mixed, thermic	Typic Hapludalfs	Alfisols	Red-Yellow Podzolic soils.
Tarklin	Fine-loamy, siliceous, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils that have a fragipan.
Tilsit	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils that have a fragipan.
Trimble	Fine-loamy, siliceous, mesic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Waynesboro [4]	Clayey, kaolinitic, thermic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Whitley	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.

[1] These soils have a higher color value in the Ap horizon when dry than is defined in the range for the series.
[2] Mapping unit Ch has less sand and a higher content of coarse fragments throughout the profile than is defined in the range for the series.
[3] These soils have less coarse fragments in the control section than is defined in the range for the series.
[4] These soils are a few degrees cooler than is defined in the range for the series.
[5] These soils have a thicker B horizon than is defined in the range for the series.
[6] These soils probably have a lower base exchange than is defined in the range for the series.
[7] Mapping unit Ng has a higher content of coarse fragments throughout the profile than is defined in the range for the series.
[8] These soils have a higher content of sand throughout the profile and higher chroma in the upper part of the B horizon than is defined in the range for the series.

growth of plants or behavior of soils where used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. An example is the fine-loamy, mixed, mesic family of Typic Hapludults.

SERIES.—The series consists of a group of soils that formed in a particular kind of parent material and have genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

New soil series must be established and concepts of some established series, especially older ones that have been used little in recent years, must be revised in the course of the soil survey program. A proposed series has tentative status until the series concept of classification is reviewed at state, regional, and national levels, and it is determined that the new series should be established. All of the soil series described in this publication have been established.

General Nature of the County [5]

This section provides a brief history of Pulaski County. It also gives significant facts related to its geology, relief, and drainage; farming; industry, transportation, and markets; and climate. Unless otherwise stated, the statistics given are from reports published by the U.S. Bureau of the Census.

Pulaski County was organized December 10, 1798, out of territory belonging to Lincoln and Green Counties. It was named for Count Casimir Pulaski, a Polish patriot who became a brigadier general in the American Revolution. The first settlers were recently discharged Revolutionary War soldiers who migrated with their families into the area. These people were predominantly Scotch, Irish, Welsh, and English.

On February 24, 1801, a site was selected for the county seat and named Somerset, for Somerset County, England. Pulaski County lost territory that formed parts of Wayne, Rockcastle, Whitley, Russell, and McCreary Counties. McCreary County was formed in 1912, at which time the present boundaries of Pulaski County were established.

The first nonfarm industry was coal mining. Most of the coal was mined in what is now McCreary County and transported down the Cumberland River to Nashville. The lumber industry grew rapidly and replaced coal as the chief industry in 1850, a position it held until 1930. Lumber and logs were floated down the river to Nashville.

Somerset was connected with Cincinnati by railroad in 1877. Early in 1880 the line reached Chattanooga, where it made connections with railroads serving the southern states. A roundhouse was constructed in Somerset for the repair of railroad locomotives, and this repair work was a major industry for the county until the advent of diesel-electric locomotives. When these locomotives replaced the steam engines, the Somerset shops were dismantled and railroad employment dropped more than 50 percent.

[5] ALBERT S. JOHNSON, soil scientist, Soil Conservation Service, helped prepare this section.

The Chamber of Commerce and other community leaders strove to develop facilities to attract new industries. New industrial plants and old plant expansions have increased employment to nearly 5,000 workers.

In 1970 the population of Pulaski County was 35,234.

Springs and cisterns are the largest source of domestic water in the county. Underground water supplies are unpredictable, but some shallow dug wells and deeper drilled wells have produced a reliable supply of water for domestic uses. The many creeks and branches provide water for livestock much of the year; however, all but the largest creeks are dry in summer. To supplement the supply of water, farmers have constructed more than 2,100 farm ponds and developed more than 600 springs for livestock and irrigation water.

The towns of Somerset and Burnside have constructed water systems that use Lake Cumberland as the water source. Lake Cumberland was formed by constructing a dam on the Cumberland River in adjoining Russell County. Increasing industrial and urban demands for water along the major highways have caused communities to organize water districts. Two districts are in the various stages of construction or planning. The Kentucky Water Company, serving Somerset, supplies water to these districts. In the near future all the remote areas of the county will be supplied purified water.

Geology, Relief, and Drainage

Pulaski County lies within two physiographic regions, the Eastern Pennyroyal and the Eastern Coalfields. These two regions are separated by an escarpment that enters the county on the south-central boundary near Bronston. It extends, intermittently, northeastward across the county and enters Rockcastle County near Plato. The Eastern Pennyroyal region lies west of this escarpment, and the Eastern Coalfields region lies east of it.

The Eastern Pennyroyal region is underlain by rocks of the Fort Payne, Warsaw, Salem, St. Louis and St. Genevieve Formations of the Mississippian System. The Fort Payne Formation ranges from 200 to 300 feet in thickness and consists largely of gray or greenish-gray shale and claystone at the base. Above the shale are cherty limestone, claystone, and limestone. Two creek valleys cut through the Mississippian System and expose the Ohio Black Shale of the Devonian System.

Green River Knob and a few other knobs along the Casey County line and near the border of the Eastern Coalfields region are tall enough to include the St. Genevieve Limestone and to be capped with sandstone and shale of the Lee Formation in the Pennsylvanian System.

The eastern and southern parts of the county lie within the Eastern Coalfields region. This physiographic region is underlain by sandstone, siltstone, and shale of the Lee Formation of the Pennsylvanian System. Coal seams are found within the Lee Formation. A few of the higher elevations are capped by members of the Breathitt Formation.

The relief of Pulaski County is related to the geology. The Eastern Pennyroyal is mainly a dissected plateau that is nearly level to very steep. Nearly level, moderately well drained to poorly drained soils on ridgetops occur in the northern and western parts of the county. The largest areas are near the corners of Casey, Pulaski, and Russell Counties and near Eubank and Bandy. Other parts of the ridgetops are sloping to moderately steep. This plateau is deeply dissected by winding U-shaped valleys. Side slopes are long and steep or very steep. The Frederick soils are dominant on the ridges, and the Garmon soils are dominant on the side slopes. Most bottom and valley soils were inundated by Lake Cumberland.

The Eastern Coalfields region is part of a strongly dissected plateau. The plateau is widest around Mt. Victory, where the relief is sloping to moderately steep. The southern and eastern slopes of the plateau are dominated by high sandstone cliffs bordered by stony talus (colluvial) soils. The western and northern slopes of the plateau are long and steep but have few cliffs. Whitley and Muse soils dominate the ridgetops; and Jefferson, Muse, and Shelocta soils dominate the side slopes, sometimes in complex patterns.

Nearly all of Pulaski County is drained by the Cumberland River, which flows westward across the southern part of the county. Three major creeks and numerous smaller creeks flow southward to the river and drain most of the area. The Rockcastle River forms part of the eastern boundary of the county and drains a small area. A small area, less than 500 acres in size, is drained by small streams that flow into Casey County and is within the Green River watershed.

Farming

Farming in Pulaski County is diversified, and income from livestock and from crops is about equal. Tobacco is the most important crop. The U.S. Census of Agriculture reports that in 1969 there were 2,839 farms averaging 85 acres per farm.

Livestock and livestock products account for 48 percent of the total farm income of Pulaski County. Cattle and dairy products account for 94 percent of the livestock income.

Industry, Transportation, and Markets

Although farming is the main economic enterprise in Pulaski County, the county is the center of a growing industrial community that provides jobs for workers in surrounding counties. Factories produce vitreous china, light bulbs, metal products, clothing, and fertilizer. The products produced are chiefly components of consumer items and are shipped northward to industrial assembly plants. Milk products are processed and packed, limestone rock is crushed, timber is processed into lumber and charcoal, and coal is mined.

The central part of the county is crossed from north to south by U.S. Highway No. 27. Kentucky Highway No. 80 crosses from west to east, and other State highways provide almost direct routes to Corbin, Monticello, Liberty, Crab Orchard, and Mount Vernon. Numerous other State highways serve as connecting roads between these major roads and most areas of the county.

The major north-to-south branch of the Southern Railroad system has sidings and spurs in Eubank, Science Hill, Somerset, Burnside, and Tateville. A landing strip at the Somerset Airport is being lengthened to handle small jet planes.

Somerset, the county seat, has an active tobacco market that serves as a sales outlet for several adjoining counties. Local livestock markets attract buyers from major meat-packing plants. In recent years production of beans, cucumbers, and bell peppers has become significant. These vegetables are sold mostly at the farms.

Climate [6]

The climate of Pulaski County is temperate. Winters are moderately cold, and summers are warm and humid. Temperature and rainfall are suitable for many types of plants and animals.

The average annual precipitation is about 49 inches, and the average annual air temperature is 56° F. Precipitation is fairly well distributed through the year. October has the least rainfall; January, February, and March have the most. During most years rainfall is adequate for plant growth and average yields, but there are years when plants suffer because of too little or too much rainfall. Snowfall is quite variable from year to year. Some winters have little, but in 1948 there was a total of 30 inches.

June, July, and August are the hottest months; the average temperature is 72.3°, 75.3° and 74.4°, respectively. The coldest months are December, January, and February; the average temperature is 37.5°, 36.4°, and 39.4°, respectively. The record highest temperature was 103° in July, 1952, and the record lowest was −28° in January, 1963. A daily freeze-thaw cycle is frequent in Pulaski County. The temperature drops to 32° or less on an average of 102 nights during the year, but it rises above freezing on all but 11 of the days that follow those nights. Readings of zero or less occur an average of about two times per winter. Table 10 shows additional information on temperature and precipitation.

The growing season, defined as the number of days between the last temperature of 32 degrees in spring and the first in fall, averages about 179 days. The season is about 200 days or more in 10 percent of the years, 190 days or more in 25 percent of the years, less than 168 days in 25 percent of the years, and less than 158 days in 10 percent of the years. Table 11 shows the probability of the last freezing temperatures in spring and the first in fall.

[6] By ALLEN B. ELAM, JR., climatologist for Kentucky, National Weather Service, U.S. Department of Commerce.

Literature Cited

(1) AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS.
1961. STANDARD SPECIFICATIONS FOR HIGHWAY MATERIALS AND METHODS OF SAMPLING AND TESTING. Ed. 8, 2 v., illus.

(2) BALDWIN, MARK, KELLOGG, CHARLES E., and THORP, JAMES.
1938. SOIL CLASSIFICATION. U.S. Dept. Agr. Ybk., pp. 979–1011, illus.

(3) BECK, DONALD E.
1962. YELLOW-POPLAR SITE INDEX CURVES. U.S. Dept. Agr., Forest Serv., Southeast. Forest Expt. Sta. Research Note No. 80, 2 pp., illus.

(4) BROADFOOT, W. M.
1960. FIELD GUIDE FOR EVALUATING COTTONWOOD SITES. USDA Southern Forest Expt. Sta., Occas. Paper 178, 6 pp., illus.

(5) ——— and KRINARD, R. M.
1959. GUIDE FOR EVALUATING SWEETGUM SITES. USDA Southern Forest Expt. Sta., Occas. Paper 176, 8 pp., illus.

(6) CLINE, MARLIN G.
1949. BASIC PRINCIPLES OF SOIL CLASSIFICATION. Soil Sci. 67: 81–91.

TABLE 10.—*Temperature and precipitation, Pulaski County, Ky.*

[Data from Somerset, Ky., 1943–66] [1]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Average monthly maximum	Average monthly minimum	Average monthly total	One year in 10 will have— Less than [1]	One year in 10 will have— More than [1]	Days with snow cover of 1.0 inch or more [2]	Average depth of snow on days with snow cover
	° F.	*° F.*	*° F.*	*° F.*	*Inches*	*Inches*	*Inches*	*Number*	*Inches*
January	46	26	67	0	4.9	1.7	9.1	5	3
February	50	28	68	5	4.8	1.6	8.0	4	3
March	58	35	76	16	5.1	2.5	7.9	1	4
April	69	44	84	26	4.2	1.9	6.0	0	0
May	78	52	88	36	4.0	1.8	6.5	0	0
June	84	60	93	46	4.7	2.3	8.1	0	0
July	87	64	94	52	4.6	1.8	7.7	0	0
August	87	62	94	50	3.7	1.3	6.3	0	0
September	81	56	92	40	3.3	1.2	5.3	0	0
October	71	44	84	26	2.3	.6	4.0	0	0
November	58	35	75	15	3.9	1.4	7.0	1	4
December	48	27	66	6	4.0	1.6	7.3	3	2
Year	69	44	[3] 96	[4] −6	49.5	39.8	58.7	14	3

[1] Based on data from Somerset and nearby locations.
[2] Period of record, 1943–50.
[3] Average annual highest temperature.
[4] Average annual lowest temperature.

TABLE 11.—*Probabilities of last freezing temperature in spring and first in fall* [1]

[Based on data from Somerset and nearby locations]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	March 25	April 2	April 15	April 25	May 6
2 years in 10 later than	March 17	March 26	April 9	April 19	May 1
5 years in 10 later than	March 3	March 14	March 28	April 8	April 21
Fall:					
1 year in 10 earlier than	November 23	October 31	October 19	October 12	October 2
2 years in 10 earlier than	November 28	November 5	October 25	October 18	October 7
5 years in 10 earlier than	December 8	November 15	November 4	October 27	October 17

[1] All freeze data are based on temperature in a standard U.S. National Weather Service thermometer shelter at a height of approximately 5 feet above the ground and in a representative exposure. Lower temperatures will occur at times nearer the ground or in local areas subject to extreme air drainage.

(7) COILE, T. S., and SCHUMACHER, F. X.
1953. RELATION OF SOIL PROPERTIES TO SITE INDEX OF LOBLOLLY AND SHORTLEAF PINES IN THE PIEDMONT REGION OF THE CAROLINAS, GEORGIA, AND ALABAMA. Jour. of Forestry, v. 51: 432–435.

(8) MCCARTHY, E. F.
1933. YELLOW-POPLAR CHARACTERISTICS, GROWTH AND MANAGEMENT. U.S. Dept. Agr., Tech. Bul. No. 356, 58 pp., illus.

(9) NELSON, T. C., CLUTTER, J. L., and CHAIKEN, L. E.
1961. YIELD OF VIRGINIA PINE. U.S. Dept. Agr. Southeast Forest Expt. Sta., Sta. Paper 124, 11 pp., illus.

(10) PORTLAND CEMENT ASSOCIATION.
1962. PCA SOIL PRIMER. 52 pp., illus.

(11) PUTMAN, JOHN A., FURNIVAL, GEORGE M., and MCKNIGHT, J.S.
1960. MANAGEMENT AND INVENTORY OF SOUTHERN HARDWOODS. U.S. Dept. Agr. Handbook 181, 102 pp., illus.

(12) SCHNUR, G. LUTHER.
1937. YIELD, STAND, AND VOLUME TABLES FOR EVEN-AGED UPLAND OAK FORESTS. USDA Tech. Bul. 560, 88 pp., illus. [Reprinted 1961]

(13) SCHUMACHER, F. COILE, and T. S.
1960. GROWTH AND YIELDS OF NATURAL STANDS OF SOUTHERN PINES. 115 pp., illus.

(14) SIMONSON, ROY W.
1962. SOIL CLASSIFICATION IN THE UNITED STATES. Sci. 137: 1027–1034.

(15) THORP, JAMES, and SMITH, GUY D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117–126, illus.

(16) UNITED STATES DEPARTMENT OF AGRICULTURE.
1951. SOIL SURVEY MANUAL. U.S. Dept. Agr. Handbook 18, 503 pp., illus., with 1962 supplement.

(17) ———
1960. SOIL CLASSIFICATION, A COMPREHENSIVE SYSTEM, 7TH APPROXIMATION. 265 pp., illus. [Supplements issued in March 1967 and September 1968]

(18) UNITED STATES DEPARTMENT OF DEFENSE.
1968. UNIFIED SOIL CLASSIFICATION SYSTEM FOR ROADS, AIRFIELDS, EMBANKMENTS AND FOUNDATIONS. MIL-STD-619B, 30 pp., illus.

Glossary

Acidity. See Reaction, soil.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed 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 capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

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

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer 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 clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at base of steep slopes.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

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 and brittle; little affected by moistening.

Depth, soil. Thickness of soil over a specified layer that generally does not permit the growth of roots. Classes used in this survey are *shallow*, 10 to 20 inches; *moderately deep*, 20 to 40 inches; and *deep*, 40 inches or more.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, 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 different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Horizon, soil. A layer of soil, approximately parallel to the surface that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Karst (topography). Marked by sinks (karst holes) interspersed with abrupt ridges and irregular protuberant rocks, and by caverns and underground streams.

Leaching. The removal of soluble materials from soils by percolating water.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of 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 these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residuum is not soil but is frequently the material in which a soil has formed.

Root zone (also termed effective rooting depth). The vertical distance between the surface of the soil and any layer, such as a fragipan or bedrock, that inhibits the growth of plant roots. Descriptive terms are as follows: *very shallow,* less than 10 inches below the surface; *shallow,* 10 to 20 inches below the surface; *moderately deep,* 20 to 30 inches below the surface; and *deep,* more than 30 inches below the surface.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slope. The amount of rise or fall in feet for each 100 feet of horizontal distance. Terms for slope used in this survey are: *nearly level,* 0 to 2 percent; *gently sloping,* 2 to 6 percent; *sloping,* 6 to 12 percent; *strongly sloping,* 12 to 20 percent; *moderately steep,* 20 to 30 percent; *steep,* 30 to 50 percent; and *very steep,* more than 50 percent.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood planes, and are seldom subjected to overflow. Marine terraces were deposited by the sea and are generally wide.

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."

Upland. Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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