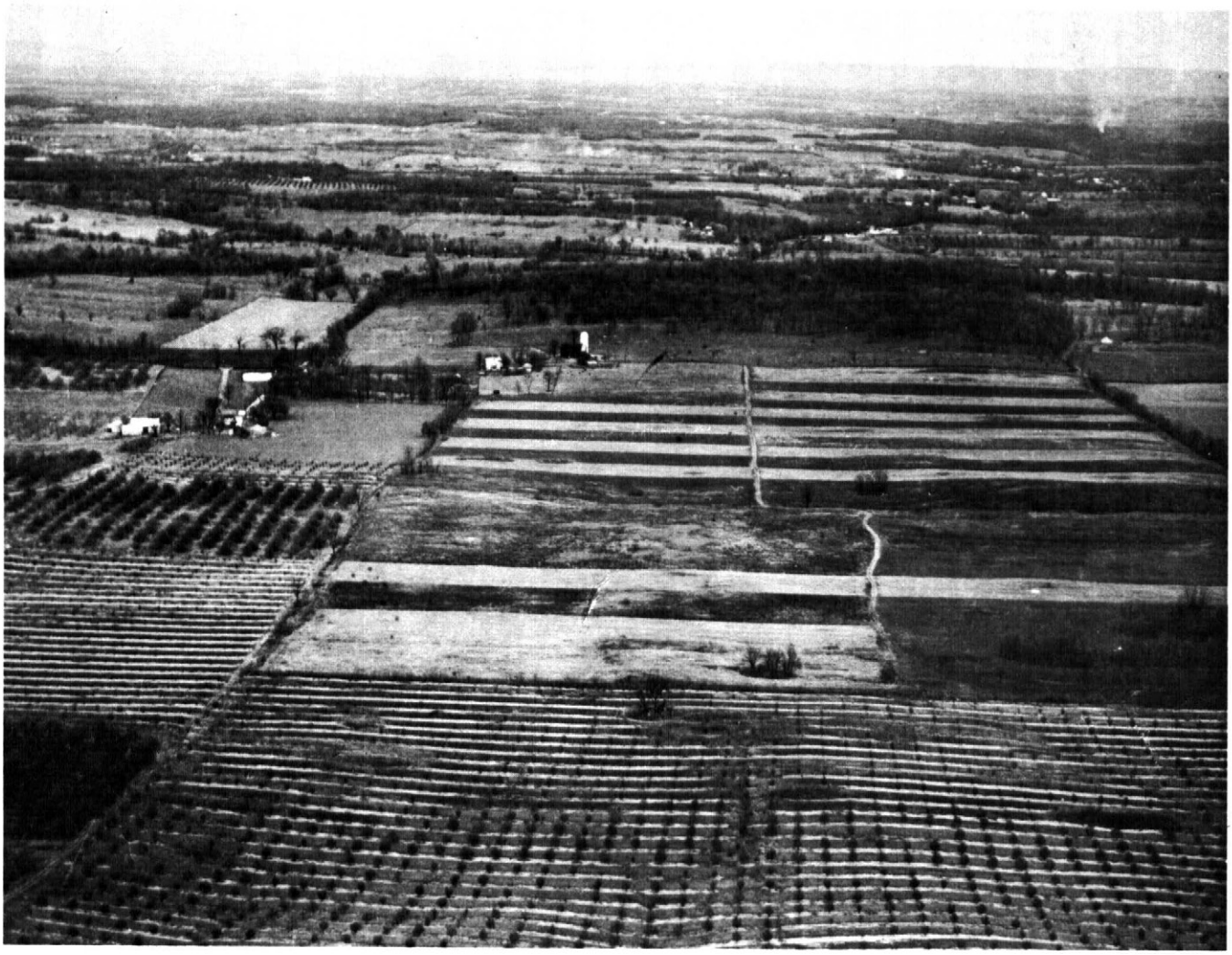
Series 1960, No. 30 Issued May 1966

SOIL SURVEY

Berkeley County, West Virginia



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION

HOW TO USE THIS SOIL SURVEY REPORT

THIS SOIL SURVEY of Berkeley County, W. Va., contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

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

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. 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 in the report. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit and woodland group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. 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, orchardists, and those who work with them can learn about use and management of the soils in the soil descriptions and in the discussions of the interpretative groupings.

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

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the subsection "Use of Soils for Wildlife."

Community planners and others concerned with suburban development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the subsection "Suburban and Recreational Uses of Soils."

Engineers and builders will find under "Use of Soils in Engineering" tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

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

Students, teachers, and others will find information about soils and their management in various parts of the text.

Newcomers in Berkeley County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County," which gives additional information.

* * * * *

Fieldwork for this survey was completed in 1960. Unless otherwise indicated, all statements in this report refer to conditions in the county at the time the survey was in progress. This survey of Berkeley County was made as part of the technical assistance furnished by the Soil Conservation Service to the Eastern Panhandle Soil Conservation District.

Cover picture: Aerial view of field stripcropping on soils in the Great Valley near Gerrardstown.

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Series 1960, No. 30

Issued May 1966

SOIL SURVEY OF BERKELEY COUNTY, WEST VIRGINIA

BY JOHN L. GORMAN, J. K. PASTO, AND C. D. CROCKER, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE WEST VIRGINIA AGRICULTURAL EXPERIMENT STATION

BERKELEY COUNTY is in the extreme eastern part of West Virginia, between Jefferson and Morgan Counties in the eastern panhandle (fig. 1). The Potomac River forms the northern boundary and separates Berkeley County from Washington County, Md. The county has a total area of 202,240 acres, or 316 square miles. Water areas occupy about 844 acres. In 1960, the population of the county was 33,791, and that of Martinsburg, the county seat and only large city, was 15,179.

Berkeley County is one of the best agricultural counties in West Virginia. It has a favorable growing season and fairly adequate rainfall. The eastern three-fifths of the county is part of the smooth, fertile Great Valley and ranges between 500 and 600 feet in elevation. The western two-fifths consists of narrow valleys and rather steep and mountainous areas, where the elevation rises to about 2,000 feet. This part is mostly wooded.

About two-thirds of the county is in farms. Apple, peach, and cherry orchards produce high yields of good-quality fruit, part of which is processed locally at Inwood and Martinsburg. Dairying and raising sheep and beef cattle also are important. Corn, wheat, oats, and barley are grown primarily for livestock feed on the farm.

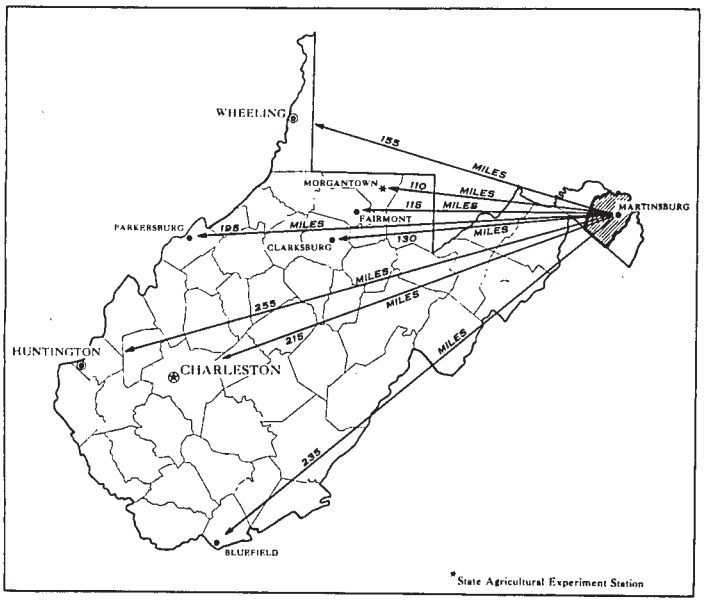

Figure 1.—Location of Berkeley County in West Virginia.

The county is served by an excellent network of roads, including U.S. Highway No. 11 and Interstate Highway 81, and by the Baltimore and Ohio and the Pennsylvania (Cumberland Valley) Railroads, both of which pass through Martinsburg. Although the county is largely agricultural, it has a large hosiery mill and plants for making cement, brick, chemicals, and cooking ware. In addition, limestone of high purity is quarried and supplied to steel companies and allied industries.

How Soils Are Mapped and Classified

Soil scientists made this survey to learn what kinds of soils are in Berkeley County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; 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 roots of plants.

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. To use this report efficiently it is necessary to know the kinds of groupings most used in a local soil classification.

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. Blairton and Frederick, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the

surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Frederick cherty silt loam and Frederick very stony loam are two soil types in the Frederick series. The difference in texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Frederick cherty silt loam, 3 to 8 percent slopes, is one of several phases of Frederick cherty silt loam, a soil type that ranges from gently sloping to moderately steep.

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 greatly help in drawing boundaries accurately. The soil map at the back of this report was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. 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 other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed, and so small in size, that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Berks-Lehew channery loams. Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Steep rock land or Steep eroded land, shale materials, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are 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 soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful for different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners.

Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey reports. On the basis of yield tables and other data, the soil scientists set up trial groups, and test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists 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 present methods of use and management.

General Soil Map

The general soil map at the back of this report shows, in color, the soil associations in Berkeley County, W. Va. 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 farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The 11 soil associations in this county are in roughly parallel bands that cross the county in a northeast-southwest direction. The general pattern of soils reflects the pattern of underlying rock formations. Soil associations 1 through 6 occupy the smooth, gently sloping Great Valley in the central and eastern parts of the county. Associations 7 through 11 occupy sloping to very steep mountains and mountain valleys in the western part.

Soils of the Great Valley

Soil associations 1 through 6 occupy the smooth, gently sloping Great Valley in the central and eastern parts of the county.

1. Hagerstown-Pickaway association: Deep, rocky and nonrocky, well drained and moderately well drained soils over limestone

This association occupies almost all of the limestone valley east of Opequon Creek. It makes up about 7 percent of the county and, in most places, is gently sloping to strongly sloping. Rocky and nonrocky Hagerstown soils and the Pickaway soils are dominant. This part of the valley is a little rougher, has a larger acreage of Hagerstown soils, and contains more rocky areas than the part farther west.

The Hagerstown soils make up about two-thirds of the association. They are deep, fertile soils that were

derived from limestone. They have a brown surface layer and a reddish-brown clayey subsoil underlain by hard limestone. About one-third of their acreage is too rocky to be plowed. The Pickaway soils occur in smooth, shallow depressions and at the head of streams. They lie well and are moderately fertile, but they are slightly wet and have a hard layer in their yellowish subsoil. Also in this association are small areas of Frederick, Duffield, Chilhowie, and other limestone soils. In addition, the Huntington and Lindside soils occupy narrow, discontinuous bottom lands along the Potomac River, and there are small areas of Murrill soils on high smooth flats above the river.

Almost all of this association is in farms. The farms generally are large, and land use is stable. The nonrocky Hagerstown soils are excellent for field crops and orchard fruits, but most areas of Pickaway soils are not suitable for orchards because of frost pockets. Dairying and livestock raising are important, and pasture is fairly extensive throughout the association. Most of the rocky soils are kept in pasture. Tracts of woodland occur, mainly in rough, rocky areas, but their total acreage is small.

This association is well supplied with all-weather roads. State Route 45 passes through the central part and connects Martinsburg and Shepherdstown, in Jefferson County. Along this highway some urban construction is underway. Small towns in the association are Van Clevesville, Greensburg, and Scrabble.

2. Berks-Montevallo-Blairton association: Shallow, droughty soils over soft acid shale, and somewhat poorly drained soils over shale

This association occupies a belt of soft, acid shale east of U.S. Highway No. 11 in the limestone valley. It is 2 to 3 miles wide, extends the length of the county, and covers about 15 percent of the total acreage. About 90 percent of the association is Berks and Montevallo soils, and most of the rest is Blairton soils.

The Berks, Montevallo, and Blairton soils occupy almost all of the smooth uplands (fig. 2). In this area slopes are rounded and are gentle except in small, steeper areas along streams. The Berks soils are mostly shaly and are moderately deep or shallow over shale. They have a grayish-brown surface layer and a yellowish-brown subsoil underlain by soft shale. These soils are easy to work but are droughty and subject to erosion. The Montevallo soils are similar to Berks soils and are intermingled with them, but Montevallo soils are shallower and more droughty, and in many areas they are severely eroded. The Blairton soils are at the head of streams and in shallow depressions within areas of Berks soils. They have a grayish-brown surface layer and a yellowish-brown, mottled, clayey subsoil.

Also in the association are small areas of Frederick, Hagerstown, Chilhowie, and other limestone soils. On the bottom land of the Potomac River and along the narrow, fertile bottom land of Opequon Creek, which flows throughout the association, are well-drained Huntington soils, moderately well drained Lindside soils, and poorly drained Melvin soils. On second bottoms above the creek are small areas of Captina and Tygart soils. Small areas of Waynesboro soils occupy high terraces above the Potomac River.

The soils in this association lie well, and most of the acreage has been cleared and cropped. The farms are mainly small to medium in size and are of the general type. Many farms include small areas of limestone soils, for the association is surrounded by these soils. Much of the upland consists of areas where erosion has been severe and still is active. Many of these areas have been abandoned to trees, and most of the orchards have been removed. The steeper slopes are occupied by woodland.

This association has many all-weather roads. Some urban expansion has occurred in the area near Martinsburg.

3. Chilhowie-Carbo-Hagerstown association: Shallow and moderately deep, fine-textured soils and deep, medium-textured soils over limestone

This association occurs in two areas in the limestone valley. The larger of the two is about 1 mile wide and extends the length of the county just east of U.S. Highway No. 11. A smaller area extends in a narrow band northward from Blairton. The association is underlain by the almost pure Stones River and Chambersburg limestones and occupies about 5 percent of the county. Slopes are gentle to strong and mostly short and irregular. The Chilhowie, Carbo, and Hagerstown soils are dominant, and about one-fourth of their acreage is rocky. Chilhowie and Carbo soils occupy about two-thirds of the association.

The Chilhowie soils have a dark-brown, clayey surface layer and a dark-brown, very sticky clay subsoil. These soils are fertile and have a high content of lime, but they are droughty and shallow to limestone. The Carbo soils are less extensive than the Chilhowie soils and generally occur on smoother slopes. They have a grayish-brown silty clay loam surface layer and a yellowish-brown, sticky clay subsoil. They are moderately deep or deep over limestone and are high in content of lime. The Hagerstown soils, which occur in small areas, have a brown surface layer and a reddish-brown subsoil. These soils are deep and fertile and are easier to till than the Chilhowie and Carbo soils. Also in the association are small areas of slightly wet Pickaway soils in smooth depressions and small areas of Murrill, Frederick, and Corydon soils, which were derived from limestone.

Much of the acreage in this association has been acquired by companies that quarry limestone for use in the steel and other industries. The change in ownership has been widespread, and many farms are operated by tenants who were formerly owners. Quarrying is active, and there are many old quarry holes filled with water. The limestone is transported on railroad spurs that have been extended into the area. Pasture is extensive in this association, and livestock farms are common. Orchards and field crops are grown in areas free of rock. On farms that extend to limestone soils in other associations, orcharding and dairying are major enterprises.

U.S. Highway No. 11 runs along the western edge and through much of this association, which includes part of the city of Martinsburg. Urban areas are expanding, especially along the highway.

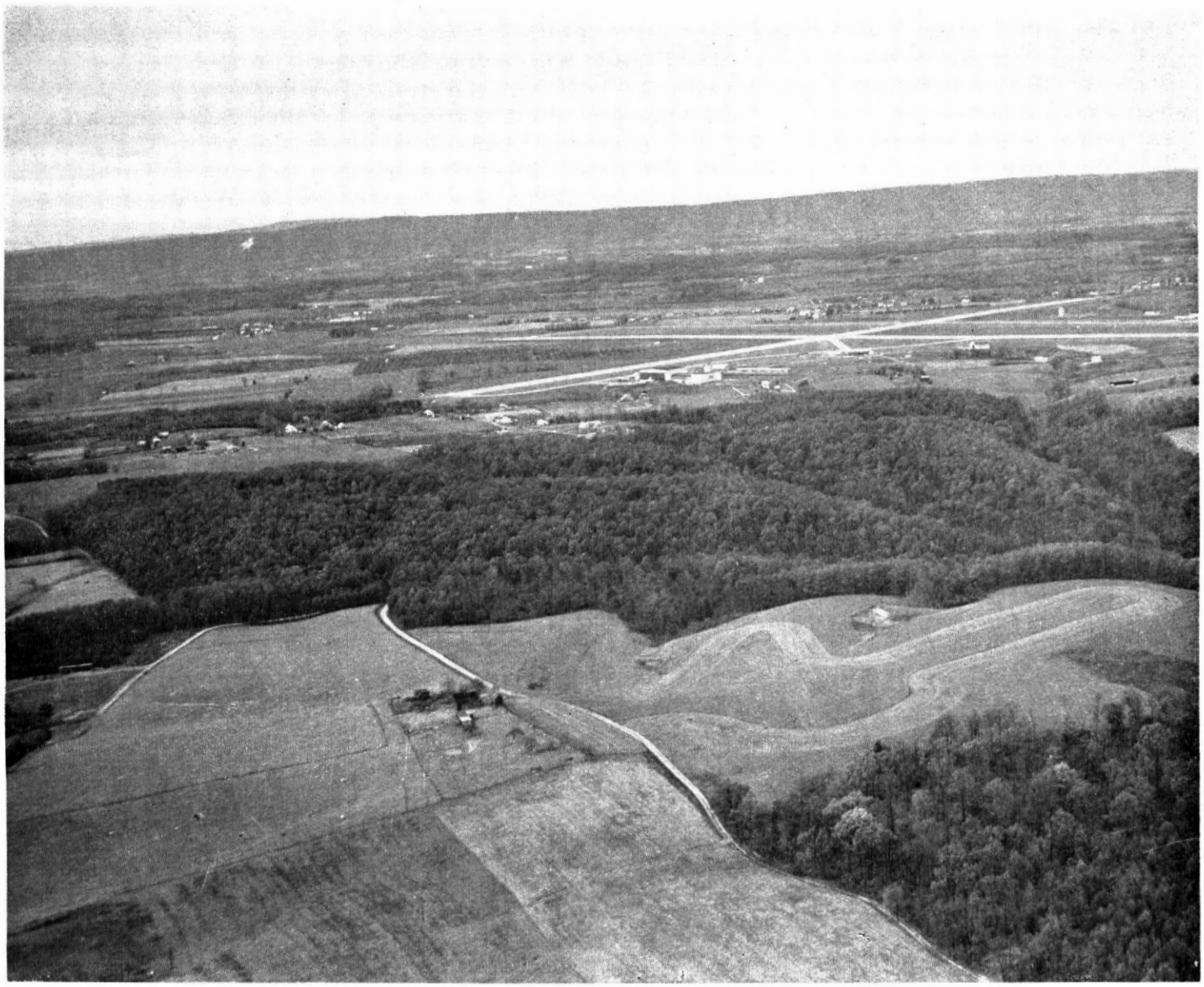

Figure 2.—Aerial view of the Berks-Montevallo-Blairton association in the limestone valley. In the middle distance, beyond airport, is the Frederick-Hagerstown-Murrill association. North Mountain in background.

4. Frederick-Hagerstown-Murrill association: Well-drained, medium-textured, mainly gently sloping soils that are deep over limestone

This association occurs as a band 2 to 3 miles wide in the smooth limestone valley just west of U.S. Highway No. 11. It extends across the county from the Virginia State line northeast to the Potomac River and makes up about 17 percent of the total acreage. This part of the county is smooth to rolling and is mostly gently sloping.

The Frederick, Hagerstown, and Murrill soils are dominant. They are deep, medium-textured, well-drained soils derived from limestone. About a fifth of their acreage is rocky. The Hagerstown soils have a dark-brown surface layer and a reddish-brown subsoil. The Frederick soils have a dark-brown surface layer and a yellowish-red subsoil. Murrill soils occur in shallow colluvial depressions and on smooth flats above the Potomac River. They resemble the Frederick soils, but their surface layer and upper subsoil have been considerably influenced by material from acid sandstone.

Small areas of the moderately well drained Pickaway soils and the somewhat poorly drained Sees soils are at the head of streams. Small areas of the Frankstown and Duffield soils also occur. The Waynesboro soils, which contain rounded gravel, are on high terraces above the Potomac River in the extreme northern part of the association. Huntington, Lindside, and Melvin soils lie on the narrow, discontinuous bottom land along the river.

Almost all the acreage in this association has been cleared. The farms are large, and land use is fairly intensive. The soils are well suited to all the crops and orchard fruits common in the county. Dairying, orcharding, and raising livestock are important enterprises. Fairly common are good limestone springs. One

of these is Harland Spring. Erosion is a moderate hazard on most of the acreage. The landscape is dotted with farm woodlots, generally only a few acres in size.

Although the soils are excellent for farming, urban construction is expanding into areas that formerly were rural, especially along U.S. Highway No. 11 (fig. 3). Part of the city of Martinsburg is on this association, as are the small towns of Bunker Hill, Inwood, Tabler, and Little Georgetown. Paved roads reach all parts of the association. Fruit-processing plants are at Inwood and Martinsburg, and a large plant for manufacturing plastic cookware is just south of Pikeside.

5. Frankstown-Duffield-Frederick association: Deep and moderately deep, medium-textured soils derived mainly from limestone and underlain by limy shale and limestone

This association occupies a band that is 1½ to 2 miles wide and lies in a northeast-southwest direction near the western edge of the limestone valley. It extends from Georgetown to an area just east of Gerrardstown and covers about 9 percent of the county. The association consists of a series of low, rounded, parallel ridges that are locally called Apple Pie Ridge. Slopes are smooth to irregular and, in most places, are gentle or strong. The underlying rocks are limy shale and limestone.

Dominant in the association are the Frankstown, Duffield, and Frederick soils. They are mellow, well-drained, productive soils that were derived from limestone. A small part of their acreage is rocky. The surface layer of the Frankstown soils is dark brown and has a fairly high content of soft shale. Underlying this layer is a brown, medium-textured subsoil. The Frankstown soils are moderately deep or deep over shaly limestone. The Duffield and Frederick soils have a dark-brown surface layer and a brown to yellowish-red subsoil. These soils generally are deep over limestone. Small fragments of sandstone are common in the Duffield soils.

Figure 3.—**Farming on soils of the Frederick-Hagerstown-Murrill association near U.S. Highway No. 11 south of Pikeside. In the background are new homes and an industrial plant that have been built in a 50-acre area formerly used for crops.**

Figure 4.—**Apple orchards on Duffield, Frankstown, and Frederick soils on Apple Pie Ridge near Gerrardstown. North Mountain in background.**

Also in the association are small areas of the moderately well drained Pickaway soils and the somewhat poorly drained Sees soils. In addition, there are small areas of the Hagerstown and Corydon soils.

Almost all of this association has been cleared, and a large acreage is used for orchards. Air drainage is good in most places, and the soils produce high yields of well-colored, good quality apples (fig. 4). Also high are the yields from peaches and cherries. The soils are well suited to all crops grown in the county, but erosion is generally a moderate hazard. Dairy farming and livestock raising are important enterprises. The entire area is rural, and land use is stable. Several fruit companies have acquired large holdings in recent years and are growing orchard fruits under intensive management.

All parts of the association are accessible by all-weather roads. Small streams and strong limestone springs occur in the area. Small villages are Gerrardstown, Nollville, Arden, and Georgetown.

6. Berks-Blairton-Sees association: Shallow, droughty soils over soft acid shale, and somewhat poorly drained soils over acid shale and limestone

This association lies between Apple Pie Ridge and the eastern base of North Mountain. It occurs in a band about 1 mile wide that crosses most of the county and makes up about 5 percent of the total acreage. The association is mostly smooth, concave, and gently sloping, and it is underlain by soft acid shale and limestone. It receives water from the adjoining mountain slopes.

Dominant are the Berks, Blairton, and Sees soils, but almost half of the association consists of the Berks soils. They are droughty, easily erodible, mostly shaly soils that are moderately deep or shallow over shale. They have a mellow, brown surface layer and a yellowish-brown subsoil. Intermingled with the Berks soils are the Montevallo soils, which are shallower and more droughty. The somewhat poorly drained Blairton soils make up about a quarter of the association. They have a clayey,

mottled, yellowish-brown subsoil, and they are shallow over shale in most places. The Sees soils are deep and somewhat poorly drained, and they occur over limestone. Their surface layer is grayish brown, and their subsoil is mottled grayish brown, sticky, and clayey.

Small areas of poorly drained soils occur at the head of streams, and there are small areas of the Corydon, Frankstown, and Frederick soils.

Most of this association is in farms, chiefly dairy and livestock farms. Crops are grown mostly in the better drained areas, and pasture is extensive, but the wettest parts are wooded. Drainage is needed before the somewhat poorly drained soils can be used for crops. If they are drained, these soils are suited to pasture and to other crops that tolerate wetness. The soils in this association are not suited to orchards.

This association has all-weather roads, and land use is stable. The small town of North Mountain is in the association.

Soils of the Mountains and Mountain Valleys

Soil associations 7 through 11 occupy sloping to very steep mountains and mountain valleys in the western part of the county.

7. Dekalb-Laidig-Buchanan association: Mostly steep and very steep, stony soils on mountains; derived from acid sandstone

This association covers about 15 percent of the county and occupies most of the higher mountain slopes in the western part. North Mountain, Third Hill Mountain, and Sleepy Creek Mountain are in the association, which is underlain by acid sandstone. Slopes are mostly steep or very steep. The Dekalb, Laidig, and Buchanan soils are dominant, and more than three-fourths of their acreage is stony. Dekalb soils make up more than half of the association.

The Dekalb soils have a grayish-brown, loamy surface layer and a yellowish-brown loamy or sandy subsoil. They are moderately deep over sandstone bedrock. The deep Laidig and Buchanan soils are on lower slopes and developed in material worked down from the steep Dekalb soils. The Buchanan soils are slightly wet and have a fragipan in the lower subsoil. Also in the association are narrow areas of Steep rock land on mountaintops and steep ridges. These areas are wooded, but tree growth is poor. In addition, there are small areas of Berks or Corydon soils.

Woodland makes up almost all of this association, but general crops and orchard fruits are grown in small areas of the better lying, nonstony soils. These nonstony soils are fairly well suited to general crops, and the Laidig soils are suited to orchards in areas that are not too stony. In most places, however, the soils in this association are most suitable as woodland. Under good management, fair to high yields of wood products can be expected.

On the western edge of the association is a large area occupied by the Sleepy Creek Public Hunting Area that is owned and administered by the West Virginia Department of Natural Resources.

8. Berks-Montevallo-Leadvale association: Shallow and moderately deep, sloping to steep soils over shale, and slightly wet soils on foot slopes

This association is on rounded foothills and lower slopes in the mountainous area of western Berkeley County. It occurs in and around the Back Creek valley and covers about 15 percent of the county. Slopes range from gentle in the valley to steep and very steep in the foothills.

Most of the association consists of the Berks soils, but the Montevallo and Leadvale soils also are important. The Berks soils are droughty, infertile, and moderately deep or shallow to hard shale. They have a grayish-brown surface layer and a yellowish-brown subsoil. The Montevallo soils are similar to the Berks soils, but they are very shallow or shallow, very droughty, and in most places, severely eroded. The Leadvale soils, which are not extensive, occupy foot slopes and developed in material that worked down from the Berks and Montevallo soils. They are deep and slightly wet and have a fragipan layer in the subsoil. Also in the association are small areas of the Dekalb and Laidig soils.

Most of the smooth, gently and strongly sloping areas have been cleared and cropped, but the steep and very steep slopes generally have been kept in woodland, which covers well over half of the association. Much of the cropped acreage is severely eroded, and a large part of it is being abandoned to trees. The farms are mostly small and of the general type, but there are some larger dairy farms. The soils are best suited to trees and to plants used for pasture or long-term hay. Although woodland is not highly productive on these soils, it controls runoff and erosion. If the soils are well managed, fair to good yields of wood products can be expected.

This association is sparsely settled, though it is fairly well supplied with roads. The town of Hedgesville is in this association.

9. Monongahela-Tygart-Atkins-Philo association: Deep, well-drained to poorly drained soils on flood plains and second bottoms

This association occupies smooth, nearly level or gently sloping flood plains and second bottoms along Back Creek in the western part of the county. It makes up about 4 percent of the total land area. The Monongahela, Atkins, and Philo soils cover about three-fifths of the association in about equal acreages. These soils developed in alluvial material that washed from uplands of acid sandstone and shale. The Monongahela and Tygart soils occupy smooth second bottoms and are above the level of flooding. Monongahela soils, which are slightly wet, have a grayish-brown surface layer and a yellowish-brown subsoil that has hard layers. The Tygart soils are wetter and more clayey than the Monongahela soils.

The poorly drained Atkins soils occur on first bottoms and are occasionally flooded. They have a dark-gray surface layer and a clayey, mottled subsoil. The Philo soils occur with the Atkins soils, but they are better drained and generally are closer to Back Creek than the Atkins soils. In addition, the well-drained Pope soils are in the association. In some places the Pope soils

are sandy, somewhat droughty, and subject to moderate flooding.

Most of this association has been cleared, but trees cover the wettest areas and areas that are frequently flooded. General farms and livestock farms are most common, and there are some dairy farms. The soils are highly suitable for agriculture, though some need drainage.

The association is fairly well served by all-weather roads. Most farmsteads are on second bottoms, where flooding is not a hazard. Small towns are Ganotown and Glengary.

10. Corydon-Frederick, thick surface, association: Shallow to moderately deep soils over limestone, and deep soils from limestone and some sandstone

This association occupies much of the small limestone area in western Berkeley County. It extends from near Jones Springs northward to Ferrel Ridge and accounts for about 4 percent of the county. Slopes are generally irregular and range from gentle to steep.

Dominant in the association are the Corydon soils and the Frederick, thick surface, soils. The Corydon soils make up about a third of the association. They have a dark-brown surface layer and a strong-brown subsoil, and they are shallow to moderately deep over hard limestone. The Frederick, thick surface, soils cover about half of the association, and about half of their acreage is stony and moderately steep or steep. They have a gravelly or stony, loamy surface layer influenced by sandstone material and a yellowish-red, clayey subsoil over hard limestone. Also in the association are the Dekalb soils on low ridges; the somewhat poorly drained Sees soils in level or depressional areas; and small areas of cherty Frederick soils.

On this association are many small and medium-sized farms. The smoother parts are mainly cleared and used for pasture or crops. The soils generally are too shallow for good orchards, though the smoother areas of nonstony Frederick soils are well suited to fruit trees. Woodland has been kept on a large acreage of the stony Frederick soils and the Dekalb soils.

The association is rural and rather sparsely settled, but it is well served by all-weather roads. Small towns are Jones Springs on the western edge and Tomahawk on the eastern.

11. Lehew-Berks association: Moderately deep, strongly sloping soils derived from red and gray acid shale and sandstone

This association occupies the rounded foothills just east of Third Hill Mountain in the western part of the county. It occurs as a band ½ to 1 mile wide that extends across the county and covers about 4 percent of the land area. Slopes are smooth and, in most places, are strong or moderately steep.

Almost all of the association consists of the Lehew and Berks soils in a mixed pattern. These soils are somewhat droughty, and most of them contain small fragments of sandstone. The Lehew soils, which occupy about three-fourths of the acreage, are moderately deep over red sandstone. Their surface layer is dark brown and loamy, and their subsoil is reddish brown and loamy or sandy. The Berks soils are moderately deep or shallow over acid gray shale. They have a grayish-brown, silty surface layer and a yellowish-brown, silty subsoil. Also in the association are small areas of the Dekalb soils. Some Dekalb soils are stony, especially those on the steeper slopes.

Considerably more than half of this association is wooded. In the past much of it was used for orchards and general crops, but the soils are susceptible to erosion, and they produce only moderate yields of orchard fruits. Consequently, many areas formerly in fruit trees have been abandoned, though most areas have good air drainage, and some of the better ones are still in orchards. Normally, the soils are most suitable as woodland and for general farming. If the soils are well managed, fair to good yields of wood products can be expected.

The association is somewhat isolated and is sparsely populated. Only a few roads cross it, and there are no towns.

Use and Management of the Soils

This section describes capability groupings and discusses the management of soils by capability units. It also gives the estimated yields of the principal crops grown under two levels of management. In addition, the section discusses the use and management of soils as woodland, for wildlife, in engineering, and in suburban and recreational developments.

Capability Groups of Soils

The capability classification is a grouping that shows, in a general way, how suitable soils are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated 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* means that water in or on the soil will interfere 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 country, indicates 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 or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the

soils in it are subject to little or no erosion but have other limitations that restrict their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils 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 identified by numbers assigned locally, for example, IIe–1 or IIIe–4. These numbers are not consecutive in Berkeley County, because not all of the capability units used in West Virginia occur in this county. The soils in each capability unit have about the same limitations and require about the same treatment.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in this county, are described in the list that follows. No soils in Berkeley County are in class V.

Class I: Soils that have few limitations that restrict their use.
- Capability unit I–1.—Nearly level, deep, well-drained soils that developed in material weathered from limestone.
- Capability unit I–6.—Nearly level, deep, well-drained soils that developed in local alluvial material derived from limestone.

Class II: Soils that have some limitations that reduce the choice of plants or require moderate conservation practices.

Subclass IIe: Soils subject to moderate erosion if they are not protected.
- Capability unit IIe–1.—Gently sloping, deep, well-drained soils that developed in material weathered from limestone.
- Capability unit IIe–4.—Gently sloping, deep, well-drained soils that developed in acid material on terraces or colluvial slopes.
- Capability unit IIe–10.—Nearly level and gently sloping, moderately deep, well-drained to excessively drained soils that developed mainly from acid shale.
- Capability unit IIe–13.—Gently sloping, deep, moderately well drained soils that have a fragipan and developed from acid material on terraces and colluvial foot slopes.
- Capability unit IIe–14.—Gently sloping, deep, moderately well drained soils that have a fragipan and developed from limestone material on uplands and terraces.

Subclass IIw: Soils that have moderate limitations because of excess water.
- Capability unit IIw–1.—Nearly level, deep, moderately well drained soils that have a fragipan and developed from acid material on smooth terraces.
- Capability unit IIw–2.—Nearly level, deep, moderately well drained soils that developed in material weathered from limestone.
- Capability unit IIw–6.—Nearly level, deep, well-drained soils on bottom lands that developed in material from limestone and shale; moderate overflow hazard.
- Capability unit IIw–7.—Nearly level and gently sloping, deep, moderately well drained soils on bottom lands that developed in material from limestone or from sandstone and shale; moderate overflow hazard.

Class III: Soils that have severe limitations that reduce the choice of plants, or require special conservation practices, or both.

Subclass IIIe: Soils subject to severe erosion if they are cultivated and not protected.
- Capability unit IIIe–1.—Strongly sloping, deep, well-drained soils that developed in material weathered from limestone.
- Capability unit IIIe–4.—Strongly sloping, deep, well-drained soils that developed in acid material on terraces or colluvial foot slopes.
- Capability unit IIIe–10.—Gently or strongly sloping, moderately deep, well-drained to excessively drained soils that developed on acid shale or on red and gray acid sandstone.
- Capability unit IIIe–13.—Strongly sloping, deep, moderately well drained soils that have a fragipan and developed from acid material on colluvial foot slopes.
- Capability unit IIIe–30.—Nearly level and gently sloping, well-drained, shallow to deep soils that are clayey, plastic, and sticky and that developed from limestone material.
- Capability unit IIIe–32.—Gently sloping, shallow or very shallow, droughty soils that developed from acid shale.

Subclass IIIw: Soils that have severe limitations because of excess water.
- Capability unit IIIw–1.—Nearly level, deep, poorly drained soils on bottom lands that developed in material from limestone or from sandstone and shale; moderate overflow hazard.
- Capability unit IIIw–5.—Nearly level and gently sloping, somewhat poorly drained, shallow to deep soils that have a clayey subsoil and developed on shale or on limestone and colluvial material.

Class IV: Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclass IVe: Soils subject to very severe erosion if they are cultivated and not protected.
- Capability unit IVe–1.—Strongly sloping, severely eroded soils and moderately steep, moderately eroded soils that are moderately deep or deep and well drained; developed from limestone material.

Capability unit IVe–3.—Deep to shallow, strongly sloping or moderately steep, chiefly well-drained soils that developed from acid sandstone and shale.

Capability unit IVe–9.—Strongly sloping, severely eroded, deep soils that are moderately well drained and have a fragipan; developed in acid material on foot slopes and terraces.

Capability unit IVe–30.—Strongly sloping, shallow or moderately deep limestone soils that are somewhat droughty and have a sticky, clayey subsoil.

Capability unit IVe–32.—Gently sloping, severely eroded soils and strongly sloping, moderately eroded soils that are shallow or very shallow and droughty; developed from acid shale.

Class VI: Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture, woodland, or wildlife food and cover.

Subclass VIe: Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Capability unit VIe–1.—Strongly sloping or moderately steep, severely eroded, silty or clayey soils that are shallow to deep and are well drained; derived from limestone.

Capability unit VIe–2.—Moderately steep, severely eroded, shallow or moderately deep, droughty soils that developed from red and gray acid sandstone and shale.

Capability unit VIe–31.—Strongly sloping, severely eroded soils and moderately steep, moderately eroded soils that are shallow or very shallow and droughty; developed from acid shale.

Subclass VIs: Soils generally unsuitable for cultivation and limited for other uses by their moisture capacity, stones, or other features.

Capability unit VIs–1.—Gently sloping to moderately steep, very stony or very rocky, well-drained soils derived from limestone.

Capability unit VIs–2.—Gently sloping to moderately steep, very stony, deep soils that are well drained and moderately well drained; developed in acid colluvium.

Subclass VIw: Soils severely limited by excess water and generally unsuitable for cultivation.

Capability unit VIw–1.—Poorly drained to well-drained land types on bottom lands; severe overflow hazard.

Class VII: Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIe: Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Capability unit VIIe–2.—Steep, moderately deep to shallow, somewhat droughty soils derived from acid sandstone and shale.

Capability unit VIIe–3.—Strongly sloping to steep, severely eroded soils that are shallow or very shallow and droughty; derived from acid shale.

Subclass VIIs: Soils very severely limited by moisture capacity, stones, or other soil features.

Capability unit VIIs–1.—Moderately steep, severely eroded soils and steep, moderately eroded, very rocky or very stony soils derived from limestone.

Capability unit VIIs–2.—Gently sloping to very steep, very stony soils on uplands and colluvial foot slopes; derived from acid sandstone and shale.

Class VIII: Soils and landforms that, without major reclamation, have limitations that preclude their use for commercial production of plants and restrict their use to recreation, wildlife, water supply, or esthetic purposes.

Subclass VIIIe: Extremely erodible land.

Capability unit VIIIe–31.—Steep, very severely eroded land underlain by acid shale.

Subclass VIIIs: Rocks or soil materials that have little potential for production of vegetation.

Capability unit VIIIs–1.—Steep and very steep, massive sandstone outcrops and small vertical cliffs; little or no soil material.

CAPABILITY UNIT I–1

This unit consists of deep, nearly level, medium-textured soils that are in small upland areas throughout the limestone valley. These soils are well drained, moderately permeable, and high in available moisture capacity. They are productive and moderately easy to till. Erosion is only a slight hazard. The soils are—

Hagerstown silt loam, 0 to 3 percent slopes.
Murrill gravelly silt loam, moderately deep, 0 to 3 percent slopes.
Murrill silt loam, 0 to 3 percent slopes.

These soils are well suited to all crops grown locally, and almost all the acreage has been cleared. If well managed, the soils produce high yields of corn, wheat, barley, alfalfa, and clover for hay and pasture, but their use for orchard fruits is limited by frost pockets. Row crops can be grown on these soils each year if they are followed by a winter cover crop.

The supply of organic matter can be maintained and tilth improved by using an occasional hay crop in the rotation. Only good farming practices that include liming and applying commercial fertilizer and manure are needed to maintain productivity and organic-matter content. Returning crop residues to the soil and keeping tillage to a minimum help to maintain good tilth. Grass should be established and maintained in natural drainageways. These soils are suitable for irrigation.

CAPABILITY UNIT I–6

Only Huntington silt loam, local alluvium, is in this unit. This deep, well-drained, nearly level soil occurs in many small areas on narrow bottom lands along small streams and intermittent drainageways throughout the limestone valley. The soil is high in natural fertility and in content of lime. It is mellow, easy to work, and only slightly susceptible to erosion, but a few areas are subject to occasional overflow from adjacent hills.

This soil is suited to all field crops grown locally, and nearly all of it has been cleared. Corn and alfalfa grow especially well and commonly produce high yields. Small grain tends to lodge and, in most areas, orchard fruits are not suitable because of frost pockets. Row crops can be grown continuously if they are followed by a winter cover crop and if a hay crop is grown occasionally to help maintain tilth and organic matter. Among the good farming practices needed are liming, fertilizing, and using crop residues.

CAPABILITY UNIT IIe-1

In this unit are deep, gently sloping, medium-textured soils on well-drained uplands and colluvial slopes. These soils occupy about 28,000 acres and occur throughout the limestone valley. They are the most important agricultural soils in the county and are especially well suited to field crops and orchards. Slopes are generally short and somewhat irregular. Gravel, chert, and shale do not seriously interfere with farming. The soils are moderately easy to till, but in places the direction of cultivation is influenced by a few limestone ledges and shallow sinkholes. The soils are moderately permeable, high in available moisture capacity, highly productive, and only moderately susceptible to erosion. They are—

Duffield gravelly silt loam, 3 to 8 percent slopes.
Duffield silt loam, 3 to 8 percent slopes.
Frankstown shaly silt loam, 3 to 8 percent slopes.
Frederick cherty silt loam, 3 to 8 percent slopes.
Frederick gravelly loam, thick surface, 3 to 8 percent slopes.
Frederick silt loam, 3 to 8 percent slopes.
Hagerstown gravelly silt loam, 3 to 8 percent slopes.
Hagerstown silt loam, 3 to 8 percent slopes.
Hagerstown silty clay loam, 3 to 8 percent slopes.
Murrill gravelly loam, 3 to 8 percent slopes.
Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes.

These soils are well suited to all locally grown crops, and almost all areas have been cleared. The soils produce high yields of good quality apples, peaches, and cherries. If well managed, they also produce good yields of corn, wheat, barley, oats, alfalfa, clover for hay and pasture, and plants for permanent pasture.

The management needed on these soils consists of rotating crops, stripcropping (figs. 5, 6), adding fertilizer and lime in proper amounts, turning under crop residues, using minimum tillage, and keeping natural drainageways in sod. To maintain good tilth and the content of organic matter, use a crop rotation consisting of a row crop followed by a small grain and then by 1 year of hay. Similar rotations also are suitable. Cultivating on the contour or across the slope reduces runoff on short, irregular slopes. In some places diversion terraces are needed on slopes that are long or that receive runoff from adjacent hills.

CAPABILITY UNIT IIe-4

This capability unit consists of deep, gently sloping, well-drained soils that developed from acid materials and are acid throughout. These soils are gravelly but are easy to till. They take in water readily, are moderately permeable, and are moderate to high in available moisture capacity. Small areas contain enough gravel to interfere with cultivation. These areas may be droughty. The soils are—

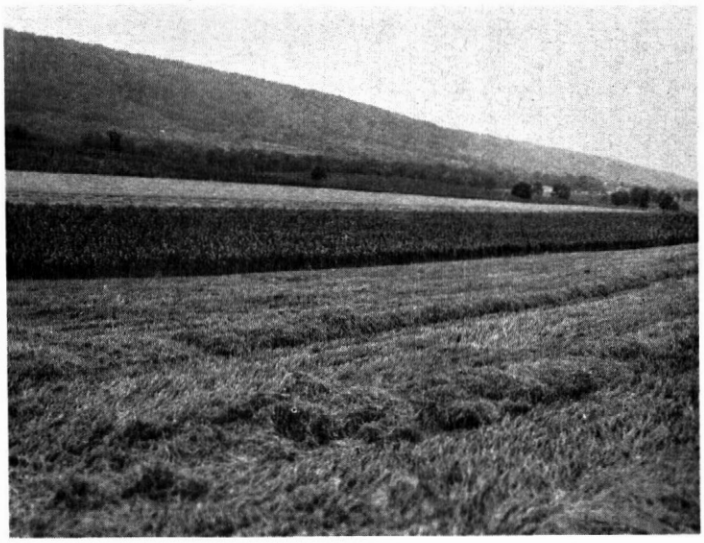

Figure 5.—**Field stripcropping on Frankstown shaly silt loam, 3 to 8 percent slopes.**

Laidig gravelly loam, 3 to 8 percent slopes.
Waynesboro gravelly loam, 3 to 8 percent slopes.

The Laidig soil is on colluvial foot slopes below hills of sandstone and shale in the western part of Berkeley County. The Waynesboro soil occupies smooth terraces high above the Potomac River in the northeastern part.

The soils in this unit are suited to general crops and are fairly well suited to orchard fruits. Almost all the acreage has been cleared. Among crop rotations commonly used are (1) a row crop, a small grain, and 1 or more years of hay; and (2) a small grain and 2 or more years of hay. Keeping hay on the soils for 2 years helps to conserve water and to maintain the supply of organic matter. If well managed, permanent pasture yields moderately well.

These soils are low in phosphorus, likely are low in potash, and may need boron if alfalfa is grown. They respond well to generous applications of fertilizer. Be-

Figure 6.—**Crops laid out in strips on Frankstown shaly silt loam, 3 to 8 percent slopes.**

cause the soils are naturally strongly acid, lime is needed unless it has been added previously. Plowing down crop residues and adding manure to fields used for row crops help to maintain tilth and the supply of organic matter. Stripcropping conserves moisture and reduces loss of soil, and in some places, terraces are effective in diverting water from adjoining hillsides. Natural drainageways should be kept in sod. The soils are suitable for irrigation.

CAPABILITY UNIT IIe-10

This unit consists of nearly level and gently sloping, moderately deep, well-drained to excessively drained soils that developed in material weathered mainly from acid shale. These soils are easy to work, but they are somewhat droughty in dry periods and are not highly productive. Permeability is moderate to rapid, and the available moisture capacity is moderate to low. Erosion is a moderate hazard. The soils are—

Berks channery silt loam, 3 to 10 percent slopes.
Berks-Lehew channery loams, 3 to 10 percent slopes.
Gilpin silt loam, soft shale substratum, 0 to 3 percent slopes.
Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes.
Lehew channery loam, 3 to 10 percent slopes.

The Berks and Lehew soils are on rather hard shale and sandstone in the hilly western part of the county. A large acreage of these soils is wooded. Much of Lehew channery loam, 3 to 10 percent slopes, has been cleared and used for orchards, but a considerable part has reverted to woods. The Gilpin soils occur on soft shale in the smooth limestone valley. In most places they have been cleared and cropped.

The soils in this unit are suited to general crops grown in rotations. Small grains yield better than corn because they mature before growth is retarded by lack of water. Some rotations commonly used are (1) a row crop, a small grain, and 1 or more years of hay; and (2) a small grain and 2 or more years of hay. If small grain is not planted until spring following a row crop, a cover crop should be used to protect the soils over winter.

These soils are too droughty for good bluegrass pasture, but they are suited to alfalfa and other deep-rooted plants that obtain enough moisture. Yields of orchard fruits are only moderate.

Where cropped, the soils in this unit are low in potash and phosphate, and they respond well to generous additions of these fertilizers. Lime and fertilizer should be added in amounts indicated by soil tests. Moisture can be conserved and the organic-matter content maintained by returning crop residues to the soil and by manuring fields used for row crops. Losses of soil and water are reduced if fields are stripcropped and if short slopes are cultivated on the contour. In some places diversion terraces are needed on slopes that are long or that receive runoff from adjacent hills. Natural drainageways should be kept in sod.

Woodland is moderately productive on the soils in this unit. The suitability and limitations of these soils for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 1 and 2.

CAPABILITY UNIT IIe-13

In this unit are deep, moderately well drained, acid soils that have a hard layer, or fragipan, in the subsoil at a depth of about 2 feet. These soils are gently sloping and occupy old stream terraces and foot slopes below uplands of sandstone and shale, mostly in the western third of the county. They are extensive in and around the Back Creek Valley. Water moves readily through the surface layer of these soils, but it moves slowly in the lower layers. In some places it accumulates above the pan during wet periods, and small seeps occur. If the soils are worked when wet, their surface layer puddles, and then it hardens as it dries. Pebbles in the gravelly soils are neither large enough nor abundant enough to interfere seriously with tillage. The available moisture capacity and the erosion hazard are moderate. The soils are—

Buchanan gravelly loam, 3 to 8 percent slopes.
Leadvale silt loam, 3 to 8 percent slopes.
Monongahela gravelly silt loam, 3 to 8 percent slopes.
Monongahela silt loam, 3 to 8 percent slopes.

The soils in this unit are used for crops and pasture, and most of their acreage has been cleared. All the common crops give good yields, but crops that are somewhat water tolerant grow best. Because the soils are slightly wet and have a hard subsoil, orchard trees are not well suited. Among the suitable rotations are (1) a row crop, a small grain, and 1 or more years of hay; and (2) a small grain and 2 or more years of hay. If the grain is not planted until spring, a cover crop should follow the row crop. For long-term hay or tall-grass pasture, the mixture should consist of such water-tolerant plants as Ladino clover and orchardgrass. Bluegrass is suited to these soils, but alfalfa may be damaged in winter. If the soils are used for permanent pasture, it is necessary to regulate carefully the time of grazing and the rate of stocking.

These soils normally are low in phosphate, and the Monongahela soils are particularly low in potash. Fertilizer and lime should be added in amounts indicated by soil tests. Alfalfa may respond to additions of boron. Plowing under crop residues and using manure on fields used for row crops help to maintain the organic-matter supply. Fields can be improved by draining the seepy areas, and stripcropping helps to control runoff and the consequent loss of soil and moisture. On long slopes diversion terraces effectively control runoff from nearby hills. Natural drainageways should be kept in sod.

CAPABILITY UNIT IIe-14

This unit consists of deep, gently sloping, lime-influenced soils that are moderately well drained. These soils take in water well, but a slowly permeable fragipan occurs at a depth of about 2 feet. In wet periods water accumulates on top of the pan, and there are a few seep spots. Roots cannot penetrate deeply. The erosion hazard is moderate, and the available moisture capacity is moderate to high. In most places the soils have a medium acid subsoil. They are easy to till and are moderately to highly productive. The soils are—

Captina silt loam, 3 to 8 percent slopes.
Pickaway silt loam, 3 to 8 percent slopes.

The Captina soil developed on terraces above Opequon Creek, the Potomac River, and other streams that drain the limestone uplands. The Pickaway soil developed on

silty limestone and occurs on smooth slopes throughout the limestone valley.

Almost all the acreage in this unit has been cleared and is cropped intensively. The soils are suited to all crops grown locally but are best suited to crops that are somewhat tolerant of water. A suitable rotation that is commonly used consists of (1) a row crop, a small grain, and 1 or more years of hay; or (2) a small grain and 2 or more years of hay. If the small grain is not planted until spring, a cover crop should follow the row crop. Water-tolerant plants are needed in mixtures used for long-term hay and tall-grass pasture. Bluegrass grows well on these soils, but alfalfa may be short lived. In areas used for permanent pasture, carefully regulating the time and rate of grazing is important.

Most areas of these soils have been cropped for a long time, and they are low in plant nutrients, especially potash. Fertilizer and lime should be added in amounts indicated by soil tests. To maintain the organic-matter supply and to conserve moisture, plow under crop residues, keep tillage to a minimum, and apply manure on fields used for row crops. Draining seepy areas is beneficial. Stripcropping helps to reduce runoff and to control erosion. Diversion terraces may be needed on long slopes and, in some places, are useful in diverting runoff from nearby hills. Natural drainageways should be kept in sod.

CAPABILITY UNIT IIw-1

The only soil in this unit is Monongahela silt loam, 0 to 3 percent slopes. This soil occupies old, smooth stream terraces that are above overflow along Back Creek and other streams draining the sandstone and shale uplands. It is deep, nearly level, moderately well drained, and strongly acid throughout. A hard layer, or fragipin, occurs at a depth of about 2 feet. This hard layer slows the movement of water and limits the growth of plant roots. Water accumulates above the pan in wet periods. Small seep spots are fairly common.

This soil has moderate available moisture capacity; it is only slightly susceptible to erosion. It is fairly easy to till, but the surface layer tends to pack and to harden. The soil is not highly productive. It is strongly leached and is naturally low in plant nutrients, especially potash.

Most of this inextensive soil has been cleared and is cropped. The soil is suited to crops commonly grown in the county but is best suited to water-tolerant plants. It is not a good soil for orchards. A suitable rotation that is commonly used consists of (1) a row crop, a small grain, and 1 or more years of hay; or (2) a small grain and 2 or more years of hay. Water-tolerant plants are most suitable for long-term hay or in mixtures for tall-grass pasture. Bluegrass can be used for pasture if it is well managed. To maintain good tilth and the organic-matter content, return crop residues to the soil and apply manure to fields used for row crops. Drains help to dry up seepy spots, and terraces are effective in diverting runoff from adjoining hillsides. Natural drainageways should be kept in permanent cover.

CAPABILITY UNIT IIw-2

The only soil in this unit is Pickaway silt loam, overwash, 0 to 3 percent slopes. This is a deep, nearly level, moderately well drained soil that has a fragipan at a depth of about 30 inches. It developed in material weathered from silty limestone and occurs in slightly depressional areas throughout the limestone valley. The original surface has been covered by a considerable amount of silty material that washed from surrounding limestone soils. Water moves readily through the present surface layer, but slowly through the fragipan. Seeps occur in a few places.

The available moisture capacity of this soil is high. Erosion is only a slight hazard. The soil is easy to till and, in most places, is highly productive.

This soil occupies about 2,500 acres, and almost all of it is cropped. It is suited to all the common crops but is not used extensively for orchards, because frost is a severe hazard. Among the suitable rotations are (1) a row crop, a small grain planted in fall, and 1 or more years of hay; and (2) a small grain and 2 or more years of hay. Bluegrass does well, and permanent pasture is highly productive if it is well managed. Alfalfa may be short lived in wetter areas.

For the best yields, this soil should be fertilized and limed in amounts indicated by soil tests. Organic matter and good tilth can be maintained and moisture conserved by adding manure to fields used for row crops and by plowing under all crop residues. Draining the seeps improves this soil, and in some places, terraces can be used to divert runoff from higher slopes. Natural drainageways should be kept in sod.

CAPABILITY UNIT IIw-6

This unit consists of deep, nearly level, well-drained soils on bottom lands. Flooding is a moderate hazard and occasionally damages soils and crops. Permeability is moderate or moderately rapid. The available moisture capacity is generally high but is moderate in the sandier areas. The soils are mellow, easy to till, and high in natural fertility. They are—

Huntington fine sandy loam.
Huntington silt loam.
Pope fine sandy loam.
Pope silt loam.

The Huntington soils are slightly acid or neutral and occur along Opequon Creek, the Potomac River, and other streams that drain the limestone uplands. The Pope soils are acid throughout and occur along Back Creek and other streams that drain uplands of limestone and shale.

Except for narrow strips along the edges of streams, the soils in this unit have been cleared and are used for crops in most areas. The soils are well suited to all the common field crops and to truck and specialty crops. Because frost is a severe hazard, they are not suited to orchards. Row crops can be grown every year if they are followed by a winter cover crop, but the choice of crops and the time of planting may be partly determined by knowledge of past flooding in local areas. Alfalfa and bluegrass yield well on these soils, and permanent pasture is highly productive if it is well managed.

These soils respond well to liberal additions of fertilizer and to ordinary good management that includes liming. Lime and fertilizer should be added in amounts indicated by soil tests. Organic matter and good tilth can be maintained by applying manure, plowing under

crop residues, and using minimum tillage. Natural waterways and low swales should be kept in sod, and streambanks should be protected by riprapping or by planting suitable shrubs. The soils are suitable for irrigation.

CAPABILITY UNIT IIw-7

This unit consists of deep, nearly level or gently sloping, moderately well drained soils that occupy areas on bottom land where flooding is a moderate hazard. These soils have a seasonally high water table and are wet in a few small spots. Flooding is likely to damage soils or crops occasionally. Permeability is moderate to slow, and the available moisture capacity is high. The soils produce medium to high yields of crops and are easy to till, but if they are worked when too wet, the surface layer is compacted and tends to harden as it dries. The soils are—

Lindside silt loam.
Lindside silt loam, local alluvium, 0 to 3 percent slopes.
Lindside silt loam, local alluvium, 3 to 8 percent slopes.
Philo fine sandy loam.
Philo silt loam.

The Lindside soils occur along narrow intermittent drainageways and along Opequon Creek, the Potomac River, and other streams that drain the limestone uplands. These soils are slightly acid or neutral. The Philo soils occur along Back Creek and other streams that drain uplands of sandstone and shale. They are acid throughout.

In most places the soils in this unit have been cleared and are used for crops and pasture. All the common crops are suited, but those that are somewhat water tolerant grow best. Because of wetness and a severe frost hazard, orchards are generally not suited. Row crops can be grown every year if they are followed by a winter cover crop, but the choice of crops and the time of planting may be influenced by the history of flooding in local areas. Alfalfa yields well on these soils, but long-lived stands are difficult to maintain because of wetness. Mixtures for long-term hay and tall-grass pasture should contain water-tolerant plants. The soils are well suited to bluegrass. Permanent pasture is highly productive if it is well managed.

The management needed for high yields of crops consists of liming and fertilizing in proper amounts, applying manure, plowing under crop residues, using minimum tillage, and improving drainage by use of tile lines or open ditches. Natural waterways and low swales should be kept in sod. Measures for protecting streambanks are needed in some places.

CAPABILITY UNIT IIIe-1

In this unit are deep, strongly sloping, medium-textured soils on limestone uplands and colluvial slopes. These soils occupy about 3,000 acres in the county and are scattered throughout the limestone valley. Slopes generally are short and fairly irregular. The soils are well drained, moderately permeable, and high in available moisture capacity. They are moderately easy to till, and they do not contain gravel, chert, or shale fragments that interfere seriously with farming. In a few places, however, shallow sinkholes and outcrops of limestone influence the direction of tillage. Erosion is a moderate or severe hazard, and small areas are severely eroded. The soils are—

Duffield silt loam, 8 to 15 percent slopes.
Frankstown shaly silt loam, 8 to 15 percent slopes.
Frederick cherty silt loam, 8 to 15 percent slopes.
Frederick gravelly loam, thick surface, 8 to 15 percent slopes.
Frederick silt loam, 8 to 15 percent slopes.
Hagerstown silty clay loam, 8 to 15 percent slopes.
Murrill gravelly loam, 8 to 15 percent slopes.

These soils are well suited to all crops grown locally, and most of the acreage has been cleared. Under good management, the soils produce excellent yields of corn, wheat, barley, oats, alfalfa, and hay crops. They also produce high yields of good quality apples, peaches, and cherries. They are well suited to bluegrass for pasture. Among the suitable rotations are (1) a row crop, a small grain, and 2 or more years of hay; and (2) a small grain followed by 3 or more years of hay.

Because of the erosion hazard, practices are needed to control runoff on these soils. Stripcropping and diversion terraces effectively shorten long slopes and permit more water to enter the soil. In addition, diversion ditches are needed in places to intercept water from adjacent hills. Natural waterways should be kept in sod. By plowing under crop residues and by adding liberal amounts of manure to fields used for row crops, good tilth and the organic-matter content can be maintained. Fertilizer and lime should be used in amounts indicated by soil tests.

CAPABILITY UNIT IIIe-4

This capability unit consists of deep, strongly sloping, well-drained soils that developed from acid materials. These soils take in water readily, have a moderately permeable subsoil, and are mostly moderate to high in available moisture capacity. Although tillage is easy, some areas tend to be droughty and contain enough large pebbles to interfere with cultivation. The soils are—

Laidig gravelly loam, 8 to 15 percent slopes.
Waynesboro gravelly loam, 8 to 15 percent slopes.

The Laidig soil occurs on colluvial foot slopes below uplands of sandstone and shale in the western part of the county. The Waynesboro soil occupies smooth terraces high above the Potomac River. All of this soil has been cleared, but some of the Laidig soil remains wooded.

The soils in this unit are suited to general crops and are fairly well suited to orchards.

The rotations commonly used consist of (1) a row crop, a small grain, and 2 or more years of hay; and (2) a small grain followed by 3 or more years of hay. The soils are likely to need potash and phosphorus, and they may need boron if alfalfa is grown. They respond well to generous additions of fertilizer and, in most places, should be limed. Liming is especially needed if alfalfa is grown. The soils can be kept in good tilth and well supplied with organic matter by adding manure to fields used for tilled crops and by plowing under all crop residues. Under good management, permanent pasture gives average yields.

To help conserve moisture and soil, stripcropping is important, and diversion terraces are useful on slopes that are long or that receive hill water. Natural drainageways should be kept in sod.

CAPABILITY UNIT IIIe-10

This unit consists of moderately deep, gently or strongly sloping, well-drained to excessively drained soils that developed on acid shale or on red and gray acid sandstone. These soils are easy to till, but they are somewhat droughty and are not highly productive. They take in water readily, are moderately to rapidly permeable, have low to moderate available moisture capacity, and are susceptible to moderate or severe erosion. The soils are—

Berks channery silt loam, 10 to 20 percent slopes.
Berks-Lehew channery loams, 10 to 20 percent slopes.
Dekalb channery loam, 5 to 15 percent slopes.
Gilpin silt loam, soft shale substratum, 8 to 15 percent slopes.
Lehew channery loam, 10 to 20 percent slopes.

Except for the Gilpin soil, which occurs in the limestone valley, the soils of this unit occupy foothills and mountains in the western part of the county. Most of the acreage remains wooded, though the largest part of the Gilpin soil has been cleared.

These soils are fairly well suited to general crops grown in rotations. Small grain commonly does better than corn. The soils are suited to orchards, but yields of fruit are only moderate. If fertilizer is applied annually, a mixture of alfalfa and orchardgrass or other deep-rooted plants produces good yields of long-term hay or pasture. The soils are not well suited to bluegrass.

A suitable rotation that is commonly used consists of (1) a row crop, a small grain, and 2 or more years of hay; or (2) a small grain and 3 or more years of hay. If grain is not planted until spring following a row crop, a cover crop is needed to control soil losses in winter. In many places the soils are low in potassium and phosphorus, and they respond to generous additions of fertilizer. Lime and fertilizer should be applied according to needs indicated by soil tests.

Practices are needed to control erosion and to keep the soil productive. Among these practices are stripcropping, manuring, returning crop residues to the soil, and keeping natural waterways in sod. Diversion terraces are needed in fields where slopes are long or receive runoff from adjacent hills. Good management should be used on pasture.

If these soils are used as woodland, they produce moderately good yields of wood products. Their suitability for trees, and the limitations on their management, are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 4 and 5.

CAPABILITY UNIT IIIe-13

This unit consists of deep, acid, moderately well drained soils that have a compact layer, or fragipan, at a depth of about 2 feet. These strongly sloping soils occupy colluvial foot slopes below uplands of sandstone and shale in the western part of the county. They receive runoff and underground water from higher slopes, and seeps occur in a few places. Water moves readily through the surface layer but slowly through the fragipan, and it may accumulate above the pan in wet periods. Surface runoff is moderate, and the erosion hazard is moderate or severe. The available moisture capacity is moderate to high. These soils are fairly easy to till and are medium to low in natural fertility. They are—

Buchanan gravelly loam, 8 to 15 percent slopes.
Leadvale silt loam, 8 to 15 percent slopes.

In some places the Buchanan soil has a few large stones on the surface.

The soils in this unit are suited to general crops, but more than half their acreage remains wooded. Because the soils are slightly wet and have a compact layer in their subsoil, they are not well suited to orchard trees. Suitable rotations are (1) a row crop, a small grain planted in fall, and 2 or more years of hay; and (2) a small grain and 3 or more years of hay. If the grain is not planted until spring, a winter cover crop should follow the row crop. Mixtures for long-term hay or tallgrass pasture should consist of water-tolerant plants. Bluegrass is well suited to these soils, but alfalfa may be damaged in winter. Careful management of grazing is needed on permanent pasture.

These soils should be fertilized and limed in amounts determined by soil tests. To keep the plants highly productive throughout a long life, stands of hay and tallgrass pasture should be fertilized annually. Organic matter and good tilth can be maintained by adding manure and plowing under all crop residues. Stripcropping helps to control excess runoff and the loss of soil and water, and diversion ditches can be used to divert water from higher slopes. The natural drainageways should be kept in sod.

These are good soils for woodland. The suitability and limitations for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability group 2.

CAPABILITY UNIT IIIe-30

In this unit are shallow to deep, nearly level and gently sloping, well-drained soils that developed in material weathered from limestone. These soils are fine textured, plastic, and sticky. They do not take in water readily, and their surface layer develops cracks in dry periods. The soils are high in lime content and in natural fertility, but they are difficult to work and are somewhat droughty. A large amount of loose limestone occurs in their subsoil, and a few limestone ledges crop out. The erosion hazard is moderate to severe; the available moisture capacity is medium to low. The soils are—

Carbo silty clay loam, 2 to 8 percent slopes.
Chilhowie silty clay, 2 to 8 percent slopes.
Corydon silt loam, 3 to 8 percent slopes.

The Carbo and Chilhowie soils are in small, narrow strips in the large limestone valley. They occur mainly along and west of U.S. Highway No. 11. Most of the Corydon soil is in a small limestone area in the western part of the county. The Carbo soil generally is deeper and has fewer stones than the other soils in this unit. Permeability is moderate in the Corydon soil and slow in the other soils.

All the soils are suited to crops commonly grown, and most areas are used for crops or pasture. Because the soils have a fine-textured subsoil and, in many places, are shallow or only moderately deep, their use for orchards is limited. Suitable rotations that are commonly used consist of (1) a row crop, a small grain planted in fall, and 2 or more years of hay; and (2) a small grain and 3 or more years of hay. If the grain is not planted until spring, the row crop should be followed by a cover

crop in winter. Alfalfa is well suited, and long-term hay is especially well suited, but bluegrass may be damaged by lack of water. Pasture should be mowed to control weeds, and the time and intensity of grazing should be regulated.

Although these soils are fertile and normally contain a large amount of lime, high yields of crops and long-lived stands of hay can be maintained by adding fertilizer and lime in amounts determined by soil tests. By using manure and plowing under crop residues, tilth is improved and moisture retained. To reduce runoff and control erosion, stripcropping is especially important and natural drainageways should be kept in sod.

CAPABILITY UNIT IIIe-32

This unit consists mainly of moderately deep or shallow, gently sloping soils that developed on acid shale. These soils contain many fine chips of shale. Some areas are deep. The soils are mellow and easy to work, but they are droughty and are low in natural fertility. Permeability is rapid or very rapid, the available moisture capacity is low to moderate, and the erosion hazard is severe (fig. 7). The soils are—

Berks shaly silt loam, 3 to 8 percent slopes.
Montevallo shaly silt loam, 3 to 10 percent slopes.
Rushtown very shaly silt loam, 3 to 8 percent slopes.

The Berks soil is extensive on the shale belts in the central and eastern parts of the county. It makes up about three-fourths of the total acreage in this unit. The Montevallo soil is extensive on smooth slopes in the western third of the county. The deep, colluvial Rushtown soil makes up only a small part of this unit. It has a high content of fine shale.

Of the soils in this unit, a large acreage has been cleared and cropped, but many areas have recently reverted to woods. The soils are not well suited to orchard fruits and are only fair for the crops commonly grown in the county. Small grains are better suited than corn because they mature earlier and generally are not severely damaged by lack of water. Among the suitable rotations are (1) a row crop, a small grain, and 2 or more years of hay; and (2) a small grain followed by 3 or more years of hay. Bluegrass does not grow well on these soils. Higher yields are obtained from alfalfa, orchardgrass, and other deep-rooted plants. Yields are no more than average, however, even if fertilizer and lime are added annually in amounts indicated by soil tests.

Figure 7.—**Sheet and gully erosion on Berks shaly silt loam, 3 to 8 percent slopes, in newly seeded pasture.**

CAPABILITY UNIT IIIw-1

This unit consists of deep, nearly level, poorly drained soils on bottom lands. These soils have a seasonally high water table at or near the surface, and they are compacted and hardened if they are worked when too wet. Occasional flooding may damage crops or soils. Permeability is slow, and the available moisture capacity is moderate. The soils are—

Alluvial land, marl substratum.
Atkins silt loam.
Melvin silt loam.

The Atkins soil occurs along Back Creek and other streams that drain the sandstone and shale uplands. This soil is acid throughout unless it has been limed. The Melvin soil and Alluvial land, marl substratum, occur along Opequon Creek, Rockymarsh Run, and other streams that drain the limestone uplands. They are neutral or slightly alkaline and have small spots that are very poorly drained.

Most of the acreage in this unit has been cleared and is pastured or cropped. The soils are too wet for orchards, and they are not suited to general crops unless drainage is improved. Water-tolerant plants grow best. Suitable rotations commonly used are (1) a row crop, a small grain, and 2 or more years of hay; and (2) a small grain and 3 or more years of hay. Because the soils are easily compacted by tillage, the most desirable rotations include more than 2 years of hay. Ladino clover, orchardgrass, birdsfoot trefoil, tall fescue, or other water-tolerant plants are most satisfactory for long-term hay and tall-grass pasture. These soils are not well suited to alfalfa, but bluegrass grows well if surface drainage is provided.

Good management of permanent pasture is needed, and grazing in spring should be delayed until the soils are firm. Fertilizer should be added in amounts determined by soil tests. More than ordinary amounts of lime are needed on the Atkins soil. Tilth can be maintained by plowing under crop residues. Low swales and narrow areas that are subject to flood damage should be kept in sod.

CAPABILITY UNIT IIIw-5

This unit consists of shallow to deep, nearly level and gently sloping soils that are somewhat poorly drained. If the soils are worked when too wet, their surface layer is compacted and is likely to harden. Permeability is slow or very slow, the available moisture capacity is medium, and the erosion hazard is slight or moderate. The soils are—

Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes.
Blairton shaly silt loam, thin solum variant, 3 to 8 percent slopes.
Blairton silt loam, 0 to 3 percent slopes.
Blairton silt loam, 3 to 8 percent slopes.
Sees silt loam, 0 to 3 percent slopes.

Sees silt loam, 3 to 8 percent slopes.
Sees silty clay loam, 3 to 8 percent slopes, severely eroded.
Tygart silt loam, 0 to 3 percent slopes.
Tygart silt loam, 3 to 8 percent slopes.

The Blairton soils are over soft shale and occur in depressions and at the head of streams in the limestone valley. The Sees soils occur on limestone and some colluvial material along the eastern base of North Mountain. They have a high content of lime. The Tygart soils occupy terraces along Back Creek and other streams. These soils are leached and are acid throughout unless limed.

In most areas the soils of this unit have been cleared and used for pasture and crops. They are too wet for orchards and must be drained before they are suited to general crops (fig. 8). Among the rotations suitable for drained areas are (1) a row crop, a small grain, and 2 or more years of hay; and (2) a small grain and 3 or more years of hay. If the soils are kept in hay crops most of the time, they are less likely to be compacted by tillage. For long-term hay and tall-grass pasture, mixtures of water-tolerant plants are needed. If surface drainage is provided, bluegrass grows well on these soils, especially the Sees soils. Alfalfa is generally not well suited to the soils in this unit, but it produces good yields in drained areas of the Sees soils.

Pasture management is especially important on the soils in this unit. Grazing should be avoided early in spring and late in fall when the soils are wet and soft. Fertilizer and lime should be added in amounts indicated by soil tests, and crop residues should be plowed under to help maintain good tilth. Diversion terraces are useful in diverting water from higher slopes.

CAPABILITY UNIT IVe-1

This unit consists of moderately deep and deep, strongly sloping and moderately steep, medium-textured soils on limestone uplands and colluvial foot slopes. These soils are well drained. Most of them are gravelly, shaly, or cherty, but they do not contain pebbles or fragments in amounts that interfere seriously with farming. In many places, however, irregular slopes and a few shallow sinkholes influence the direction of cultivation. The strongly sloping soils are severely eroded and have lost most of their original surface layer. A few ledges of limestone crop out. All the soils are moderately permeable and have moderate to high available moisture capacity. The soils are—

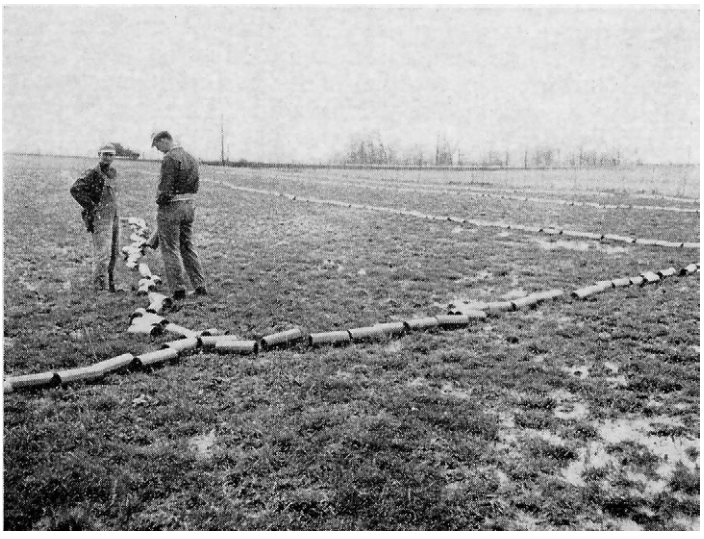

Figure 8.—**A planned arrangement of drainage tile in a field of Blairton silt loam, 0 to 3 percent slopes, that is to be tile drained.**

Duffield gravelly silt loam, 8 to 15 percent slopes, severely eroded.
Duffield silt loam, 8 to 15 percent slopes, severely eroded.
Frankstown shaly silt loam, 8 to 15 percent slopes, severely eroded.
Frankstown shaly silt loam, 15 to 25 percent slopes.
Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded.
Frederick cherty silt loam, 15 to 25 percent slopes.
Frederick gravelly loam, thick surface, 8 to 15 percent slopes, severely eroded.
Frederick gravelly loam, thick surface, 15 to 25 percent slopes.
Frederick silt loam, 8 to 15 percent slopes, severely eroded.
Hagerstown gravelly silt loam, 8 to 15 percent slopes, severely eroded.
Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded.
Murrill gravelly loam, 8 to 15 percent slopes, severely eroded.
Murrill gravelly loam, 15 to 25 percent slopes.

Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded, has a finer textured surface layer and is more difficult to till than the other soils in this unit.

The soils in this unit have been cleared in most places. They are well suited to grasses and legumes used for long-term hay. A row crop should be grown only occasionally. Apple orchards produce good yields if the soils are kept in permanent cover to prevent erosion. Suitable rotations commonly used consist of (1) a row crop, a small grain, and 3 or more years of hay; and (2) a small grain followed by 3 or more years of hay. By seeding long-term hay with the small grain, more protection is given to these soils. The soils are well suited to bluegrass and, if well managed, produce good yields of permanent pasture.

Conservation practices needed on these soils consist of fertilizing, liming, stripcropping, sodding the waterways, and diverting runoff. Satisfactory stands of hay can be established and vigorous growth maintained by adding lime and fertilizer in adequate amounts. Diversion terraces break long slopes and intercept runoff from higher slopes nearby.

CAPABILITY UNIT IVe-3

Soils in this unit are deep to shallow, strongly sloping or moderately steep, and chiefly well drained. These soils developed in material that weathered from red and gray acid sandstone or from shale. They occur on foot slopes, hillsides, and ridges in the western part of the county. Most of the soils are moderately or severely eroded, and some of them are droughty. The soils take in water readily and are easy to work, but in some areas they contain gravel that interferes with cultivating and harvesting. Small areas have a few large stones on the surface. Permeability ranges from moderate to rapid. The available moisture capacity is normally moderate, but it ranges to low in severely eroded areas. The soils are—

Berks channery silt loam, 20 to 30 percent slopes.
Berks-Lehew channery loams, 20 to 30 percent slopes.

Dekalb channery loam, 15 to 25 percent slopes.
Laidig gravelly loam, 8 to 15 percent slopes, severely eroded.
Laidig gravelly loam, 15 to 25 percent slopes.
Lehew channery loam, 10 to 20 percent slopes, severely eroded.
Lehew channery loam, 20 to 30 percent slopes.
Montevallo channery silt loam, 10 to 20 percent slopes, severely eroded.
Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded.
Waynesboro gravelly loam, 8 to 15 percent slopes, severely eroded.

The Waynesboro soil is on terraces above the Potomac River. Dekalb and Lehew soils are well drained to excessively drained.

The soils in this unit are used for general crops, pasture, orchards, and woodland. They are well suited to long-term hay grown in rotation with an occasional row crop. Suitable rotations are (1) a row crop, a small grain, and 3 or more years of hay; and (2) a small grain followed by 3 or more years of hay. Alfalfa and other deep-rooted legumes and grasses produce good hay and pasture. Yields of pasture are higher from tall grasses than from bluegrass. Orchards on these soils are only moderately productive.

Fertilizer and lime should be applied in amounts indicated by soil tests. The organic-matter content can be maintained by turning under crop residues and by spreading manure on fields used for row crops. If pasture is fertilized annually and is otherwise well managed, a good cover of sod can be maintained.

Carefully applied practices are needed on these soils to reduce runoff and to control erosion. Among the practices are stripcropping, cultivating on the contour, keeping natural drainageways in sod, and installing diversion ditches in fields that receive water from higher slopes. Mulching and seeding control runoff on small spots where erosion is active.

The soils in this unit are moderately productive of trees. Their suitability and limitations are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 2, 4, and 5.

CAPABILITY UNIT IVe-9

This unit consists of deep, strongly sloping, acid soils that are moderately well drained. These soils occupy foot slopes and terraces below uplands of sandstone and shale in the western part of the county. Most of the acreage occurs in and around the Back Creek valley. The soils are severely eroded and have lost most of their original surface layer. They have a compact layer, or fragipan, at a depth of about 2 feet. Water moves readily through the surface layer but slowly in the fragipan, and it may accumulate above the pan in wet periods. In addition, these soils receive runoff from higher slopes, and small seep spots occur. The available moisture capacity is moderate. The soils are—

Leadvale silt loam, 8 to 15 percent slopes, severely eroded.
Monongahela silt loam, 8 to 15 percent slopes, severely eroded.

About half the acreage of these soils is in woods, and half is in general crops and pasture. The soils are well suited to long-term hay or pasture but can be used occasionally for row crops. They are not well suited to orchards. Among the suitable rotations are (1) a row crop, a small grain, and 3 or more years of hay; and (2) a small grain and 3 or more years of hay. Bluegrass for pasture grows fairly well on these soils. Water-tolerant plants are best for long-term hay and tall-grass pasture. Alfalfa is suitable but may be short lived. Fertilizer and lime should be added in amounts indicated by soil tests.

Carefully applied conservation measures are needed on these severely eroded soils. Losses of soil and water can be reduced by stripcropping, by cultivating on the contour, and by using diversion terraces in places that receive runoff from higher slopes. Natural drainageways should be kept in sod.

CAPABILITY UNIT IVe-30

This unit consists of shallow or moderately deep, strongly sloping soils that developed in material weathered from limestone. These soils have a sticky, clayey subsoil and are somewhat droughty. Many fragments of limestone occur in the subsoil, and there are a few limestone outcrops. The soils have a medium to high content of lime and are high in natural fertility, but they are difficult to work. The available moisture capacity is low to moderate, runoff is rapid, and the erosion hazard is severe. The soils are—

Chilhowie silty clay, 8 to 15 percent slopes.
Corydon silt loam, 8 to 20 percent slopes.

The slowly permeable Chilhowie soil occurs in the limestone valley, commonly along U.S. Highway No. 11. Most of the moderately permeable Corydon soil is in a small limestone area in the western part of the county.

A large acreage of these soils has been cleared and is used for pasture and general crops. The soils are too shallow and too fine in texture for good production of orchard fruits. They are well suited to long-term hay but can be used occasionally for row crops. Suitable rotations commonly used are (1) a row crop, a small grain, and 3 or more years of hay; and (2) a small grain followed by 3 or more years of hay. Alfalfa grows well on these soils. Bluegrass for pasture also grows well except in dry periods. The soils should be fertilized and limed in amounts indicated by soil tests.

Carefully applied conservation measures are needed on these soils. By stripcropping the long slopes and by cultivating short slopes on the contour, loss of soil and water can be controlled. The natural drainageways should be kept in sod. Hay crops should be seeded in strips. If these erodible soils are used for permanent pasture, good management is needed and overgrazing should be avoided.

CAPABILITY UNIT IVe-32

This unit consists of shallow or very shallow, gently sloping or strongly sloping, droughty soils that developed in material weathered from acid shale. A large acreage of these soils has lost most of the original surface layer. Although they have a high content of fine shale, the soils are mellow and easy to work, but they are acid throughout and are low in natural fertility. Permeability is rapid, and the available moisture capacity is low. The soils are—

Berks shaly silt loam, 8 to 15 percent slopes.
Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded.
Montevallo shaly silt loam, 3 to 10 percent slopes, severely eroded.
Montevallo shaly silt loam, 10 to 20 percent slopes.

The Berks soils and the Berks-Montevallo complex occupy shale belts in the limestone valley in the central and eastern parts of the county. The Montevallo soils are extensive in the western part.

The soils in this unit are fairly well suited to general crops and pasture, but they are too shallow and too droughty for good orchards. They are well suited to long-term hay and an occasional row crop. A large part of the cleared acreage has reverted to woods. Among the suitable crop rotations are (1) a row crop, a small grain and 3 or more years of hay; and (2) a small grain and 3 or more years of hay. The mixture for long-term hay should be seeded with the small grain. Yields of small grain generally are higher than those of corn. Bluegrass does not grow well on these soils. The best plants for hay or tall-grass pasture are those that resist drought. Fertilizer should be applied annually, and lime added in amounts determined by soil tests.

Erosion can be controlled by stripcropping, by cultivating on the contour, and by using diversion ditches where needed (fig. 9). Yields of permanent pasture are only fair, even under good management. Overstocking should be avoided.

These soils are suitable as woodland, but they are low to average in productivity. Their suitability and limitations for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 4, 6, and 11.

CAPABILITY UNIT VIe-1

This unit consists of well-drained, severely eroded limestone soils that are scattered throughout the limestone valley. These soils have lost about three-fourths of their original surface soil and, in places, are marked by shallow gullies and a few limestone outcrops. Erosion is a severe hazard. The soils are—

Carbo clay, 8 to 15 percent slopes, severely eroded.
Chilhowie clay, 8 to 15 percent slopes, severely eroded.
Corydon silty clay, 8 to 15 percent slopes, severely eroded.
Corydon silty clay, 15 to 25 percent slopes, severely eroded.
Duffield silt loam, 15 to 25 percent slopes, severely eroded.

Figure 9.—**Contour stripcropping on Berks shaly silt loam, 8 to 15 percent slopes, east of the Martinsburg Airport.**

Frankstown shaly silt loam, 15 to 25 percent slopes, severely eroded.
Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded.
Frederick gravelly loam, thick surface, 15 to 25 percent slopes, severely eroded.
Hagerstown silty clay loam, 15 to 25 percent slopes, severely eroded.

The Chilhowie, Carbo, and Corydon soils in this unit are strongly sloping and shallow or moderately deep to limestone. They have low to moderate available moisture capacity and are high in lime content, but they are clayey and hard to work. The Duffield, Frankstown, Frederick, and Hagerstown soils are moderately steep, medium textured, and moderately deep or deep over limestone. They are moderately permeable, moderate to high in available moisture capacity, and fairly easy to work.

Because the erosion hazard is severe, a continuous cover of close-growing plants is needed on the soils in this unit. Where permanent grass sod can be maintained, apples and cherries are suited to all the soils except the Chilhowie and Corydon. Permanent pasture that consists mainly of bluegrass and white clover is well suited and furnishes good protection. Tall-grass pasture also furnishes adequate protection and gives higher yields.

Special care is needed when reseeding these soils for pasture. They should be disked instead of plowed, and crop residues should be turned under. The reseeding should be done in contour strips, or in field strips if the slopes are uneven, and natural drainageways should be maintained in sod. In areas where small gullies occur or erosion is active, mulching, diverting runoff through terraces, and other practices may be needed. By adding lime and fertilizer in adequate amounts, good sod is maintained and further erosion is controlled. Needed in pasture management are proper stocking, mowing, and providing an adequate supply of water for grazing animals.

Although these soils are used largely for pasture, they are well suited as woodland. Their suitability and limitations for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 1 and 7.

CAPABILITY UNIT VIe-2

This unit consists of moderately deep or shallow, moderately steep, droughty soils that developed in material weathered from red and gray acid sandstone and shale. These soils occur on the slopes of rounded hills in the western part of the county. They have lost most of their original surface layer and are highly susceptible to further erosion. They are mellow and easy to till, rapidly permeable, and moderate to low in available moisture capacity. The soils are—

Lehew channery loam, 20 to 30 percent slopes, severely eroded.
Montevallo channery silt loam, 20 to 30 percent slopes, severely eroded.
Montevallo-Lehew channery loams, 20 to 30 percent slopes, severely eroded.

Most of the acreage in this unit was cleared and used for general crops and orchards, but a large part has been abandoned to woods. The soils are not well suited to orchard trees. Because of erosion, they should be kept

in pasture, woods, or other permanent cover. They are better suited to tall, drought-resistant grasses and legumes than they are to bluegrass. If the soils are used for pasture, they should be broken by disking and seeded in strips to avoid further erosion. They should be fertilized and limed in amounts determined by soil tests. Maintaining permanent pasture requires careful stocking and other practices of management.

Woodland is moderately productive on the soils in this unit. The suitability and limitations of the soils for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 4 and 5.

CAPABILITY UNIT VIe-31

This unit consists of shallow or very shallow, strongly sloping and moderately steep, droughty soils that developed in material weathered from acid shale. These soils occur in the western part of the county and on the shale belts in the limestone valley. The strongly sloping soils have lost most of their original surface soil, and all the soils are subject to further erosion. The soils are easy to work, but they have a high content of fine shale and are acid throughout. Permeability is rapid, and the available moisture capacity is low. The soils are—

Berks shaly silt loam, 15 to 25 percent slopes.
Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded.
Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded.
Montevallo shaly silt loam, 20 to 30 percent slopes.

These soils are poorly suited to bluegrass for pasture and generally produce low yields of permanent pasture, even if limed, fertilized, and well managed. Although much of the Berks soil has been cleared and cropped, some of it has reverted to woods. Most areas of the other soils remain wooded. Because erosion is a severe hazard, the soils in this unit should be protected by pasture plants, trees, or other continuous cover. If the soils are tilled for reseeding, extreme care is needed to control further erosion. Stands of pasture are improved and erosion is reduced by avoiding overgrazing. Tall fescue or other drought-resistant plants are most suitable for pasture and need yearly applications of fertilizer.

These soils can be best protected by keeping them in woodland, but yields of wood products are low to moderate. The suitability and limitations of the soils for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 4, 6, and 11.

CAPABILITY UNIT VIs-1

This unit consists of shallow to deep, gently sloping to moderately steep, very rocky or very stony soils that are well drained and developed in material weathered from limestone. These soils are in small areas throughout the limestone valley. The rocks and stones occur mainly on narrow, parallel ledges of limestone that extend in a southwest-northeast direction. They hinder cultivation in some places, but mowers and lime spreaders can be used in most areas. The content of lime in these soils is medium to high. The erosion hazard generally is moderate but is severe in some areas. The soils are—

Chilhowie very rocky silty clay, 3 to 8 percent slopes.
Chilhowie very rocky silty clay, 8 to 15 percent slopes.
Frankstown very rocky silt loam, 8 to 15 percent slopes.
Frederick very rocky silt loam, 3 to 15 percent slopes.
Frederick very stony loam, thick surface, 8 to 15 percent slopes.
Frederick very stony loam, thick surface, 15 to 25 percent slopes.
Hagerstown very rocky silt loam, 3 to 8 percent slopes.
Hagerstown very rocky silt loam, 8 to 15 percent slopes.
Hagerstown very rocky silt loam, 15 to 25 percent slopes.
Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded.

The available moisture capacity ranges from low in the Chilhowie soils to high in the Hagerstown and Frederick soils.

The soils in this unit occupy about 15,000 acres. More than half the acreage has been cleared and is used for pasture, but most of the rockiest areas remain wooded. The soils are important for grazing (fig. 10) and are suitable as woodland. They are good soils for bluegrass.

Permanent pasture can be improved by mowing weeds and by liming and fertilizing in amounts determined by soil tests. An adequate supply of water is needed for livestock. Overgrazing should be avoided because it weakens the sod and results in further erosion. Mulching and seeding are commonly needed on small spots that are eroding.

Woodland is well suited to these soils but should be protected from grazing. The suitability and limitations for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 1 and 7.

CAPABILITY UNIT VIs-2

This unit consists of deep, gently sloping to moderately steep, moderately well drained or well drained soils that are acid throughout and very stony. These soils occur on colluvial foot slopes below mountain slopes in the western part of the county. Very large sandstone fragments limit cultivation, but mowing machines and lime spreaders can be used in some areas. The erosion hazard is moderate. Permeability is medium to slow, and the

Figure 10.—**A highly productive pasture made up of bluegrass and white clover on Hagerstown very rocky silt loam, 3 to 8 percent slopes.**

available moisture capacity is moderate to high. The soils in this unit are—

Buchanan very stony loam, 3 to 15 percent slopes.
Laidig very stony loam, 3 to 15 percent slopes.
Laidig very stony loam, 15 to 25 percent slopes.

These soils are suitable for pasture or woodland, but almost all of their acreage still is woodland. Bluegrass for pasture produces fairly well. If the soils are pastured, the management needed consists of liming, fertilizing, mowing, proper stocking, and supplying water for grazing animals.

Woodland is highly productive on these soils, but protecting the stands from fire and grazing is important. The suitability of the soils for trees, and the limitations on their management, are discussed in the subsection "Use of Soils as Woodland" under woodland suitability group 2.

CAPABILITY UNIT VIw-1

In this unit are two deep, nearly level miscellaneous land types—Alluvial land, neutral or slightly acid, and Alluvial land, strongly acid. These land types occur along streams that drain uplands of limestone or of acid sandstone and shale. Within short distances the texture ranges from sand to silt, and drainage ranges from good to poor. The sandy areas are droughty, but the silty areas have high available moisture capacity. Because overflow is a severe hazard, soil material is frequently deposited or washed away. Severe crop damage can be expected.

In most areas permanent pasture is fairly well suited, but most of the acreage remains wooded. Areas used for pasture need protection from floodwaters, and they should be mowed, limed and fertilized, and properly stocked.

CAPABILITY UNIT VIIe-2

This unit consists of deep, moderately deep and shallow, somewhat droughty soils that developed in material weathered from red and gray acid sandstone and shale. These steep soils occur on mountains and foothills in the western part of the county. They have lost most of their original surface layer and are highly susceptible to further erosion. They contain some large stones. The soils take in water well, but they are rapidly permeable and have moderate to low available moisture capacity. They are acid throughout and, in most places, are low in natural fertility. The soils are—

Dekalb channery loam, 25 to 45 percent slopes.
Lehew channery loam, 30 to 45 percent slopes.
Montevallo channery silt loam, 30 to 50 percent slopes.
Montevallo-Lehew channery loams, 30 to 45 percent slopes.

The soils in this unit generally remain in woods. They are too steep and too droughty for pasture, though small areas have a little value for grazing.

These soils are well suited to trees, but protection from fire and grazing is needed in wooded areas. The suitability of the soils as woodland, and the limitations that affect management, are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 4 and 5.

CAPABILITY UNIT VIIe-3

This unit consists of strongly sloping to steep, shallow and very shallow, droughty soils that developed on acid shale, mainly in the western and central parts of the county. These soils contain much fine shale. In most places they have lost nearly all of their original surface layer through erosion, and they are highly susceptible to further erosion. Permeability is rapid or very rapid, and the available moisture capacity is low. The soils are low in natural fertility and are acid throughout. They are—

Berks-Montevallo shaly silt loams, 15 to 25 percent slopes, severely eroded.
Montevallo shaly silt loam, 20 to 30 percent slopes, severely eroded.
Montevallo shaly silt loam, 30 to 50 percent slopes.
Montevallo shaly silt loam, 30 to 50 percent slopes, severely eroded.
Sloping eroded land, shale materials.

Most of the acreage of these soils is wooded. Some areas have been cleared and cropped, but most of them are reverting to brushy woods.

To control further erosion, a cover of plants is generally needed on the soils in this unit. Suitable trees, shrubs, or hardy grasses or legumes should be planted in areas where erosion is active. Small areas of Sloping eroded land, shale materials, occur within larger areas used for pasture. Mulching, fertilizing, diversion ditches, and other measures for controlling erosion may be necessary in establishing cover in such areas. Plantings should be protected from fire and grazing.

The suitability of these soils for trees, and the limitations that affect woodland management, are discussed in the subsection "Use of Soils as Woodland" under suitability groups 4, 6, and 11.

CAPABILITY UNIT VIIs-1

This unit consists of shallow to deep, moderately steep and steep, well-drained limestone soils that are very rocky and, in most places, are droughty. These soils are scattered throughout the limestone valley. They are moderately or severely eroded and are moderately or highly susceptible to further erosion. The rocks generally occur as narrow, parallel ledges of limestone that crop out in a southwest-northeast direction. These outcrops severely limit the use of farm machinery. The soils have a medium to high content of lime. They are slowly to moderately permeable and have low to high available moisture capacity. The soils are—

Chilhowie very rocky clay, 8 to 15 percent slopes, severely eroded.
Chilhowie very rocky clay, 15 to 25 percent slopes, severely eroded.
Frederick very stony loam, thick surface, 25 to 45 percent slopes.
Hagerstown very rocky silt loam, 25 to 50 percent slopes.
Hagerstown very rocky silty clay loam, 15 to 25 percent slopes, severely eroded.
Murrill very stony silt loam, 20 to 40 percent slopes.

The severely eroded soils in this unit have been cleared and are used for grazing, but they generally are too steep and too severely eroded to be good for pasture. Some areas that are smooth and less eroded can be pastured,

but the plant cover should not be broken. Pastured areas should be limed and fertilized.

Almost all areas of the steep soils remain wooded. These areas should be protected from fire and grazing. The suitability and limitations of the soils for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 1 and 7.

CAPABILITY UNIT VIIs-2

This unit consists of moderately deep and deep, gently sloping to very steep, very stony soils that developed in material weathered from sandstone and shale. These soils occur on mountainsides and colluvial foot slopes in the western part of the county. They are droughty and are strongly acid throughout. On the surface are numerous stones, some of them many feet across, that prevent the use of farm machinery. Erosion is a slight or moderate hazard. Permeability is moderate to rapid, and the available moisture capacity is moderate to low. The soils are—

Dekalb very stony loam, 0 to 25 percent slopes.
Dekalb very stony loam, 25 to 45 percent slopes.
Dekalb very stony loam, 45 to 70 percent slopes.
Laidig very stony loam, 25 to 45 percent slopes.

For the most part, these soils are not suited to pasture. Some of the smooth areas, however, can provide limited grazing if they are limed and fertilized.

Woodland is productive on these soils if it is protected from fire and grazing, and nearly all areas remain wooded. The suitability and limitations of these soils for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability groups 2 and 5.

CAPABILITY UNIT VIIIe-31

In this unit is Steep eroded land, shale materials, which is underlain by acid shale. It occurs in small spots on the shale belts in the western part of the county and in the limestone valley in the eastern part. Many shallow gullies occur, and the raw shale is exposed or is covered by only a few inches of soil material. This land is very droughty. Water concentrates in the gullies, and the raw shale has little or no plant cover.

Most of this land was once cleared but has been abandoned. Because runoff is rapid, suitable shrubs and trees should be planted to insure adequate cover. For successful plantings, it is necessary to provide diversion ditches and other water-control measures.

Generally, this land produces poor yields of wood products. The suitability and limitations for trees are discussed in the subsection "Use of Soils as Woodland" under woodland suitability group 11.

CAPABILITY UNIT VIIIs-1

Only Steep rock land is in this unit. This steep and very steep land consists of massive outcrops of sandstone and small vertical cliffs. It occurs on crests, points, and upper slopes of Sleepy Creek Mountain and North Mountain in the western part of the county. Because little soil has accumulated on the bare rock, few plants grow on it, and commercial production of wood crops is not feasible.

This land has value only as scenic spots and as landmarks in mountainous areas, but the sparse vegetation should be protected from fire because it helps to protect the watershed.

Estimated Yields Under Two Levels of Management [1]

In table 1 are listed estimated yields for the major grain and forage crops and for permanent pasture grown on the soils of Berkeley County. Also listed are productivity ratings for orchards. Yields are estimated for two levels of management and are shown in columns A and B. Those in columns A are estimated for the common management now used by farmers. Those in columns B are estimated for the best management practical on the soils, including proper kinds and amounts of fertilizer. These figures are averages for a 10-year period. In the future, new techniques may increase the average yields over those shown, but there is not likely to be much change in the relative response of the different soils.

Known crop yields, where available from farmers or others, were used to estimate the yields in columns A. Average yields were calculated from the United States census data for 1959 for Berkeley County. Present yields for the various crops were estimated on data from corn trials made by the West Virginia Experiment Station on known soils and on information from farmers who have kept records for crops grown on various soils. Where information was lacking, present yields were estimated, taking into consideration the properties of the soils involved.

Present yields shown in columns A are about what the average farmer obtains over a 10-year period when he uses common practices. On many of the soils in the county, yields are well above average for the State, and management, especially of the limestone soils, is considerably better than average.

The estimated yields in columns B are based on experimental results secured from corn trials on soils in Berkeley County and on actual experience by farmers using the best management. These yields represent about what can be expected from management based on present knowledge and methods that can be practically used. The management needed to obtain these yields consists of liming to the pH required for the crop, fertilizing according to need as determined by soil tests, using good rotations, and using necessary soil and water conservation practices, including drainage where necessary. Generally, manure is not used extensively, except on dairy farms. The management needed to obtain the yields estimated for pasture includes the use of enough fertilizer to provide phosphate and potash where needed and enough lime to maintain a pH of 6.0 to 6.5.

Yields under improved management for which data were not available were estimated. In making these estimates, the properties of the soils and local knowledge and experience were considered.

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[1] FRANK W. GLOVER, assistant State soil conservationist, Soil Conservation Service, assisted in preparing this subsection.

TABLE 1.—*Estimated average acre yields of principal crops and productivity ratings for orchards*

[Yields in columns A are obtained under common management; those in columns B are obtained under improved management. Absence of a figure indicates crop is not commonly grown under the management level indicated, or that orchards are not suited. Soils that are severely limited by steep slopes, stoniness, rockiness, or severe erosion are considered not suitable for crops listed and are not listed in the table]

Map symbol	Soil	Grain crops								Forage crops				Permanent pasture		Orchards[1]
		Corn		Wheat		Barley		Spring oats		Clover-grass		Alfalfa-grass				
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*[2]	*Cow-acre-days*[2]	
Aa	Alluvial land, neutral or slightly acid													60	120	
Ab	Alluvial land, strongly acid													50	90	
Am	Alluvial land, marl substratum	35	75	18	25	25	45	25	50	1.5	2.5			80	150	
At	Atkins silt loam	35	70	15	25			30	55	1.0	2.0			60	120	
BcB	Berks channery silt loam, 3 to 10 percent slopes	35	70	20	30	30	40	30	40	1.5	2.5	2.0	3.0	60	90	75
BcC	Berks channery silt loam, 10 to 20 percent slopes	30	60	18	28	27	37	28	38	1.4	2.4	1.9	2.9	55	85	70
BcD	Berks channery silt loam, 20 to 30 percent slopes	25	50	15	25	25	35	25	35	1.2	2.2	1.7	2.7	50	80	
BhB	Berks shaly silt loam, 3 to 8 percent slopes	35	65	20	30	30	40	30	45	1.5	2.2	1.8	3.0	60	85	65
BhC	Berks shaly silt loam, 8 to 15 percent slopes	30	60	18	27	27	37	27	40	1.4	2.0	1.7	2.8	55	80	55
BhD	Berks shaly silt loam, 15 to 25 percent slopes													50	75	
BkB	Berks-Lehew channery loams, 3 to 10 percent slopes[3]	35	70	20	30	30	40	30	40	1.5	2.5	2.0	3.0	55	90	75
BkC	Berks-Lehew channery loams, 10 to 20 percent slopes[3]	30	60	18	28	27	37	28	38	1.4	2.4	1.9	2.9	50	85	70
BkD	Berks-Lehew channery loams, 20 to 30 percent slopes[3]	25	50	15	25	25	35	25	35	1.2	2.2	1.7	2.7	45	80	55
BmB3	Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded[3]	30	60	18	27	27	37	27	40	1.4	2.0	1.7	2.8	55	80	55
BmC3	Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded[3]													50	70	
BnA	Blairton silt loam, 0 to 3 percent slopes	30	65	17	22	20	40	20	35	1.5	2.0			70	100	
BnB	Blairton silt loam, 3 to 8 percent slopes	30	65	17	22	20	40	20	35	1.5	2.0			70	100	
BtA	Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes	30	60	15	20	18	35	18	35	1.3	1.7			60	85	
BtB	Blairton shaly silt loam, thin solum variant, 3 to 8 percent slopes	30	60	15	20	18	35	18	35	1.3	1.7			60	85	
BuB	Buchanan gravelly loam, 3 to 8 percent slopes	55	75	18	28	23	48	25	55	1.5	2.5	2.0	3.0	60	110	70
BuC	Buchanan gravelly loam, 8 to 15 percent slopes	50	70	15	25	20	45	23	52	1.4	2.3	1.8	2.7	55	100	60
BvC	Buchanan very stony loam, 3 to 15 percent slopes													40	70	
CaB	Captina silt loam, 3 to 8 percent slopes	45	85	20	30	30	55	30	55	1.8	2.8	2.0	3.5	70	140	
EaC3	Carbo clay, 8 to 15 percent slopes, severely eroded													75	110	
EbB	Carbo silty clay loam, 2 to 8 percent slopes	35	80	20	30	25	45	25	40	1.5	2.0	2.0	3.8	90	130	75
EcC3	Chilhowie clay, 8 to 15 percent slopes, severely eroded													70	100	
EdB	Chilhowie silty clay, 2 to 8 percent slopes	35	75	15	25	25	45	24	40	1.3	1.8	2.0	3.5	85	120	60
EdC	Chilhowie silty clay, 8 to 15 percent slopes	35	75	15	25	25	45	25	40	1.3	1.8	2.0	3.5	85	120	55
EkC3	Chilhowie very rocky clay, 8 to 15 percent slopes, severely eroded													60	80	
EkD3	Chilhowie very rocky clay, 15 to 25 percent slopes, severely eroded													55	75	
EnB	Chilhowie very rocky silty clay, 3 to 8 percent slopes													70	90	
EnC	Chilhowie very rocky silty clay, 8 to 15 percent slopes													65	85	
CnB	Corydon silt loam, 3 to 8 percent slopes	35	75	15	25	25	45	25	40	1.3	1.8	2.0	3.5	85	120	75
CnC	Corydon silt loam, 8 to 20 percent slopes	30	70	13	23	22	40	22	35	1.1	1.6	1.7	3.2	80	110	65
CoC3	Corydon silty clay, 8 to 15 percent slopes, severely eroded													75	105	55
CoD3	Corydon silty clay, 15 to 25 percent slopes, severely eroded													65	95	

See footnotes at end of table.

TABLE 1.—*Estimated average acre yields of principal crops and productivity ratings for orchards*—Continued

Map symbol	Soil	Grain crops								Forage crops				Permanent pasture		Orchards[1]
		Corn		Wheat		Barley		Spring oats		Clover-grass		Alfalfa-grass				
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*[2]	*Cow-acre-days*[2]	
DaC	Dekalb channery loam, 5 to 15 percent slopes	40	70	18	32	30	45	30	45	1.5	2.0	1.8	2.8	60	90	70
DaD	Dekalb channery loam, 15 to 25 percent slopes	35	65	16	30	27	40	27	40	1.3	1.8	1.6	2.5	50	80	60
DaE	Dekalb channery loam, 25 to 45 percent slopes													40	70	
DfB	Duffield gravelly silt loam, 3 to 8 percent slopes	60	110	25	45	40	65	50	75	2.0	3.0	2.7	4.5	120	180	100
DfC3	Duffield gravelly silt loam, 8 to 15 percent slopes, severely eroded	55	95	20	40	35	55	40	65	1.6	2.5	2.3	3.5	100	160	90
DgB	Duffield silt loam, 3 to 8 percent slopes	60	110	25	45	40	65	50	75	2.0	3.0	2.7	4.5	120	180	100
DgC	Duffield silt loam, 8 to 15 percent slopes	55	100	22	42	37	60	45	70	1.8	2.8	2.5	4.0	110	170	95
DgC3	Duffield silt loam, 8 to 15 percent slopes, severely eroded	50	95	20	40	35	55	40	60	1.7	2.7	2.4	3.6	100	160	90
DgD3	Duffield silt loam, 15 to 25 percent slopes, severely eroded													90	140	65
FbB	Frankstown shaly silt loam, 3 to 8 percent slopes	60	100	20	40	35	60	40	70	2.5	3.0	2.5	4.0	100	150	95
FbC	Frankstown shaly silt loam, 8 to 15 percent slopes	55	95	18	37	30	55	35	65	2.3	2.8	2.3	3.7	90	140	90
FbC3	Frankstown shaly silt loam, 8 to 15 percent slopes, severely eroded	50	90	15	35	28	50	32	60	2.1	2.6	2.1	3.5	80	130	85
FbD	Frankstown shaly silt loam, 15 to 25 percent slopes	50	90	15	35	28	50	32	60	2.1	2.6	2.1	3.5	80	130	80
FbD3	Frankstown shaly silt loam, 15 to 25 percent slopes, severely eroded													75	120	
FcC	Frankstown very rocky silt loam, 8 to 15 percent slopes													70	100	
FdB	Frederick silt loam, 3 to 8 percent slopes	65	110	25	45	45	70	55	75	2.5	3.5	2.5	4.5	120	180	100
FdC	Frederick silt loam, 8 to 15 percent slopes	60	105	22	40	40	65	50	70	2.3	3.2	2.3	4.0	115	170	95
FdC3	Frederick silt loam, 8 to 15 percent slopes, severely eroded	55	95	20	38	38	62	45	65	2.1	3.0	2.1	3.7	110	160	90
FfB	Frederick cherty silt loam, 3 to 8 percent slopes	65	110	25	45	45	70	55	75	2.5	3.5	2.5	4.5	115	175	100
FfC	Frederick cherty silt loam, 8 to 15 percent slopes	60	105	22	40	40	65	50	70	2.3	3.2	2.3	4.0	110	165	95
FfC3	Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded	55	95	20	38	38	62	45	65	2.1	3.0	2.1	3.7	105	155	90
FfD	Frederick cherty silt loam, 15 to 25 percent slopes	55	95	20	38	38	62	45	65	2.1	3.0	2.1	3.7	105	150	85
FfD3	Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded													100	140	
FgB	Frederick gravelly loam, thick surface, 3 to 8 percent slopes	60	100	20	40	35	60	40	70	2.5	3.0	2.5	4.0	100	150	95
FgC	Frederick gravelly loam, thick surface, 8 to 15 percent slopes	55	95	18	37	30	55	35	65	2.3	2.8	2.3	3.7	90	140	90
FgC3	Frederick gravelly loam, thick surface, 8 to 15 percent slopes, severely eroded	50	90	15	35	28	50	32	60	2.1	2.6	2.1	3.5	80	130	80
FgD	Frederick gravelly loam, thick surface, 15 to 25 percent slopes	50	90	15	35	28	50	32	60	2.1	2.6	2.1	3.5	80	130	75
FgD3	Frederick gravelly loam, thick surface, 15 to 25 percent slopes, severely eroded													70	120	
FkC	Frederick very rocky silt loam, 3 to 15 percent slopes													70	100	
FsC	Frederick very stony loam, thick surface, 8 to 15 percent slopes													60	90	
FsD	Frederick very stony loam, thick surface, 15 to 25 percent slopes													50	80	
FsE	Frederick very stony loam, thick surface, 25 to 45 percent slopes													40	70	
GpA	Gilpin silt loam, soft shale substratum, 0 to 3 percent slopes	45	75	22	32	35	50	35	55	1.8	2.5	2.2	3.3	70	100	80
GpB	Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes	40	70	20	30	32	45	32	50	1.6	2.3	2.0	3.0	65	95	75

See footnotes at end of table.

TABLE 1.—*Estimated average acre yields of principal crops and productivity ratings for orchards*—Continued

Map symbol	Soil	Grain crops								Forage crops				Permanent pasture		Orchards[1]
		Corn		Wheat		Barley		Spring oats		Clover-grass		Alfalfa-grass				
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*[2]	*Cow-acre-days*[2]	
GpC	Gilpin silt loam, soft shale substratum, 8 to 15 percent slopes	35	65	18	28	30	40	30	40	1.5	2.1	1.8	2.7	60	85	65
HaB	Hagerstown gravelly silt loam, 3 to 8 percent slopes	60	105	22	43	42	68	50	70	2.4	3.4	2.4	4.2	110	170	100
HaC3	Hagerstown gravelly silt loam, 8 to 15 percent slopes, severely eroded	50	90	20	40	40	60	45	65	2.0	3.0	2.0	3.5	100	160	95
HbA	Hagerstown silt loam, 0 to 3 percent slopes	65	115	27	47	47	75	57	77	2.5	3.5	2.5	4.5	130	190	(4)
HbB	Hagerstown silt loam, 3 to 8 percent slopes	65	110	25	45	45	70	55	75	2.5	3.5	2.5	4.5	120	180	95
HcB	Hagerstown silty clay loam, 3 to 8 percent slopes	55	95	22	43	42	68	50	70	2.4	3.4	2.4	4.2	110	170	90
HcC	Hagerstown silty clay loam, 8 to 15 percent slopes	50	80	20	37	40	60	45	60	2.2	3.2	2.2	3.8	100	155	85
HcC3	Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded	40	75	15	35	30	55	35	55	2.0	3.0	2.0	3.5	90	145	------
HcD3	Hagerstown silty clay loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	----	----	----	----	----	75	125	------
HgB	Hagerstown very rocky silt loam, 3 to 8 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	80	110	------
HgC	Hagerstown very rocky silt loam, 8 to 15 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	75	105	------
HgD	Hagerstown very rocky silt loam, 15 to 25 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	70	100	------
HgF	Hagerstown very rocky silt loam, 25 to 50 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	60	90	------
HkC3	Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded	----	----	----	----	----	----	----	----	----	----	----	----	60	90	------
HkD3	Hagerstown very rocky silty clay loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	----	----	----	----	----	----	50	80	------
Hm	Huntington fine sandy loam	70	100	20	40	35	50	35	50	2.0	3.0	2.5	4.0	110	170	------
Hn	Huntington silt loam	80	120	25	45	40	60	40	60	2.0	3.5	2.5	4.5	130	190	------
Ho	Huntington silt loam, local alluvium	85	125	28	50	45	65	45	65	2.5	3.5	2.8	4.8	130	200	------
LaB	Laidig gravelly loam, 3 to 8 percent slopes	50	90	20	30	30	45	30	45	1.5	2.3	1.8	3.1	70	140	90
LaC	Laidig gravelly loam, 8 to 15 percent slopes	45	85	18	28	28	43	28	43	1.4	2.2	1.7	3.0	65	135	85
LaC3	Laidig gravelly loam, 8 to 15 percent slopes, severely eroded	40	80	15	25	26	40	25	40	1.3	2.0	1.6	2.8	60	130	80
LaD	Laidig gravelly loam, 15 to 25 percent slopes	40	80	15	25	26	40	25	40	1.3	2.0	1.6	2.8	60	130	75
LbC	Laidig very stony loam, 3 to 15 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	40	70	60
LbD	Laidig very stony loam, 15 to 25 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	40	65	60
LdB	Leadvale silt loam, 3 to 8 percent slopes	60	80	20	30	25	50	30	60	1.5	2.5	2.0	3.0	70	135	------
LdC	Leadvale silt loam, 8 to 15 percent slopes	60	80	18	28	23	48	28	58	1.5	2.5	2.0	3.0	65	125	------
LdC3	Leadvale silt loam, 8 to 15 percent slopes, severely eroded	55	75	15	25	20	45	25	55	1.4	2.3	1.8	2.8	60	110	------
LhB	Lehew channery loam, 3 to 10 percent slopes	40	70	18	32	30	45	30	45	1.5	2.0	1.8	2.8	60	90	75
LhC	Lehew channery loam, 10 to 20 percent slopes	35	65	15	30	27	40	27	40	1.3	1.8	1.6	2.5	50	80	70
LhC3	Lehew channery loam, 10 to 20 percent slopes, severely eroded	30	60	13	25	25	35	25	35	1.2	1.7	1.5	2.3	45	70	60
LhD	Lehew channery loam, 20 to 30 percent slopes	30	60	13	25	25	35	25	35	1.2	1.7	1.5	2.3	45	70	------
LhD3	Lehew channery loam, 20 to 30 percent slopes, severely eroded	----	----	----	----	----	----	----	----	----	----	----	----	40	60	------
Ln	Lindside silt loam	70	105	20	40	35	55	35	55	2.0	3.2	2.5	3.7	110	170	------
LoB	Lindside silt loam, local alluvium, 0 to 3 percent slopes	70	105	20	40	35	55	35	55	2.0	3.2	2.5	3.7	110	170	------
LoC	Lindside silt loam, local alluvium, 3 to 8 percent slopes	70	105	20	40	35	55	35	55	2.0	3.2	2.5	3.7	110	170	------
Ma	Melvin silt loam	35	80	20	30	30	50	30	55	1.5	3.0	----	----	90	150	------

See footnotes at end of table.

TABLE 1.—*Estimated average acre yields of principal crops and productivity ratings for orchards*—Continued

Map symbol	Soil	Grain crops								Forage crops				Permanent pasture		Orchards[1]
		Corn		Wheat		Barley		Spring oats		Clover-grass		Alfalfa-grass				
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	
		Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*[2]	*Cow-acre-days*[2]	
MgB	Monongahela gravelly silt loam, 3 to 8 percent slopes	40	80	18	30	25	55	35	60	1.5	2.0	2.0	3.0	60	130	------
MhA	Monongahela silt loam, 0 to 3 percent slopes	40	80	18	30	25	55	35	60	1.5	2.0	2.0	3.0	60	130	------
MhB	Monongahela silt loam, 3 to 8 percent slopes	40	80	18	30	25	55	35	60	1.5	2.0	2.0	3.0	60	130	------
MhC3	Monongahela silt loam, 8 to 15 percent slopes, severely eroded	30	70	15	25	20	50	30	50	1.3	1.8	1.6	2.3	50	115	------
MkC3	Montevallo channery silt loam, 10 to 20 percent slopes, severely eroded	25	50	15	25	25	35	25	35	1.2	2.2	1.7	2.7	50	80	------
MkD3	Montevallo channery silt loam, 20 to 30 percent slopes, severly eroded	----	----	----	----	----	----	----	----	----	----	----	----	45	70	------
MmB	Montevallo shaly silt loam, 3 to 10 percent slopes	25	55	15	25	25	37	25	37	1.2	2.2	1.5	2.5	55	80	60
MmB3	Montevallo shaly silt loam, 3 to 10 percent slopes, severely eroded	25	45	----	22	20	32	20	35	1.0	2.0	1.3	2.3	40	70	------
MmC	Montevallo shaly silt loam, 10 to 20 percent slopes	20	50	13	22	22	34	22	34	1.1	2.1	1.3	2.3	50	75	50
MmC3	Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded	----	----	----	----	----	----	----	----	----	----	----	----	30	60	------
MnC3	Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded[5]	25	50	15	25	25	35	25	35	1.2	2.2	1.7	2.7	45	80	60
MrA	Murrill gravelly silt loam, moderately deep, 0 to 3 percent slopes	60	100	20	40	35	60	40	70	2.5	3.0	2.5	4.0	100	150	(4)
MrB	Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes	60	100	20	40	35	60	40	70	2.5	3.0	2.5	4.0	100	150	90
MsB	Murrill gravelly loam, 3 to 8 percent slopes	60	100	25	35	35	50	35	55	1.5	2.5	2.0	3.5	80	130	95
MsC	Murrill gravelly loam, 8 to 15 percent slopes	55	95	23	32	32	48	32	52	1.3	2.3	1.8	3.2	75	125	90
MsC3	Murrill gravelly loam, 8 to 15 percent slopes, severely eroded	50	85	20	30	30	45	30	50	1.1	2.0	1.5	3.0	70	115	85
MsD	Murrill gravelly loam, 15 to 25 percent slopes	50	85	20	30	30	45	30	50	1.1	2.0	1.5	3.0	70	115	80
MuA	Murrill silt loam, 0 to 3 percent slopes	60	100	25	35	35	50	35	55	1.5	2.5	2.0	3.5	80	130	(4)
Pf	Philo fine sandy loam	70	105	20	40	35	55	35	55	2.0	3.0	2.0	3.2	90	150	------
Ph	Philo silt loam	80	120	20	40	35	55	35	55	2.0	3.0	2.0	3.2	100	170	------
PkA	Pickaway silt loam, overwash, 0 to 3 percent slopes	75	105	25	35	40	60	50	70	2.0	3.0	2.5	3.5	110	170	(4)
PmB	Pickaway silt loam, 3 to 8 percent slopes	65	100	25	35	35	55	50	65	1.8	2.8	2.0	3.2	100	160	(4)
Pn	Pope fine sandy loam	70	100	25	35	35	55	35	55	2.0	3.0	2.5	3.5	80	150	------
Po	Pope silt loam	75	110	25	45	40	60	40	60	2.0	3.5	2.5	4.2	110	180	------
RuB	Rushtown very shaly silt loam, 3 to 8 percent slopes	30	60	15	25	25	35	25	35	1.2	2.2	1.5	2.5	55	80	------
SaA	Sees silt loam, 0 to 3 percent slopes	40	80	15	25	25	45	----	----	1.8	2.5	2.0	3.0	90	160	------
SaB	Sees silt loam, 3 to 8 percent slopes	40	80	15	25	25	45	----	----	1.8	2.5	2.0	3.0	90	160	------
ScB3	Sees silty clay loam, 3 to 8 percent slopes, severely eroded	35	85	13	22	22	45	----	----	1.5	2.0	1.8	2.5	80	150	------
TyA	Tygart silt loam, 0 to 3 percent slopes	40	80	18	25	----	----	----	----	1.5	2.5	----	----	70	130	------
TyB	Tygart silt loam, 3 to 8 percent slopes	40	80	18	25	----	----	----	----	1.5	2.5	----	----	70	130	------
WaB	Waynesboro gravelly loam, 3 to 8 percent slopes	45	90	25	35	35	45	35	45	1.5	2.5	2.0	3.0	75	110	90
WaC	Waynesboro gravelly loam, 8 to 15 percent slopes	40	85	22	30	30	40	30	40	1.3	2.2	1.8	2.5	70	100	85
WaC3	Waynesboro gravelly loam, 8 to 15 percent slopes, severely eroded	35	75	20	25	25	35	25	35	1.2	2.0	1.5	2.3	60	85	75

[1] Rating indicates relative suitability of the soil for orchards and is based on 100 for the best soils.

[2] Cow-acre-days refers to the number of days in a year that a mature animal (cow, horse, or steer) can graze without damaging the pasture.

[3] Differences in productivity between the Berks and the Lehew soils or the Berks and the Montevallo soils are minor. The yields shown are for the Berks component; yields for the Lehew or the Montevallo component are shown elsewhere in this table.

[4] Poor air drainage limits use for orchards.

[5] Yields shown are for the Montevallo component; yields for the Lehew component are somewhat higher and are shown elsewhere in this table.

The figures shown in table 1 for orchards indicate relative suitability ratings instead of estimated yields. They are based on a rating of 100 for the best soils. Thus, a rating of 75 means that a soil is about three-fourths as productive of orchard fruits as a soil rated 100. The production of apples and peaches, the main orchard fruits grown in this county, is influenced by soil properties and by frost damage where trees occupy a poor position on the landscape.

Use of Soils as Woodland [2]

Woodland in Berkeley County occupies slightly more than 80,000 acres, or about 40 percent of the total land area. Most of the woodland is on the sandstone and shale hills in the western third of the county. In this area there are large, continuous tracts on North Mountain, Third Hill Mountain, and Sleepy Creek Mountain. A smaller acreage occurs on the shale belts in the limestone valley. Throughout this part of the county are many small woodlots on farms.

Berkeley County lies in the central forest region. Several forest types are in the county, but uplands oaks and associated hardwords are dominant (*12*).[3] Following are the common forest types and the soils and sites on which they occur.

Scarlet oak and chestnut oak forest type is on the Montevallo soils and other shallow, droughty soils, mainly on dry ridges and south-facing slopes.

Black locust forest type occurs in severely eroded, abandoned fields and in areas of Hagerstown soils and other rocky limestone soils.

White pine-chestnut oak forest type occurs mostly on the Berks and Montevallo soils.

White oak-red oak-hickory forest type occurs on the Frederick and other deep limestone soils and on the Dekalb, Lehew, Berks, and other soils on north-facing slopes.

Yellow poplar-white oak-northern red oak forest type occurs on north slopes of the Dekalb, Lehew, and other soils on mountains and in small, scattered woodlots on the Hagerstown and other deep limestone soils in the limestone valley.

Virginia pine forest type is on severely eroded soils in the Montevallo, Lehew, Berks, and other series that were formerly used for agriculture (figs. 11, 12).

Soil properties have a definite influence on tree growth, species adaptation, and woodland management practices (*16*, *17*). The ability of a soil to supply moisture and plant nutrients is the property that most affects tree growth. Thus, a deep, fertile limestone soil with high available moisture capacity, such as the Frederick or Hagerstown, can be expected to give faster growth than a shallow, droughty, infertile soil, such as the Montevallo. Steepness of slope also may influence the amount of moisture available to trees. Depth to hard bedrock, to a fragipan, or to a clayey subsoil affects moisture-supplying capacity and root growth. A high water table also influences root growth and species adaptation.

[2] Ross H. Mellinger, woodland conservationist, Soil Conservation Service, assisted in preparing this subsection.

[3] Italic numbers in parentheses refer to Literature Cited, p. 141.

***Figure 11.*—Natural stand of Virginia pine, about 35 years old, in an old field on Berks-Montevallo shaly silt loams, 15 to 25 percent slopes, severely eroded.**

Competition to new seedlings from grass, weeds, and brush is more intensive on some soils than on others. In addition, woodland management is affected by other soil properties. Stoniness, a clayey subsoil, and very steep slopes are among the features that limit use of equipment on some soils. When tree crops are harvested, some soils erode more readily than others.

Woodland suitability grouping

Management of woodland can be planned more effectively if soils are grouped according to those characteristics that affect growth of trees and management of the stands. For this reason, the soils of Berkeley County have been placed in 12 woodland suitability groups. These woodland groups are listed in table 2 and also are described in the text. Each group consists of soils that have about the same suitability for wood crops, require about the same management, and have about the same potential productivity. Most of the commercial woodland in the county occurs on soils in groups 2, 4, 5, and 6.

In table 2 the estimated site indexes are given for upland oaks, Virginia pine, white pine, and yellow-poplar. The *site index* expresses the potential productivity of a soil for a specified kind, or species, of tree. A site index for a given soil is the height, in feet, that a specified kind

Figure 12.—**Pine needles and humus accumulated on the surface of severely eroded Berks and Montevallo soils under a stand of 35-year-old Virginia pine.**

of tree growing on that soil will reach in 50 years. This site rating is determined mainly by the capacity of the soil to provide moisture and growing space for tree roots.

For a number of soils in this county, site indexes were obtained by measuring the height and age of certain tree species growing on the soils. These data were correlated with data taken on similar soils outside Berkeley County, and the information was used to estimate the site indexes for soils in each woodland suitability group. The site indexes in table 2 are listed as an average and, in parentheses, as a range.

The quality of a site for upland oaks, Virigina pine, white pine, and yellow-poplar can be rated by using the average site indexes listed in table 3 for these trees. For example, table 2 shows that the soils in woodland suitability group 2 have an average site index of 70 for upland oaks, 70 for Virginia pine, 80 for white pine, and 80 for yellow-poplar. Table 3, page 30, indicates that the quality of a site having these site indexes is good for upland oaks, good for Virginia pine, good for white pine, and good for yellow-poplar.

On some soils the site index varies from one area to another because of aspect, steepness of slope, position on the slope, or a combination of these features. This information is given in table 2 for soils in those woodland groups in which it applies. Aspect, or the compass direction in which a slope faces, is listed as north or south. Slopes that face north or east of a line drawn from true northwest to true southeast have a north aspect; those that face south or west of this line have a south aspect.

SPECIES SUITABILITY.—Named in the description of each woodland suitability group in the text are the species generally preferred in natural stands and those preferred for planting for wood crops, for Christmas trees, and for farmstead windbreaks. The species listed grow well on the soils in the group. Species shown as suitable for wood crops have a higher relative value than others not shown, but they are not listed in order of priority. On the shallower soils, however, pines are better adapted than hardwoods and generally produce more wood in less time. In addition, hardwoods are more difficult to establish by planting than conifers and, in general, are less successful.

White pine is among the preferred species, even though the white-pine weevil is a pest in Berkeley County. The high value of this species both for Christmas trees and for wood crops may offset the cost of control measures. White-pine blister rust is under control in the county, but extensive areas to be planted to white pine should be examined for plants of currants and gooseberries, commonly called ribes, the alternate hosts for this disease.

Growers of Scotch pine for Christmas trees should choose blue-green strains, which hold their green color through winter. Also suggested for Christmas trees is the blue, or glauca, variety of Douglas-fir.

In table 2 are listed the hazards and limitations that affect the management of each woodland suitability group. As shown in the table, each woodland group has, in varying degree, limitations that affect its management. Some of these limitations are expressed in the relative terms, slight, moderate, or severe. The relative term expresses the degree of limitation, as explained in the following:

PLANT COMPETITION.—Each woodland group carries a rating for plant competition. This is an estimate of the effect of brush, grass, vines, or other undesirable plants on the establishment of planted or naturally occurring tree seedlings. Competition is *slight* if unwanted plants are no special problem. It is *moderate* if the invading plants delay but generally do not prevent the establishment of desirable seedlings. Competition is *severe* if natural restocking of desired species cannot be relied on; even planted trees may be choked out unless special measures are taken to control competition.

SEEDLING MORTALITY.—Even when healthy seedlings of a suitable tree are correctly planted or occur naturally in adequate numbers, some of them will not survive if characteristics of the soil are unfavorable. Mortality is *slight* if not more than 25 percent of the planted seedlings die, or if trees ordinarily regenerate naturally in places where there are enough seeds. It is *moderate* if 25 to 50 percent of the planted seedlings die, or if trees do not regenerate naturally in numbers needed for adequate restocking. Mortality is *severe* if more than 50 percent of the planted seedlings die, or if trees do not ordinarily reseed naturally in places where there are enough seeds.

TABLE 2.—*Woodland suitability groups of soils, their estimated site potential,*

[Absence of entry indicates that information is not

Woodland suitability groups	Map symbols	Slope		
		Range	Aspect	Position
		Percent		
Group 1. Deep, well-drained limestone soils that are fertile and rocky or nonrocky.	DfB, DfC3, DgB, DgC, DgC3; FbB, FbC, FbC3, FcC; FdB, FdC, FdC3, FfB, FfC, FfC3, FgB, FgC, FgC3, FgD, FkC, FsC; HaB, HaC3, HbA, HbB, HcB, HcC, HcC3, HgB, HgC, HkC3; MrA, MrB, MsB, MsC, MsC3, MuA; PkA, PmB.	0–15	All	All
	DgD3; FbD, FbD3; FfD, FfD3, FgD3, FsD; HcD3, HgD, HkD3; MsD.	15–25	All	All
	FsE; HgF; MvE	20–50	All	All
Group 2. Deep, well drained and moderately well drained, acid colluvial and terrace soils.	BuB, BuC, BvC; LaB, LaC, LaC3, LbC; LdB, LdC, LdC3; WaB, WaC, WaC3.	3–15	All	All
	LaD, LbD	15–25	All	All
	LbE	25–45	All	All
Group 3. Deep, moderately well drained terrace soils with a fragipan.	CaB; MgB, MhA, MhB, MhC3	0–15	All	All
Group 4. Shallow or moderately deep, somewhat droughty soils derived from acid shale.	BcB, BcC, BhB, BhC; BkB,[2] BkC;[2] GpA, GpB, GpC; RuB.	0–20 0–20	North South	All All
	BcD, BhD; BkD;[2] MkC3, MkD3; MnC3,[2] MnD3.[2]	10–30 10–30	North South	All All
	MkE; MnE[2]	30–50 30–50	North South	All All
Group 5. Moderately deep, mostly steep and stony soils derived from sandstone.	DaC; LhB, LhC, LhC3	3–20 3–20 3–20 3–20	North North South South	Lower Middle and upper Lower and middle Upper
	DaD, DbD; LhD, LhD3	0–30 0–30 0–30 0–30	North North South South	Lower Middle and upper Lower and middle Upper
	DaE, DbE, DbF, LhE	25–70 25–70 25–70 25–70	North North South South	Lower Middle and upper Lower and middle Upper
Group 6. Shallow or very shallow, droughty, shaly soils derived from acid shale.	BmB3,[2] BmC3;[2] MmB, MmC	3–20 3–20	North South	All All
	BmD3;[2] MmD	20–30 20–30	North South	All All
	MmE	30–50 30–50	North South	All All
Group 7. Shallow or moderately deep, fine- to medium-textured limestone soils.	CnB, CnC, CoC3; EaC3, EbB; EcC3, EdB, EdC, EkC3, EnB, EnC.	2–20	All	All
	CoD3; EkD3	15–25	All	All
Group 8. Deep, well drained and moderately well drained soils on bottom land.	Hm, Hn, Ho; Ln, LoB, LoC; Pf, Ph; Pn, Po.	0–8	All	All

See footnotes at end of table.

and ratings for major limitations and hazards that affect management

available or that the factor does not apply]

Site index [1]				Plant competition		Seedling mortality	Equipment limitation	Erosion hazard
Upland oaks	Virginia pine	White pine	Yellow-poplar	Hardwoods	Pines			
80(75–84)			90(85–94)	Severe	Severe	Slight	Moderate	Slight.
80(75–84)		90(85–94)	90(85–94)	Severe	Severe	Slight	Moderate	Moderate.
80(75–84)		90(85–94)	90(85–94)	Severe	Severe	Slight	Severe	Severe.
70(65–74)	70(65–74)	80(75–84)	80(75–84)	Slight	Severe	Slight	Slight	Slight.
70(65–74)	70(65–74)	80(75–84)	80(75–84)	Slight	Severe	Slight	Moderate	Moderate.
70(65–74)	70(65–84)	80(75–84)	80(75–84)	Slight	Severe	Slight	Moderate	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Slight	Severe	Moderate.
70(65–74)	70(65–74)	80(75–84)		Slight	Severe	Slight	Slight	Slight.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Moderate	Slight	Slight.
70(65–74)	70(65–74)	80(75–84)		Slight	Severe	Slight	Moderate	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Moderate	Moderate	Moderate.
70(65–74)	70(65–74)	80(75–84)		Slight	Severe	Slight	Severe	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Moderate	Severe	Moderate.
70(65–74)	70(65–74)	80(75–84)	80(75–84)	Slight	Severe	Slight	Slight	Slight.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Slight	Slight	Slight.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Slight	Slight	Slight.
50(45–54)	50(45–54)	60(55–64)		Slight	Moderate	Moderate	Slight	Slight.
70(65–74)	70(65–74)	80(75–84)	80(75–84)	Slight	Severe	Slight	Moderate	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Slight	Moderate	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Slight	Moderate	Moderate.
50(45–54)	50(45–54)	60(55–64)		Slight	Moderate	Moderate	Moderate	Moderate.
70(65–74)	70(65–74)	80(75–84)	80(75–84)	Slight	Severe	Slight	Severe	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Slight	Severe	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Slight	Severe	Moderate.
50(45–54)	50(45–54)	60(55–64)		Slight	Moderate	Moderate	Severe	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Moderate	Slight	Slight.
50(45–54)	50(45–54)	60(55–64)		Slight	Slight	Moderate or severe	Slight	Slight.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Moderate	Moderate	Moderate.
50(45–54)	50(45–54)	60(55–64)		Slight	Slight	Moderate or severe	Moderate	Moderate.
60(55–64)	60(55–64)	70(65–74)		Slight	Moderate	Moderate	Severe	Severe.
50(45–54)	50(45–54)	60(55–64)		Slight	Slight	Moderate or severe	Severe	Severe.
70(65–74)	70(65–74)		80(75–84)	Severe	Severe	Slight	Severe	Severe.
70(65–74)	70(65–74)		80(75–84)	Severe	Severe	Slight	Severe	Severe.
80(75–84)			90(85–94)	Severe	Severe	Slight	Severe	Slight.

TABLE 2.—*Woodland suitability groups of soils, their estimated site potential,*

Woodland suitability groups	Map symbols	Slope		
		Range	Aspect	Position
		Percent		
Group 9. Shallow to deep soils with a fine-textured, sticky subsoil; on foot slopes and terraces.	BnA, BnB, BtA, BtB; SaA, SaB, ScB3; TyA, TyB.	0–8	All	All
Group 10. Mainly poorly drained soils on bottom land.	Aa, Ab, Am; At; Ma.	0–3	All	All
Group 11. Very shallow or shallow, severely eroded, droughty soils derived from shale, and very severely eroded shaly land types.	MmB3, MmC3.	3–20	All	All
	MmD3.	20–30	All	All
	MmE3; ShD; ShE.	10–50	All	All
Group 12. Steep rock land.	SrF.	30–70		

[1] Figures in parentheses indicate the estimated range in site index.

TABLE 3.—*Site quality and estimated corresponding site index for the common tree species*

[Dashes indicate the species is not common on sites of the specified quality]

Site quality	Average site index for—			
	Upland oaks	Virginia pine	White pine	Yellow-poplar
Excellent	80		90	90
Good	70	70	80	80
Fair	60	60	70	
Poor	50	50	60	

EQUIPMENT LIMITATION.—Slope, texture and wetness of the subsoil, number and size of stones, and other soil characteristics commonly restrict or prohibit the use of ordinary equipment in tending and harvesting tree crops. The limitation is *slight* if slopes are less than 15 percent and if there are no restrictions on the kind of equipment or on the time of year that the equipment can be used. It is *moderate* if the use of equipment is limited for less than 3 months a year and if slopes range from 15 to 35 percent. The limitation is *severe* if the use of heavy equipment is prohibited for more than 3 months a year, if many large stones seriously interfere with cultural or harvesting work, or if slopes are more than 35 percent.

EROSION HAZARD.—The erosion hazard is rated on the basis of the risk of gully erosion incurred in managing and harvesting tree crops. The hazard generally is related to layout, use, and care of roads and skid trails in woodland. It is *slight* where no special measures are necessary to control erosion if ordinary hauling and skidding practices are used and if layouts for roads and trails are good. The erosion hazard is *moderate* where roads and trails should be carefully laid out on moderate grades and where measures to control erosion are needed immediately after logging. It is *severe* where roads and trails should be on grades of less than 10 percent; water-diversion measures are needed during logging; outsloping and diversion of water are needed immediately after logging; and seeding and mulching generally are needed to supplement other measures.

WOODLAND SUITABILITY GROUP 1

This group consists of medium-textured or moderately fine textured, mostly gently sloping to strongly sloping soils that developed in material weathered from limestone and that are deep and well drained. About one-fourth of the acreage is very rocky or very stony. These soils are highly fertile and have high available moisture capacity. They occur throughout the limestone valley and make up about 30 percent of the county. Only a small part of the total acreage is woodland, which occurs as small woodlots on farms. Many of the woodlots are on very rocky soils, where eastern redcedar and black locust are fairly common in the eroded areas. Many woodlots consist of mature or overmature oaks and other hardwoods and generally are grazed. The soils are—

Duffield gravelly silt loam, 3 to 8 percent slopes.
Duffield gravelly silt loam, 8 to 15 percent slopes, severely eroded.
Duffield silt loam, 3 to 8 percent slopes.
Duffield silt loam, 8 to 15 percent slopes.
Duffield silt loam, 8 to 15 percent slopes, severely eroded.
Duffield silt loam, 15 to 25 percent slopes, severely eroded.
Frankstown shaly silt loam, 3 to 8 percent slopes.
Frankstown shaly silt loam, 8 to 15 percent slopes.
Frankstown shaly silt loam, 8 to 15 percent slopes, severely eroded.
Frankstown shaly silt loam, 15 to 25 percent slopes.
Frankstown shaly silt loam, 15 to 25 percent slopes, severely eroded.
Frankstown very rocky silt loam, 8 to 15 percent slopes.
Frederick cherty silt loam, 3 to 8 percent slopes.
Frederick cherty silt loam, 8 to 15 percent slopes.

and ratings for major limitations and hazards that affect management—Continued

Site index [1]				Plant competition		Seedling mortality	Equipment limitation	Erosion hazard
Upland oaks	Virginia pine	White pine	Yellow-poplar	Hardwoods	Pines			
70(65–74)				Severe	Severe	Moderate	Severe	Slight.
				Severe	Severe	Moderate	Severe	Slight.
<54	<54	60(55–64)		Slight	Slight	Severe	Slight	Moderate.
<54	<54	60(55–64)		Slight	Slight	Severe	Moderate	Moderate.
<54	<54	60(55–64)		Slight	Slight	Severe	Severe	Moderate.
				Slight	Slight		Severe	Slight.

[2] Because they are similar, ratings are given for the soil complexes instead of for their components.

Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded.
Frederick cherty silt loam, 15 to 25 percent slopes.
Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded.
Frederick gravelly loam, thick surface, 3 to 8 percent slopes.
Frederick gravelly loam, thick surface, 8 to 15 percent slopes.
Frederick gravelly loam, thick surface, 8 to 15 percent slopes, severely eroded.
Frederick gravelly loam, thick surface, 15 to 25 percent slopes.
Frederick gravelly loam, thick surface, 15 to 25 percent slopes, severely eroded.
Frederick very rocky silt loam, 3 to 15 percent slopes.
Frederick silt loam, 3 to 8 percent slopes.
Frederick silt loam, 8 to 15 percent slopes.
Frederick silt loam, 8 to 15 percent slopes, severely eroded.
Frederick very stony loam, thick surface, 8 to 15 percent slopes.
Frederick very stony loam, thick surface, 15 to 25 percent slopes.
Frederick very stony loam, thick surface, 25 to 45 percent slopes.
Hagerstown gravelly silt loam, 3 to 8 percent slopes.
Hagerstown gravelly silt loam, 8 to 15 percent slopes, severely eroded.
Hagerstown silt loam, 0 to 3 percent slopes.
Hagerstown silt loam, 3 to 8 percent slopes.
Hagerstown silty clay loam, 3 to 8 percent slopes.
Hagerstown silty clay loam, 8 to 15 percent slopes.
Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded.
Hagerstown silty clay loam, 15 to 25 percent slopes, severely eroded.
Hagerstown very rocky silt loam, 3 to 8 percent slopes.
Hagerstown very rocky silt loam, 8 to 15 percent slopes.
Hagerstown very rocky silt loam, 15 to 25 percent slopes.
Hagerstown very rocky silt loam, 25 to 50 percent slopes.
Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded.
Hagerstown very rocky silty clay loam, 15 to 25 percent slopes, severely eroded.
Murrill gravelly silt loam, moderately deep, 0 to 3 percent slopes.
Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes.
Murrill gravelly loam, 3 to 8 percent slopes.
Murrill gravelly loam, 8 to 15 percent slopes.
Murrill gravelly loam, 8 to 15 percent slopes, severely eroded.
Murrill gravelly loam, 15 to 25 percent slopes.
Murrill silt loam, 0 to 3 percent slopes.
Murrill very stony silt loam, 20 to 40 percent slopes.
Pickaway silt loam, overwash, 0 to 3 percent slopes.
Pickaway silt loam, 3 to 8 percent slopes.

These soils are rated as excellent sites for trees, particularly for high-quality hardwoods. The site index is 75 to 84 for upland oaks and is 85 to 94 for yellow-poplar. Few conifers except redcedar now grow on these soils.

Among the more valuable hardwoods to favor in natural stands are red oak, white oak, black oak, yellow-poplar, basswood, white ash, black walnut, black cherry, and black locust.

Trees preferred for planting for wood crops are yellow-poplar, white pine, Japanese larch, black locust, black walnut, and red oak. Black walnut and red oak can be established by seeding. Hardwoods are better suited where the sod cover is light and brush is scattered.

Suitable as Christmas trees are Scotch pine, white pine, Norway spruce, and Douglas-fir. These trees can be grown on nonstony soils that have slopes of less than 25 percent.

White pine, hemlock, Norway spruce, and Austrian pine make good windbreaks.

Plant competition is severe on these soils. Grasses, shrubs, vines, and annual weeds compete severely with desirable trees (fig. 13). Large openings in the canopy encourage the growth of sod that keeps seedlings from establishing naturally. The openings are then taken over by elm, ailanthus, Halls honeysuckle, and other undesirable plants. If trees are planted in these areas, furrowing, scalping, treating with chemicals, or other intensive site preparation is needed. Natural seeding cannot be relied on to stock large open areas. If plant competition is controlled, however, natural or planted seedlings survive well.

Equipment limitation is moderate on the gently sloping to moderately steep soils and is severe on the steep

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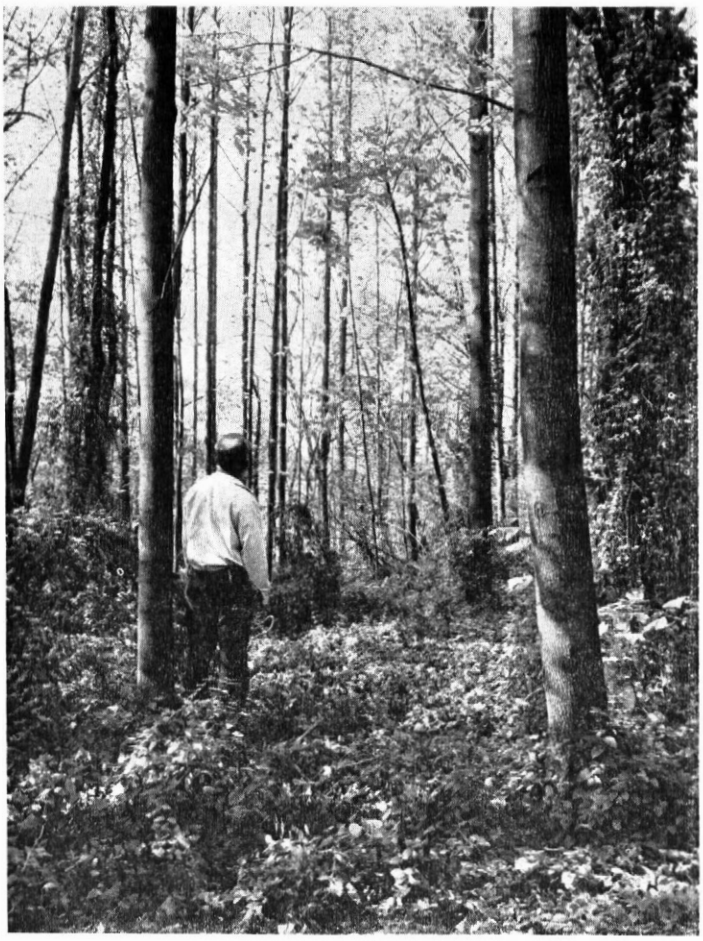

Figure 13.—Vigorous growth of Halls honeysuckle under a stand of yellow-poplar, about 25 years old, on Hagerstown very rocky silt loam, 3 to 8 percent slopes.

and very steep soils. Because all the soils have a clayey subsoil, the use of logging equipment is limited during winter and early in spring unless the ground is frozen.

The erosion hazard is slight on the gently sloping and strongly sloping soils, moderate on the moderately steep soils, and severe on the steep and very steep soils. To control erosion, it is necessary to divert water from higher areas immediately after logging and to seed tall fescue or a similar grass on steep grades.

WOODLAND SUITABILITY GROUP 2

The soils in this group are deep, acid, medium textured, and mostly strongly sloping. They are moderately fertile and are high to medium in available moisture capacity. These soils occupy about 12,000 acres in the county. The important trees are mixed oaks, hickory, yellow-poplar, and other hardwoods. The soils are—

Buchanan gravelly loam, 3 to 8 percent slopes.
Buchanan gravelly loam, 8 to 15 percent slopes.
Buchanan very stony loam, 3 to 15 percent slopes.
Laidig gravelly loam, 3 to 8 percent slopes.
Laidig gravelly loam, 8 to 15 percent slopes.
Laidig gravelly loam, 8 to 15 percent slopes, severely eroded.
Laidig gravelly loam, 15 to 25 percent slopes.
Laidig very stony loam, 3 to 15 percent slopes.
Laidig very stony loam, 15 to 25 percent slopes.
Laidig very stony loam, 25 to 45 percent slopes.
Leadvale silt loam, 3 to 8 percent slopes.
Leadvale silt loam, 8 to 15 percent slopes.
Leadvale silt loam, 8 to 15 percent slopes, severely eroded.
Waynesboro gravelly loam, 3 to 8 percent slopes.
Waynesboro gravelly loam, 8 to 15 percent slopes.
Waynesboro gravelly loam, 8 to 15 percent slopes, severely eroded.

The Laidig soils make up about half the acreage of this group. These well-drained soils are on sandstone and shale colluvium at the base of mountain slopes in the western part of the county. They are mainly wooded, and more than half their acreage is very stony. The Buchanan and Leadvale soils, which also formed in colluvium, are slightly wet and have a hard layer, or fragipan, at a depth of about 2 feet. The well-drained Waynesboro soils occur on high terraces above the Potomac River and have been cleared and farmed in most places.

The soils in this group are capable of producing good yields of wood crops. The estimated site index is 65 to 74 for upland oaks and Virginia pine and 75 to 84 for yellow-poplar and white pine.

The trees preferred in natural stands are white pine, yellow-poplar, red, white, and black oaks, basswood, white ash, black locust, black cherry, sugar maple, and black walnut. Suitable trees to plant for wood crops are white pine, Japanese larch, yellow-poplar, white ash, black locust, black walnut, and red oak. Black walnut and red oak can be established by seeding.

Scotch pine, white pine, Norway spruce, and Douglas-fir are suitable as Christmas trees on nonstony soils that have slopes of less than 25 percent. Douglas-fir is suitable on north-facing slopes.

Plant competition normally is slight for hardwoods in natural stands, but if large openings are made in the canopy, Halls honeysuckle vines and ailanthus trees are a problem. Unwanted plants compete severely with white pine, and brush must be controlled if this tree is to regenerate satisfactorily.

Seedling mortality is slight, and naturally occurring and planted seedlings survive well.

Although these soils generally are accessible, the use of equipment is sightly limited on slopes of 15 percent or less and is moderately limited on slopes of more than 15 percent. Large stones make logging difficult at times, and seep spots commonly cause trouble on logging roads and skid trails.

Erosion is a slight to moderate hazard. During and after logging, it is necessary to divert runoff from higher areas nearby.

WOODLAND SUITABILITY GROUP 3

This group consists of deep, moderately well drained, mostly gently sloping soils that have a hard layer, or fragipan, at a depth of about 2 feet. This layer is slowly permeable and restricts root penetration. Water accumulates above the pan in wet periods, and small seep spots are common. These soils have moderate available moisture capacity and are medium or low in fertility. They occupy about 2,200 acres, most of which have been cleared and cropped. Woodlots on farms are small and have a small total acreage. The soils are—

Captina silt loam, 3 to 8 percent slopes.
Monongahela gravelly silt loam, 3 to 8 percent slopes.
Monongahela silt loam, 0 to 3 percent slopes.
Monongahela silt loam, 3 to 8 percent slopes.
Monongahela silt loam, 8 to 15 percent slopes, severely eroded.

The Monongahela soils are on acid terraces, mostly along Back Creek. The Captina soils occupy lime-influenced terraces and are mainly along Opequon Creek and the Potomac River.

These soils are fair sites for trees, but nearly all their acreage has been cleared for farming, and little of the original forest remains. Virginia pine has reseeded naturally in abandoned fields. In well-stocked stands, Virginia pine is highly productive of pulpwood. The estimated site index on the soils of this group is 55 to 64 for upland oaks and Virginia pine and is 65 to 74 for white pine.

The trees to favor in natural stands are red oak, black oak, white pine, and Virginia pine. In well-stocked stands, Virginia pine produces high yields of pulpwood.

Species suitable for planting for woodcrops are white pine, shortleaf pine, and Japanese larch. In addition, Virginia pine is suitable in a short rotation for pulpwood.

Trees planted for Christmas trees do well on these soils. Scotch pine, white pine, Norway spruce, and Douglas-fir are preferred.

White pine, hemlock, Norway spruce, and Austrian pine make good windbreaks.

Plant competition in natural stands is slight for hardwoods and is moderate for pines. In old fields the competition from sod ranges from slight on soils of low fertility to severe on soils that once were limed and fertilized. In places where the sod cover is heavy, scalping, furrowing, or chemical control is desirable before trees are planted. Virginia pine or white pine reseed naturally on these soils if there is a source of seed nearby and if sites are prepared by plowing or disking.

Seedling mortality is slight. Both planted and naturally occurring seedlings survive well.

The use of equipment is severely restricted in winter and early in spring because excess water accumulates above the fragipan.

Erosion is a moderate hazard. Water should be diverted from logging roads and skid trails.

WOODLAND SUITABILITY GROUP 4

This group consists of shallow or moderately deep, somewhat droughty, mostly strongly sloping or moderately steep soils that were derived from acid shale on uplands. These soils are medium textured and have a high content of shale fragments or small stones. Slopes range from gentle to very steep. Fertility is low, and the available moisture capacity is low to medium.

The soils of this group occupy about 26,000 acres in the county. Most areas that have been cleared are severely eroded. Wooded areas range from small woodlots on farms to fairly extensive tracts. The important trees are mixed oaks, hickory, and Virginia pine, and there is some white pine. In many old fields, Virginia pine has reseeded naturally and occurs in pure stands. The soils are—

Berks channery silt loam, 3 to 10 percent slopes.
Berks channery silt loam, 10 to 20 percent slopes.
Berks channery silt loam, 20 to 30 percent slopes.
Berks shaly silt loam, 3 to 8 percent slopes.
Berks shaly silt loam, 8 to 15 percent slopes.
Berks shaly silt loam, 15 to 25 percent slopes.
Berks-Lehew channery loams, 3 to 10 percent slopes.
Berks-Lehew channery loams, 10 to 20 percent slopes.
Berks-Lehew channery loams, 20 to 30 percent slopes.
Gilpin silt loam, soft shale substratum, 0 to 3 percent slopes.
Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes.
Gilpin silt loam, soft shale substratum, 8 to 15 percent slopes.
Montevallo channery silt loam, 10 to 20 percent slopes, severely eroded.
Montevallo channery silt loam, 20 to 30 percent slopes, severely eroded.
Montevallo channery silt loam, 30 to 50 percent slopes.
Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded.
Montevallo-Lehew channery loams, 20 to 30 percent slopes, severely eroded.
Montevallo-Lehew channery loams, 30 to 45 percent slopes.
Rushtown very shaly silt loam, 3 to 8 percent slopes.

The Berks soils make up about half the total acreage in this group (fig. 14). The shaly Berks soils occur in the limestone valley, and most of their smoother parts have been cleared and cropped. The channery Berks and Montevallo soils occur on rather hard shale in the foothills of western Berkeley County. In many places these soils remain wooded, and some areas formerly farmed are eroded and have reverted to trees.

On the soils of this group, the productivity ranges from fair to good and is strongly affected by aspect.

On north-facing slopes the trees to favor in natural stands are red oak, white oak, black oak, yellow-poplar, white ash, white pine, and shortleaf pine. Virginia pine produces good yields of pulpwood. On slopes that have a south aspect, the preferred species for managing are black oak, red oak, white pine, shortleaf pine, and Virginia pine.

Trees suitable for planting for wood crops are white pine, shortleaf pine, Japanese larch, and Virginia pine.

Christmas trees can be grown on slopes that do not exceed 30 percent. Scotch pine and white pine are suit-

Figure 14.—A typical, well-stocked stand of upland oaks on Berks shaly silt loam, 8 to 15 percent slopes. These trees are on a south-facing slope and are 53 years old. The site index is 61.

able on all sites, and Norway spruce and Douglas-fir are more suitable on soils that have a north aspect.

Plant competition is slight for hardwoods and is moderate or severe for conifers. In establishing pines the most difficulty occurs on slopes that have a north aspect. If a source of seed is nearby, however, and if the mineral soil is exposed by disking or plowing, pines generally can be established through natural seeding. Competition from sod is slight, except in fields formerly cultivated that have recently been limed and fertilized for high yields of farm crops.

In most places seedling mortality is slight, but it is moderate on the upper part of south-facing slopes.

The limitation on the use of equipment ranges from slight to severe and depends on steepness of slopes. Because of the many small stones and shale fragments, good roads can be built on these soils and used in all seasons.

The hazard of erosion is slight in gently to strongly sloping areas but is moderate in steeper ones. Measures are needed to divert water from roads and skid trails.

WOODLAND SUITABILITY GROUP 5

This group consists of moderately deep, well-drained to somewhat droughty, acid soils on uplands that are underlain by gray and red sandstone. These soils are loamy or sandy, have moderate available moisture capacity, and are low to medium in fertility. They make up about 22,600 acres on mountain slopes in western Berkeley County, and more than three-fourths of this acreage is stony. Most areas are steep or very steep; few have been cleared. These soils are important as woodland and, for the most part, occur in large tracts, especially on Sleepy Creek Mountain. Among the dominant trees are upland oaks, hickory, yellow-poplar, white oak, black locust, Virginia pine, pitch pine, and some white pine. The soils in this group are—

Dekalb channery loam, 5 to 15 percent slopes.
Dekalb channery loam, 15 to 25 percent slopes.
Dekalb channery loam, 25 to 45 percent slopes.
Dekalb very stony loam, 0 to 25 percent slopes.
Dekalb very stony loam, 25 to 45 percent slopes.
Dekalb very stony loam, 45 to 70 percent slopes.
Lehew channery loam, 3 to 10 percent slopes.
Lehew channery loam, 10 to 20 percent slopes.
Lehew channery loam, 10 to 20 percent slopes, severely eroded.
Lehew channery loam, 20 to 30 percent slopes.
Lehew channery loam, 20 to 30 percent slopes, severely eroded.
Lehew channery loam, 30 to 45 percent slopes.

On these mountain soils the growth and management of tree crops are strongly affected by relief. Table 2 shows the degree to which site index is influenced by aspect and position on the slope.

The trees to favor in natural stands on the lower third of north aspects are yellow-poplar, basswood, white ash, black walnut, red oak, white oak, black oak, black cherry, sugar maple, and white pine. Black, red, and white oaks and white pine are suitable on the middle and upper parts of north aspects and the lower and middle parts of south aspects. White pine, pitch pine, and Virginia pine are the species to favor on the upper third of south aspects.

The trees suitable for planting for wood crops on the lower third of north aspects are white pine, Japanese larch, black locust, yellow-poplar, and red oak. Red oak can be established by seeding. Favored for planting on all other slopes are white pine, Virginia pine, and Japanese larch. Virginia pine is preferred for pulpwood.

Christmas trees can be grown on nonstony soils that have slopes of less than 25 percent. Scotch pine and white pine are suitable for planting on all sites. Norway spruce and Douglas-fir are more suitable on soils that have a north aspect.

Plant competition is severe for pines on the lower third of north aspects. If pines are to regenerate on these slopes, weeding must be intensive. On all other slopes, plant competition is moderate for pines. Competition is no more than slight for hardwoods on all sites, and only simple weeding is needed to release the most valuable species. Natural seeding generally cannot be relied on for restocking large areas formerly farmed unless the site is prepared by exposing mineral soil and unless there are desirable, light-seeded trees nearby.

Seedling mortality ordinarily is slight, but it is moderate on upper slopes that have a south aspect.

Limitations on the use of equipment generally are severe because much of the acreage has slopes of more than 35 percent. In many places the soils are covered with large stones that interfere with the movement of machinery and the harvesting of tree crops.

The hazard of erosion is slight to moderate in places where logging roads are built. Roads and skid trails can be stabilized during and after logging by using water-diversion practices. Because the soils contain many small stones, there are no seasonal restrictions on the use of roads.

WOODLAND SUITABILITY GROUP 6

This group consists of shaly, droughty, shallow or very shallow soils on gently sloping to very steep uplands that are underlain by acid shale. These soils are low in available moisture capacity and natural fertility. Because they have a high content of shale, water moves through them readily. They occupy about 32,000 acres in Berkeley County.

In the western part of the county, woodland occurs in fairly large tracts on these soils. In the limestone valley, most woodlots are small. The important trees are chestnut oak and other oaks, hickory, white pine, and Virginia pine. Where it has seeded naturally in abandoned fields, Virginia pine is in pure stands. The soils in this group are—

Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded.
Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded.
Berks-Montevallo shaly silt loams, 15 to 25 percent slopes, severely eroded.
Montevallo shaly silt loam, 3 to 10 percent slopes.
Montevallo shaly silt loam, 10 to 20 percent slopes.
Montevallo shaly silt loam, 20 to 30 percent slopes.
Montevallo shaly silt loam, 30 to 50 percent slopes.

The Berks-Montevallo soils occupy a large acreage in the limestone valley. Most areas of these soils have been cropped, but many of them have been abandoned to Virginia pine. The Montevallo soils are extensive

along the valley of Back Creek and in other foothill areas in the western part of the county. Some gently to strongly sloping areas have been cleared and cropped, and some of these have been abandoned to trees. Most other areas remain wooded.

The soils in this group are fair to poor sites for trees. As shown in table 2, the site indexes for upland oaks, Virginia pine, and white pine are influenced by aspect.

In the management of natural stands for wood crops, pines are preferred over hardwoods. The pines to favor are white, Virginia, shortleaf, and pitch pines. Black oak, chestnut oak, and red oak are the trees preferred in stands of hardwoods on north aspects.

The species suitable for planting for wood crops are white pine, Virginia pine, shortleaf pine, and Japanese larch.

Scotch pine, white pine, and Douglas-fir are suitable as Christmas trees. However, Douglas-fir is most suitable on north-facing slopes.

White pine, Scotch pine, and Austrian pine can be used in windbreaks.

Plant competition is slight for hardwoods. For pines the competition is slight to moderate, and most of it occurs from brush on soils that have a north aspect. Desirable conifers will reseed naturally if the site is prepared and if a source of seed is nearby. In dry years, however, many seedlings may not survive on south slopes.

Seedling mortality is moderate or severe. The hazard to seedlings is greatest on steep slopes that have a south aspect.

The use of equipment is restricted only by slope. The slopes range from gentle to very steep, and the equipment limitation ranges from slight to severe. Because the soils have a high content of shale, good roads are easily built on them and, if water is diverted, are easily maintained.

The hazard of erosion is generally slight or moderate on logging roads that are properly laid out, well built, and stabilized by water-diverting practices. On very steep slopes, however, the erosion hazard is severe.

WOODLAND SUITABILITY GROUP 7

This group consists of shallow or moderately deep, fine-textured to medium-textured, mostly gently sloping soils that developed in material weathered from limestone. These soils are fertile and are high in lime content, but they have low to medium available moisture capacity and are droughty. They take in water slowly and erode readily.

These soils occupy about 7,100 acres in the county. They occur throughout the limestone valley and in the limestone area north of Jones Springs. Most areas have been cleared and are used for crops and pasture, and there is only a small area of woodland. The original tree cover probably was oaks and other hardwoods. Bluegrass grows vigorously on these soils, and red cedar comes in naturally in old fields. The soils in this group are—

Carbo clay, 8 to 15 percent slopes, severely eroded.
Carbo silty clay loam, 2 to 8 percent slopes.
Chilhowie clay, 8 to 15 percent slopes, severely eroded.
Chilhowie silty clay, 2 to 8 percent slopes.
Chilhowie silty clay, 8 to 15 percent slopes.
Chilhowie very rocky silty clay, 3 to 8 percent slopes.
Chilhowie very rocky silty clay, 8 to 15 percent slopes.
Chilhowie very rocky clay, 8 to 15 percent slopes, severely eroded.
Chilhowie very rocky clay, 15 to 25 percent slopes, severely eroded.
Corydon silt loam, 3 to 8 percent slopes.
Corydon silt loam, 8 to 20 percent slopes.
Corydon silty clay, 8 to 15 percent slopes, severely eroded.
Corydon silty clay, 15 to 25 percent slopes, severely eroded.

The Carbo soils are deeper and less droughty than the other soils in this group.

The estimated site index for oaks and Virginia pine is 65 to 74 and for yellow-poplar is 75 to 84.

In natural woodland the preferred trees are black oak, red oak, white oak, yellow-poplar, white ash, black locust, black walnut, and basswood.

Species suitable for planting for wood crops are white pine, shortleaf pine, Virginia pine, and Japanese larch.

In most places these soils are not well suited to species grown for Christmas trees. Austrian pine is preferred for windbreaks.

Competition from grasses and annual weeds is severe both for planted trees and for the regeneration of natural stands. Seedling mortality is generally slight.

The use of equipment is severely restricted in winter and early in spring by the heavy clayey subsoil.

Erosion is a severe hazard on these soils. For controlling erosion, special care is needed to divert water from roads and skid trails, and mulching and seeding also may be necessary.

WOODLAND SUITABILITY GROUP 8

This group consists of deep, nearly level, well drained and moderately well drained soils that occur on bottom land and, in most places, are occasionally flooded. These soils are fertile and have high available moisture capacity. Almost all the acreage has been cleared and is intensively cropped, and there is little natural woodland. The soils are—

Huntington fine sandy loam.
Huntington silt loam.
Huntington silt loam, local alluvium.
Lindside silt loam.
Lindside silt loam, local alluvium, 0 to 3 percent slopes.
Lindside silt loam, local alluvium, 3 to 8 percent slopes.
Philo silt loam.
Philo fine sandy loam.
Pope fine sandy loam.
Pope silt loam.

The Pope and Philo soils are acid throughout and occur along Back Creek and other streams. In most places the Huntington and Lindside soils are neutral throughout. They occur along Opequon Creek, the Potomac River, and other streams.

The estimated site index is 80 or higher for upland oaks and is 90 or higher for yellow-poplar. If the soils in this group are used as woodland, only such valuable trees as black walnut, yellow-poplar, and white pine should be planted. Scotch pine, white pine, and Norway spruce are suitable for Christmas trees but should be grown only in areas that are not frequently flooded. Douglas-fir is poorly suited to these soils because of frost pockets.

For planted trees the competition from annual weeds and other unwanted plants generally is severe. In tree plantations the rows should be widely spaced so that

weeds can be controlled by disking. Frequent mowing is needed in areas planted to Christmas trees. Seedling mortality is slight.

The use of equipment is severely restricted during winter and early in spring when the soils are excessively wet. The hazard of erosion is slight.

WOODLAND SUITABILITY GROUP 9

In this group are gently sloping, shallow to deep, somewhat poorly drained soils that have a fine-textured, slowly permeable subsoil. They are moderate to low in available moisture capacity and are medium to high in natural fertility. The water table is near the surface in winter. These soils occupy about 7,500 acres in Berkeley County. Of this acreage, a large part has been cleared and drained and is used for pasture and crops. Woodland covers only a small acreage and occurs mainly as small woodlots that commonly contain red maple, sycamore, elm, and other trees that tolerate considerable wetness. The soils in this group are—

Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes.
Blairton shaly silt loam, thin solum variant, 3 to 8 percent slopes.
Blairton silt loam, 0 to 3 percent slopes.
Blairton silt loam, 3 to 8 percent slopes.
Sees silt loam, 0 to 3 percent slopes.
Sees silt loam, 3 to 8 percent slopes.
Sees silty clay loam, 3 to 8 percent slopes, severely eroded.
Tygart silt loam, 0 to 3 percent slopes.
Tygart silt loam, 3 to 8 percent slopes.

The Blairton soils are in depressional areas on the shale belts of the limestone valley. The deep, fertile Sees soils are along the eastern base of North Mountain, and the acid Tygart soils occur on terraces, mostly along Back Creek.

The estimated site index for upland oaks is 65 to 74.

White pine, European larch, and Virginia pine may be suitable for planting for wood crops, but the capacity of the soils in this group for producing yields of planted trees is not known. Scotch pine, white pine, and Norway spruce may be suitable as Chirstmas trees if the site is prepared by ridge furrowing or by surface drainage. Before a large area is planted to Christmas trees, however, the species should be tested in a small area.

Competition from sod may be severe for planted trees. On sites prepared for planting, drainage can be improved and the competition from sod reduced by ridge furrowing. Mortality of planted seedlings is moderate because of frost heaving.

The use of equipment is severely limited when the soils are wet. The erosion hazard is slight.

WOODLAND SUITABILITY GROUP 10

This group consists of deep, nearly level soils on poorly drained bottom land. These soils occupy about 5,000 acres in the county. Natural stands of trees consist mainly of pin oak, red maple, sycamore, and elm. No ratings of site index are available. The soils are—

Alluvial land, neutral or slightly acid.
Alluvial land, strongly acid.
Alluvial land, marl substratum.
Atkins silt loam.
Melvin silt loam.

The Alluvial lands occur in acid and limestone areas, are variable in texture and drainage, and are frequently damaged by floods. Most areas remain in fairly open woodland that is pastured. The acid Atkins soil is along Back Creek and similar streams, and the lime-influenced Melvin soil occurs along Opequon Creek and other streams. Both soils are subject to occasional flooding and have medium available moisture capacity. Most of their acreage has been cleared and drained and is used for pasture and crops.

White pine is suitable in trial plantings for wood crops on the Atkins and Melvin soils, but only if the site is improved by surface drainage or by ridge furrowing.

Plant competition is generally severe for planted trees. Because of flooding and frost heaving, seedling mortality is moderate.

The use of equipment is severely restricted to periods when the ground is dry. Although the hazard of flooding is moderate or severe, the erosion hazard is only slight.

WOODLAND SUITABILITY GROUP 11

This group consists mainly of strongly sloping and moderately steep, severely eroded Montevallo soils that developed in material weathered from thin-bedded, acid shale. These soils are very shallow or shallow and are droughty. Erosion has removed most of their surface layer and, in spots, has exposed the underlying shale. Surface runoff is rapid; fertility is low.

The soils and land types of this group occupy about 11,000 acres in the county. Most areas were cleared and cropped in the past, but most of these have reverted to brush and trees. Natural stands consist mainly of pines that have seeded on abandoned fields. The soils and land types are—

Montevallo shaly silt loam, 3 to 10 percent slopes, severely eroded.
Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded.
Montevallo shaly silt loam, 20 to 30 percent slopes, severely eroded.
Montevallo shaly silt loam, 30 to 50 percent slopes, severely eroded.
Sloping eroded land, shale materials.
Steep eroded land, shale materials.

The land types in this group consist of small areas that have lost all their surface layer through erosion. Before erosion destroyed their profiles, the soils in these areas were of the Berks, Montevallo, and Lehew series. Runoff is very rapid, gullies are common, and shale is exposed in most places. Establishing plants is difficult.

These soils and land types are poor or very poor sites for producing wood crops. They are better suited to pines than to oaks and other hardwoods, but trees grown in short rotations for pulpwood are the only wood crops feasible. The estimated site index is 54 or less for upland oaks and Viriginia pine and is 55 to 64 for white pine.

The trees suitable for planting for wood crops are Virginia pine and shortleaf pine. Black locust can be planted for erosion control or as a companion crop. Scotch pine is suitable for Chirstmas trees in nongullied areas on slopes of less than 30 percent.

Plant competition is slight for hardwoods and for conifers, but in dry years the mortality of planted and of naturally occurring seedlings is severe.

The use of equipment is severely limited by the steep slopes and gullies. After roads are built, however, they can be used all year. Although the hazard of erosion is moderate, roads and trails are generally kept in good condition by use of simple water-diversion measures.

WOODLAND SUITABILITY GROUP 12

Only Steep rock land is in this group. This steep and very steep land consists of massive outcrops of sandstone and small vertical cliffs. It occurs on the crests and points of Sleepy Creek Mountain, North Mountain, and other mountains in the county and occupies about 1,800 acres.

Planting trees on this land or producing trees commercially is not practical. Productivity is low, and the site index generally is 50 or less for both hardwoods and conifers. The land is too steep and too rocky for use other than watershed, wildlife, and esthetic purposes.

In the regeneration of hardwoods and pines, plant competition is only slight. If wood crops are harvested, however, the use of equipment is severely limited by many large stones and by ledges of rock. There is little or no erosion hazard.

Yield and growth data

Tables 4, 5, 6, and 7 list potential yields for even-aged, fully stocked stands of upland oaks, Virginia pine, yellow-poplar, and white pine.

TABLE 4.—*Yields per acre from upland oaks in even-aged, fully stocked stands*

[Compiled from USDA TECHNICAL BULLETIN 560 (*11*)]

Site quality and average site index	Age of stand	Merchantable volume		
	Years	*Cubic feet* [1]	*Cords* [2]	*Board feet* [3]
Poor (50)	30	540	6	350
	40	1, 090	13	1, 400
	50	1, 600	19	3, 250
	60	2, 080	25	5, 600
	70	2, 510	30	8, 150
	80	2, 900	34	10, 450
Fair (60)	30	880	10	850
	40	1, 580	19	3, 200
	50	2, 230	26	6, 300
	60	2, 800	33	9, 700
	70	3, 290	39	12, 800
	80	3, 730	44	15, 650
Good (70)	30	1, 270	15	1, 750
	40	2, 090	25	5, 500
	50	2, 830	33	9, 750
	60	3, 480	41	13, 900
	70	4, 030	47	17, 700
	80	4, 510	53	21, 200
Excellent (80)	30	1, 690	20	3, 350
	40	2, 610	31	8, 600
	50	3, 450	41	13, 750
	60	4, 160	49	18, 600
	70	4, 770	56	23, 100
	80	5, 340	63	27, 250

[1] Merchantable stems to a top diameter of 4 inches, outside bark.
[2] Figures rounded to nearest cord.
[3] According to International rule, ⅛ inch, for stems to a top diameter of 5 inches, inside bark.

TABLE 5.—*Estimated yields per acre from Virginia pine in even-aged, natural, fully stocked stands* [1]

Site quality and average site index	Age of stand	Merchantable volume
	Years	*Cords* [2]
Poor (50)	30	15
	40	20
	50	25
Fair (60)	30	21
	40	28
	50	35
Good (70)	30	30
	40	40
	50	50

[1] Estimates based on field experience and preliminary studies.
[2] Standard cords of cylindrical stems, including bark.

TABLE 6.—*Yields per acre from yellow-poplar in even-aged, fully stocked stands*

[Compiled from USDA TECHNICAL BULLETIN 356 (*9*)]

Site quality and average site index	Age of stand	Merchantable volume		
	Years	*Cubic feet* [1]	*Cords* [2]	*Board feet* [3]
Good (80)	30	1, 800	21	5, 500
	40	2, 690	31	11, 230
	50	3, 570	41	17, 620
Excellent (90)	30	2, 300	27	8, 710
	40	3, 390	39	16, 300
	50	4, 480	52	24, 400

[1] Peeled volume of all trees 5 inches or more in diameter breast high and to a top diameter of 3 inches, inside bark.
[2] Figures converted from cubic feet by using a factor of 86.4 cubic feet of solid wood per cord and rounding values to nearest cord.
[3] According to International rule, ⅛ inch.

Table 8 gives data obtained by studying the growth of upland oaks in eight plots on two soil types in the Berks series that are extensive in Berkeley County. Shown for each plot is the site index, which is the average height, in feet, of the dominant and codominant trees in well-stocked stands, at 50 years of age (*11*). The volume of timber in well-stocked stands at a given age can be determined by using site indexes.

Use of Soils for Wildlife

About two-thirds of Berkeley County is in farms, and about 40 percent of the total land area is wooded. Many soils in the county are well suited to intensive use for wildlife. Cottontail rabbit, bobwhite quail, gray squirrel, fox squirrel, ruffed grouse, wild turkey, mourning dove, and white-tailed deer are abundant enough for observing or hunting. Because the county draws hunters and other recreation seekers from Washington, D.C., Baltimore, Md.,

TABLE 7.—*Yields per acre from white pine in even-aged, natural, fully stocked stands* [1]

Site quality and average site index	Age of stand	Merchantable volume
	Years	*Board feet*[2]
Poor (60)	40	7, 600
	50	16, 700
	60	26, 400
	70	35, 500
	80	42, 700
Fair (70)	40	11, 200
	50	25, 000
	60	37, 300
	70	47, 800
	80	55, 700
Good (80)	40	14, 700
	50	31, 400
	60	43, 100
	70	55, 000
	80	63, 700
Excellent (90)	40	18, 800
	50	37, 100
	60	52, 100
	70	65, 500
	80	74, 600

[1] Adapted for use in Southern Appalachians by W. T. DOOLITTLE from RESEARCH BULLETIN 98, University of Wisconsin Agricultural Experiment Station.

[2] According to International rule, ¼ inch, for trees 7 inches or more in diameter breast high and to a top diameter of 5 inches, inside bark. Values are rounded to the nearest 100 board feet.

and other cities, there is increasing demand for areas developed primarily or solely as wildlife habitat.

This subsection discusses the four wildlife habitat areas in the county. Then, it rates the soils according to their suitability for eight elements of wildlife habitat and for three kinds of wildlife. Finally, it explains the ratings and discusses the elements and the kinds of wildlife.

For information about limitations on use of the soils for access roads, buildings, impoundments, and other structures needed in developing areas for wildlife, turn to the subsection "Suburban and Recreational Uses of Soils" beginning on page 66.

Wildlife habitat areas

In this county there are four wildlife habitat areas. Three of the areas are made up of several soil associations, and the fourth consists of part of soil association 7. The colored general soil map at the back of this report outlines the boundaries of the different soil associations.

WILDLIFE HABITAT AREA 1

This area is made up of soil associations 1, 4, and 5 in the limestone valley in the central and eastern parts of Berkeley County. It is the main farming and fruitgrowing section of the county and accounts for about 35 percent of the total land area.

Most of the area consists of deep, productive soils derived from limestone. These are the Duffield, Frankstown, Frederick, Hagerstown, and Murrill soils. In most places the area is smooth and has gentle slopes, but rocky places and small sinkholes occur throughout. Most of the acreage is moderately eroded. The general elevation ranges between 500 and 600 feet.

This habitat area is all in farms, and less than 20 percent of the acreage is in small woodlots. The main farming enterprises are orcharding, dairying, and raising beef cattle and sheep. A crop rotation commonly used consists of corn, small grain, and 2 years of hay. Permanent bluegrass pasture is extensive, especially in rocky areas. Land use is stable.

Wildlife species common in the area are bobwhite quail, mourning dove, cottontail rabbit, woodchuck, red and gray foxes, and a few fox squirrel and gray squirrel. Meadows provide ample food for rabbits, but good cover is lacking in many places. Most pastures are mowed at least once a year and do not provide good cover. Because they damage young trees, rabbits should be kept out of orchards. Corn and grain crops furnish some food for quail and dove, but seeds of wild plants are scarce because farming is intensive. Orchards are frequently sprayed with chemicals and are not a suitable habitat. In rocky areas and sinkholes, weeds generally furnish good food and cover for wildlife. Woodlots in the area are small and commonly grazed, but they contain mature or overly mature oaks that provide food and cover for gray and fox squirrels.

TABLE 8.—*Plot data and site indexes for upland oaks on Berks soils*

Soil type and plot number	Slope	Position on slope	Aspect (bearing)	Number of trees	Average age of trees	Average height of trees	Site index [1]
Berks channery silt loam:	*Percent*				*Years*	*Feet*	
Plot 1	36	Lower	S. 85° W.	7	60	76	68
Plot 2	21	Middle	N. 5° E.	7	60	78	70
Plot 3	12	Middle	N. 3° E.	10	61	78	70
Berks shaly silt loam:							
Plot 4	13	Middle	N. 35° E.	9	35	62	78
Plot 5	16	Middle	S. 10° W.	6	50	57	57
Plot 6	14	Middle	S. 32° W.	7	53	67	64
Plot 7	22	Middle	N. 50° E.	7	49	73	74
Plot 8	6	Upper	S. 70° E.	5	49	69	70

[1] Site indexes from USDA TECHNICAL BULLETIN 560 (*11*).

Few conifers grow in this area, but redcedar is scattered in some eroded pastures. Swampy areas along Rockymarsh Run, the Potomac River, and other streams furnish resting and feeding places for migratory wildfowl. Although the soils generally are not well suited to impoundments, small ponds for fish and fowl have been built successfully. Mill Creek and other small streams contain pan fish and are stocked with trout. Bass, bluegill, and catfish live in the Potomac River, which forms the northern boundary of the habitat area. A few strong-flowing limestone springs occur throughout the area.

WILDLIFE HABITAT AREA 2

This area consists of soil associations 2, 3, and 6 in the limestone valley in the central and eastern parts of Berkeley County. It is in two belts that cross the county in a northeast-southwest direction. One belt is just east of North Mountain, and the other is just east of U.S. Highway No. 11. The total area makes up about 25 percent of the county.

This habitat area is underlain mainly by soft acid shale but partly by limestone. Most of the acreage is made up of the shallow, droughty Berks and Montevallo soils. In the shale sections there are small areas of the somewhat poorly drained Blairton soils, and near North Mountain are areas of the somewhat poorly drained Sees soils, which are over limestone. The fine-textured, shallow and moderately deep Chilhowie and Carbo soils occur in narrow strips east of U.S. Highway No. 11. All of these soils are generally smooth and gently to strongly sloping. Erosion has been severe on much of the acreage, especially on the Montevallo and Berks soils. The general elevation ranges between 500 and 600 feet.

This habitat area is almost all in farms, but yields of crops and orchard fruits are not high. About one-third of the area is wooded. Although many of the farms are general, some that have highly productive limestone soils specialize in dairying and the raising of sheep and beef cattle. On these soils small grain and corn are grown, generally in a 4-year rotation with hay crops. Pasture is extensive, especially on the limestone soils. The shale soils are not well suited to bluegrass pasture, and many severely eroded areas of these soils have grown up in hardwoods and Viriginia pine. Limestone companies have bought many farms along U.S. Highway No. 11 and have then leased them to their former owners, who use them mainly for pasture.

Wildlife species common in the area are bobwhite quail, mourning dove, cottontail rabbit, gray and fox squirrels, and some grouse, woodchuck, and fox. In addition, there are a few deer. Corn and grain crops furnish food in limited quantities for quail and dove. Meadows are not extensive, but they furnish good food for rabbits. In many places the limestone soils are rocky, and pasture is difficult to mow. Consequently, pasture on rocky soils provides fair to good food and cover for rabbits. In many brushy areas, pines and hardwoods furnish good cover for rabbits and other wildlife. Fairly good cover and food for squirrels are supplied by the small woodlots that occupy the smooth parts of the area and by the large wooded tracts that are on the steep shale soils or on the wet soils at the foot of North Mountain.

Most soils in the area have a pervious subsoil and are not well suited to ponds, but shallow ponds can be built successfully on the Blairton and Sees soils. In places where limestone was quarried, there are many narrow, long, very deep holes full of water that furnish a little fishing but are used by migratory wildfowl. Opequon Creek and many small streams that drain the area provide fishing for bluegill and bass and good sites for camping and picnicking. Migratory fowl feed and rest on Opequon Creek and small ponds.

WILDLIFE HABITAT AREA 3

This area consists of soil associations 8, 9, 10, 11, and the part of soil association 7 that is on North Mountain. Almost all the area is on uplands, bottom lands, and terraces in the basin drained by Back Creek in the western part of the county. The acreage is more than half wooded and accounts for about 30 percent of the county.

The Berks and Dekalb soils occupy most of the moderately steep and steep uplands and generally are shallow or moderately deep. These soils are droughty, are low in productivity, and are underlain by acid shale and sandstone. A large part of their acreage is wooded. The Montevallo soils are common on the gently sloping uplands in Back Creek valley. Much of their acreage has been cleared and is severely eroded and very droughty. Extensive along Back Creek are the Philo, Atkins, and other soils on bottom lands and the Monongahela and other soils on terraces. These soils are mostly in crops or pasture. North of Jones Springs is a small area of shallow to deep, productive limestone soils that are suitable for farming and orcharding. A belt of reddish Lehew soils that occurs on the foothills of Third Hill Mountain also is used for orchards, but many of the orchards have been abandoned because the soils are eroded. The rest of this habitat area is in general farms on which some beef and dairy cattle are raised. The elevation ranges from about 450 feet along Back Creek to about 1,800 feet on North Mountain.

Cottontail rabbit, gray and red squirrels, grouse, deer, quail, and a few wild turkey are common in the habitat area, and there are raccoon, woodchuck, and red fox. In fields used for crops and pasture, food and cover generally are available but not abundant. Because most of the open areas are surrounded by woodland, wildlife can travel freely between food in the open areas and cover in the woods.

The woodland consists mostly of mixed hardwoods, but many small, eroded areas are covered by dense stands of Virginia pine. Timber has been cut heavily for pulpwood. The cutting improves browse for deer, but it reduces the supply of nuts and seeds for squirrel and wild turkey.

Back Creek and its small tributaries furnish good fishing for bass and bluegill, and Tilhance Creek furnishes some trout fishing. The area has many small farm ponds. Some of the soils in this area are suitable for impoundments, but many are not. The suitability and limitations of the soils for impoundments are shown in the table in this subsection and in the subsection "Suburban and Recreational Uses of Soils" beginning on

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p. 66. Migratory waterfowl occasionally rest and feed along Back Creek.

WILDLIFE HABITAT AREA 4

This area consists of the part of soil association 7 that occurs on Third Hill Mountain and Sleepy Creek Mountain in the extreme western part of the county. It makes up about 10 percent of the county and is almost all wooded.

The moderately deep, loamy or sandy Dekalb soils occupy most of the side slopes in the area, and the deep, loamy Laidig and Buchanan soils occur on the more gentle colluvial foot slopes. Most of the habitat area is steep or very steep; much of it is stony; and small cliffs occur on mountaintops. The elevation ranges from about 900 feet at Meadow Branch to about 1,700 feet on Sleepy Creek Mountain and Third Hill Mountain. Meadow Branch drains most of the area, and Little Brush Creek drains the rest.

This habitat area is mountainous and somewhat isolated. No towns have been built, and roads are scarce. The eastern edge of the area is next to general farms and orchards, and the western edge adjoins continuous forest. The woodland consists mainly of oaks and other hardwoods, but there are scattered pitch, white, and Virginia pines.

Among the common wildlife species in the area are gray and fox squirrels, ruffed grouse, white-tailed deer, wild turkey, raccoon, and fox. The West Virginia Department of Natural Resoures owns most of the area and operates it for public hunting. The Department has initiated an extensive, long-range program for managing game and fish. The program consists of properly managing timber, establishing food plots, making census counts, building access roads, impounding water, and making other improvements. Although fires were common in the area for many years, their number has been sharply reduced. Sleepy Creek Lake, which covers about 203 acres on Meadow Branch, was completed in 1962 and provides warm-water fishing. Little Brush Creek affords some trout fishing.

Habitat elements and kinds of wildlife

Table 9 lists the soils in the county and rates their suitability for eight elements of wildlife habitat and for three groups, or kinds, of wildlife. In addition, the elements of wildlife habitat are discussed in the following paragraphs.

HABITAT ELEMENTS

Each soil is rated in table 9 according to its suitability for various kinds of plants and other elements that make up wildlife habitats. The ratings are 1, 2, 3, and 4, each number indicating relative suitability for the various elements. A rating of 1 denotes well suited; 2 denotes suited; 3, poorly suited; and 4, not suited. Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife.

Grain and seed crops.—The soils are rated according to their suitability for corn, wheat, sorghum, buckwheat, millet, and other annual herbaceous plants. Soils that are well suited can be planted to the named crops each year without rotating them with sod crops. Those that are suited can be used for grain and seed crops for 1 year if they are followed by sod crops for 2 years. The soils rated poorly suited should be kept in sod crops more than two-thirds of the time, and those rated not suited should not be used for grain and seed crops.

Grasses and legumes.—The soils are rated according to their suitability for fescue, bluegrass, orchardgrass, tall oatgrass, reed canarygrass, clover, alfalfa, and other perennial grasses and herbaceous legumes. Korean lespedeza, which reseeds itself, can be planted in some places. On soils that are rated well suited, an adequate stand of many of the plants can be maintained for about 10 years without renovating or fertilizing the soils. The soils that have a rating of suited can also be used for many of these grasses and legumes for a period of 10 years, but the stands need renovating, liming, and fertilizing. Poorly suited soils can be used for only one or two kinds of plants that retain their natural vigor without renovation, liming, or fertilizing. The soils rated not suited produce only sparse stands of a few plants, and on these soils renovation, liming, and fertilization are impossible or impractical.

Wild herbaceous plants on uplands.—The soils are rated according to their suitability for bluestem, indiangrass, wildrye, oatgrass, pokeweed, lespedeza, beggarweed, ragweed, strawberries, goldenrod, and dandelion. These perennial grasses and weeds are established mainly through natural processes and provide food and cover mainly for wildlife on uplands. On soils that are rated well suited, many kinds of these uncultivated plants establish themselves well and grow vigorously. Only a few plants grow vigorously on the soils that have a rating of suited. Soils that have a rating of poorly suited produce only a few kinds of plants, and even these grow poorly. Soils rated unsuited maintain such poor growth that stands of grasses and weeds have little value for wildlife.

Hardwood plants.—The soils are rated according to their suitability for nonconiferous trees, shrubs, and woody vines that produce nuts and other fruits, buds, catkins, foliage, or twigs that wildlife eat. Among these plants are oak, beech, cherry, hickory, poplar, walnut, and other trees and wild grape, honeysuckle, and greenbrier. Although hardwood plants normally establish themselves naturally in this county, they can also be planted. The soils that are rated well suited produce vigorous growth of many kinds of hardwoods, and those that are suited produce fair to good growth. On soils that are poorly suited, only low yields of a few kinds of wildlife food are produced. On soils that are rated not suited, few or no woody plants grow well enough to furnish wildlife food.

Coniferous plants.—The soils are rated according to their suitability for cone-bearing trees and shrubs—for example, Virginia pine, white pine, pitch pine, redcedar, and hemlock. These plants are important to wildlife primarily as cover, but they also furnish browse or seeds. If the trees quickly form a dense canopy that cuts out the light, the abundance of food is limited. Normally, conifers establish themselves naturally in this county, but they also can be planted. The soils that are well suited produce a limited number of adapted plants that grow slowly and delay closing the canopy. On soils that are suited, a limited number of plants make slow or moderate growth. All locally adapted conifers grow on the soils that are rated poorly suited, but they grow rapidly and quickly close the canopy. Soils rated not suited support few or no conifers that produce wildlife food and cover.

TABLE 9.—*Suitability of soils for elements of wildlife habitats and for kinds of wildlife*

[Ratings 1, 2, 3, and 4 are explained in the text; not rated are Sloping eroded land, shale materials (ShD); Steep eroded land, shale materials (ShE); and Steep rock land (SrF)]

Symbol	Soil	Wildlife habitat elements								Kinds of wildlife		
		Grain and seed crops	Grasses and legumes	Wild herbaceous plants on uplands	Hardwood plants	Coniferous plants	Wetland food and cover plants	Shallow water developments	Impoundments	Openland wildlife	Woodland wildlife	Wetland wildlife
Aa	Alluvial land, neutral or slightly acid	3	2	2	2	3	2	2	3	2	1	1
Ab	Alluvial land, strongly acid	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	2–3	2–3	3–4
Am	Alluvial land, marl substratum	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	2–3	2–3	3–4
At	Atkins silt loam	3	2	2	1	3	2	3	3	2	1	1
BcB	Berks channery silt loam, 3 to 10 percent slopes	2	2	2	2	2	4	4	3	2	2	4
BcC	Berks channery silt loam, 10 to 20 percent slopes	3	2	2	2	2	4	4	4	2	2	4
BcD	Berks channery silt loam, 20 to 30 percent slopes	4	3	2	2	2	4	4	4	3	2	4
BhB	Berks shaly silt loam, 3 to 8 percent slopes	3	3	2	2	2	4	4	3	3	2	4
BhC	Berks shaly silt loam, 8 to 15 percent slopes	3	3	2	2	1	4	4	4	3	2	4
BhD	Berks shaly silt loam, 15 to 25 percent slopes	4	4	2	3	1	4	4	4	4	2	4
BkB	Berks-Lehew channery loams, 3 to 10 percent slopes	2	2	2	2	2	4	4	4	3	2	4
BkC	Berks-Lehew channery loams, 10 to 20 percent slopes	3	2	2	2	2	4	4	4	3	2	4
BkD	Berks-Lehew channery loams, 20 to 30 percent slopes	4	3	2	2	1	4	4	4	3–4	2	4
BmB3	Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded	3	3	2	2	1	4	4	4	3	2	4
BmC3	Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded	4	3	2	2	1	4	4	4	3	2	4
BmD3	Berks-Montevallo shaly silt loams, 15 to 25 percent slopes, severely eroded	4	4	2	2	1	4	4	4	3–4	2	4
BnA	Blairton silt loam, 0 to 3 percent slopes	3	3	2	1	2	1	2	2	3	2	2
BnB	Blairton silt loam, 3 to 8 percent slopes	3	3	2	1	2	3	4	2	3	2	4
BtA	Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes	3	3	2	1	2	1	2	2	3	2	2
BtB	Blairton shaly silt loam, thin solum variant, 3 to 8 percent slopes	3	3	2	1	2	3	4	2	3	2	4
BuB	Buchanan gravelly loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	2	1	1	4
BuC	Buchanan gravelly loam, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
BvC	Buchanan very stony loam, 3 to 15 percent slopes	4	3	1	1	3	4	4	2–4	3	1	4
CaB	Captina silt loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	2	1	1	4
EaC3	Carbo clay, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
EbB	Carbo silty clay loam, 2 to 8 percent slopes	2	1	1	1	3	4	4	3–4	1	1	4
EcC3	Chilhowie clay, 8 to 15 percent slopes, severely eroded	4	3	1	1	3	4	4	4	2	1	4
EdB	Chilhowie silty clay, 2 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
EdC	Chilhowie silty clay, 8 to 15 percent slopes	3	2	1	1	3	4	4	4	2	1	4
EkC3	Chilhowie very rocky clay, 8 to 15 percent slopes, severely eroded	4	3	1	1	3	4	4	4	3	1	4
EkD3	Chilhowie very rocky clay, 15 to 25 percent slopes, severely eroded	4	4	2	2	2	4	4	4	4	2	4
EnB	Chilhowie very rocky silty clay, 3 to 8 percent slopes	3	3	2	1	2	4	4	4	3	2	4
EnC	Chilhowie very rocky silty clay, 8 to 15 percent slopes	4	3	2	1	2	4	4	4	3	2	4
CnB	Corydon silt loam, 3 to 8 percent slopes	2	1	1	1	4	4	4	4	1	1	4
CnC	Corydon silt loam, 8 to 20 percent slopes	3	2	1	1	4	4	4	4	2	1	4
CoC3	Corydon silty clay, 8 to 15 percent slopes, severely eroded	3	2	1	1	4	4	4	4	2	1	4
CoD3	Corydon silty clay, 15 to 25 percent slopes, severely eroded	4	3	1	1	3	4	4	4	3	1	4
DaC	Dekalb channery loam, 5 to 15 percent slopes	2	2	2	2	2	4	4	4	2	2	4
DaD	Dekalb channery loam, 15 to 25 percent slopes	3	2	2	2	2	4	4	4	2	2	4

[1] Variable.

TABLE 9.—*Suitability of soils for elements of wildlife habitats and for kinds of wildlife*—Continued

Symbol	Soil	Wildlife habitat elements								Kinds of wildlife		
		Grain and seed crops	Grasses and legumes	Wild herbaceous plants on uplands	Hardwood plants	Coniferous plants	Wetland food and cover plants	Shallow water developments	Impoundments	Openland wildlife	Woodland wildlife	Wetland wildlife
DaE	Dekalb channery loam, 25 to 45 percent slopes	4	3	2	2	2	4	4	4	3	2	4
DbD	Dekalb very stony loam, 0 to 25 percent slopes	4	3	2	2	2	4	4	4	3	2	4
DbE	Dekalb very stony loam, 25 to 45 percent slopes	4	4	2	2	2	4	4	4	3	2	4
DbF	Dekalb very stony loam, 45 to 70 percent slopes	4	4	2	2	2	4	4	4	3	2	4
DfB	Duffield gravelly silt loam, 3 to 8 percent slopes	2	2	1	1	3	4	4	4	1	1	4
DfC3	Duffield gravelly silt loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
DgB	Duffield silt loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
DgC	Duffield silt loam, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
DgC3	Duffield silt loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
DgD3	Duffield silt loam, 15 to 25 percent slopes, severely eroded	4	3	2	2	2	4	4	4	3	2	4
FbB	Frankstown shaly silt loam, 3 to 8 percent slopes	2	1	1	1	1	4	4	4	1	1	4
FbC	Frankstown shaly silt loam, 8 to 15 percent slopes	2	1	1	1	1	4	4	4	1	1	4
FbC3	Frankstown shaly silt loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
FbD	Frankstown shaly silt loam, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	1	4
FbD3	Frankstown shaly silt loam, 15 to 25 percent slopes, severely eroded	4	3	2	2	2	4	4	4	3	2	4
FcC	Frankstown very rocky silt loam, 8 to 15 percent slopes	3	3	2	1	2	4	4	4	3	2	4
FdB	Frederick silt loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
FdC	Frederick silt loam, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
FdC3	Frederick silt loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
FfB	Frederick cherty silt loam, 3 to 8 percent slopes	2	1	1	1	1	4	4	4	1	1	4
FfC	Frederick cherty silt loam, 8 to 15 percent slopes	2	1	1	1	1	4	4	4	1	1	4
FfC3	Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
FfD	Frederick cherty silt loam, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	1	4
FfD3	Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded	4	3	2	2	2	4	4	4	3	2	4
FgB	Frederick gravelly loam, thick surface, 3 to 8 percent slopes	2	1	1	1	1	4	4	4	1	1	4
FgC	Frederick gravelly loam, thick surface, 8 to 15 percent slopes	2	1	1	1	1	4	4	4	1	1	4
FgC3	Frederick gravelly loam, thick surface, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
FgD	Frederick gravelly loam, thick surface, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	1	4
FgD3	Frederick gravelly loam, thick surface, 15 to 25 percent slopes, severely eroded	4	3	2	2	2	4	4	4	3	2	4
FkC	Frederick very rocky silt loam, 3 to 15 percent slopes	3	3	2	1	2	4	4	4	3	2	4
FsC	Frederick very stony loam, thick surface, 8 to 15 percent slopes	3	3	1	1	3	4	4	4	3	1	4
FsD	Frederick very stony loam, thick surface, 15 to 25 percent slopes	3	3	1	1	3	4	4	4	3	2	4
FsE	Frederick very stony loam, thick surface, 25 to 45 percent slopes	4	3	2	1	2	4	4	4	3	2	4
GpA	Gilpin silt loam, soft shale substratum, 0 to 3 percent slopes	1	1	1	1	3	4	3–4	3–4	1	1	4
GpB	Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4

TABLE 9.—*Suitability of soils for elements of wildlife habitats and for kinds of wildlife*—Continued

Symbol	Soil	Wildlife habitat elements								Kinds of wildlife		
		Grain and seed crops	Grasses and legumes	Wild herbaceous plants on uplands	Hardwood plants	Coniferous plants	Wetland food and cover plants	Shallow water developments	Impoundments	Openland wildlife	Woodland wildlife	Wetland wildlife
GpC	Gilpin silt loam, soft shale substratum, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
HaB	Hagerstown gravelly silt loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
HaC3	Hagerstown gravelly silt loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
HbA	Hagerstown silt loam, 0 to 3 percent slopes	1	1	1	1	3	4	4	4	1	1	4
HbB	Hagerstown silt loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
HcB	Hagerstown silty clay loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
HcC	Hagerstown silty clay loam, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
HcC3	Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
HcD3	Hagerstown silty clay loam, 15 to 25 percent slopes, severely eroded	4	3	2	2	2	4	4	4	3	2	4
HgB	Hagerstown very rocky silt loam, 3 to 8 percent slopes	3	3	2	1	2	4	4	4	3	1	4
HgC	Hagerstown very rocky silt loam, 8 to 15 percent slopes	3	3	2	1	2	4	4	4	3	1	4
HgD	Hagerstown very rocky silt loam, 15 to 25 percent slopes	3	3	2	1	2	4	4	4	3	1	4
HgF	Hagerstown very rocky silt loam, 25 to 50 percent slopes	4	4	2	2	3	4	4	4	4	2	4
HkC3	Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded	3	3	2	1	2	4	4	4	3	1	4
HkD3	Hagerstown very rocky silty clay loam, 15 to 25 percent slopes, severely eroded	4	4	2	2	3	4	4	4	3	1	4
Hm	Huntington fine sandy loam	2	1	1	1	3	4	4	4	1	1	4
Hn	Huntington silt loam	2	1	1	1	3	4	4	3–4	1	1	4
Ho	Huntington silt loam, local alluvium	1	1	1	1	3	4	3–4	3–4	1	1	4
LaB	Laidig gravelly loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
LaC	Laidig gravelly loam, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
LaC3	Laidig gravelly loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
LaD	Laidig gravelly loam, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	1	4
LbC	Laidig very stony loam, 3 to 15 percent slopes	4	3	1	1	2	4	4	4	3	1	4
LbD	Laidig very stony loam, 15 to 25 percent slopes	4	4	1	1	2	4	4	4	3	1	4
LbE	Laidig very stony loam, 25 to 45 percent slopes	4	4	1	1	2	4	4	4	3	1	4
LdB	Leadvale silt loam, 3 to 8 percent slopes	2	1	1	1	3	3	4	2–3	1	1	4
LdC	Leadvale silt loam, 8 to 15 percent slopes	2	1	1	1	3	3	4	3	1	1	4
LdC3	Leadvale silt loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	3	4	3	2	1	4
LhB	Lehew channery loam, 3 to 10 percent slopes	2	2	2	2	2	4	4	4	2	2	4
LhC	Lehew channery loam, 10 to 20 percent slopes	2	2	2	2	2	4	4	4	2	2	4
LhC3	Lehew channery loam, 10 to 20 percent slopes, severely eroded	3	2	2	2	2	4	4	4	2	2	4
LhD	Lehew channery loam, 20 to 30 percent slopes	3	2	2	2	2	4	4	4	2	2	4
LhD3	Lehew channery loam, 20 to 30 percent slopes, severely eroded	4	3	2	2	2	4	4	4	3	2	4
LhE	Lehew channery loam, 30 to 45 percent slopes	4	4	2	2	2	4	4	4	3	2	4
Ln	Lindside silt loam	2	1	1	1	3	3	3	2–3	1	1	3
LoB	Lindside silt loam, local alluvium, 0 to 3 percent slopes	2	1	1	1	3	3	2–3	1–2	1	1	3
LoC	Lindside silt loam, local alluvium, 3 to 8 percent slopes	2	1	1	1	3	4	4	3–4	1	1	4
Ma	Melvin silt loam	3	2	1	1	3	3	2–3	1–2	2	1	3
MgB	Monongahela gravelly silt loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	3	1	1	4
MhA	Monongahela silt loam, 0 to 3 percent slopes	2	1	1	1	3	3	2–3	2–3	1	1	3
MhB	Monongahela silt loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	3	1	1	4

TABLE 9.—*Suitability of soils for elements of wildlife habitats and for kinds of wildlife*—Continued

Symbol	Soil	Wildlife habitat elements								Kinds of wildlife		
		Grain and seed crops	Grasses and legumes	Wild herbaceous plants on uplands	Hardwood plants	Coniferous plants	Wetland food and cover plants	Shallow water developments	Impoundments	Openland wildlife	Woodland wildlife	Wetland wildlife
MhC3	Monongahela silt loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
MkC3	Montevallo channery silt loam, 10 to 20 percent slopes, severely eroded	3	2	2	2	2	4	4	4	2	2	4
MkD3	Montevallo channery silt loam, 20 to 30 percent slopes, severely eroded	3	3	2	2	2	4	4	4	2	2	4
MkE	Montevallo channery silt loam, 30 to 50 percent slopes	4	4	2	2	2	4	4	4	3	2	4
MmB	Montevallo shaly silt loam, 3 to 10 percent slopes	3	3	2	2	2	4	4	4	3	2	4
MmB3	Montevallo shaly silt loam, 3 to 10 percent slopes, severely eroded	3	3	2	2	2	4	4	4	3	2	4
MmC	Montevallo shaly silt loam, 10 to 20 percent slopes	3	3	2	2	2	4	4	4	3	2	4
MmC3	Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded	4	4	2	2	1	4	4	4	3	2	4
MmD	Montevallo shaly silt loam, 20 to 30 percent slopes	4	4	2	2	1	4	4	4	4	3	4
MmD3	Montevallo shaly silt loam, 20 to 30 percent slopes, severely eroded	4	4	3	3	1	4	4	4	4	2	4
MmE	Montevallo shaly silt loam, 30 to 50 percent slopes	4	4	2	2	1	4	4	4	3	2	4
MmE3	Montevallo shaly silt loam, 30 to 50 percent slopes, severely eroded	4	4	3	3	1	4	4	4	4	3	4
MnC3	Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded	3	2	2	2	2	4	4	4	2	2	4
MnD3	Montevallo-Lehew channery loams, 20 to 30 percent slopes, severely eroded	3	3	2	2	2	4	4	4	2	2	4
MnE	Montevallo-Lehew channery loams, 30 to 45 percent slopes	4	4	2	2	2	4	4	4	3	2	4
MrA	Murrill gravelly silt loam, moderately deep, 0 to 3 percent slopes	1	1	1	1	3	4	4	4	1	1	4
MrB	Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
MsB	Murrill gravelly loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
MsC	Murrill gravelly loam, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
MsC3	Murrill gravelly loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
MsD	Murrill gravelly loam, 15 to 25 percent slopes	3	2	1	1	3	4	4	4	2	1	4
MuA	Murrill silt loam, 0 to 3 percent slopes	1	1	1	1	3	4	4	4	1	1	4
MvE	Murrill very stony silt loam, 20 to 40 percent slopes	4	4	1	1	2	4	4	4	3	1	4
Pf	Philo fine sandy loam	2	1	1	1	3	3	4	4	1	1	4
Ph	Philo silt loam	2	1	1	1	3	4	3	3	1	1	3
PkA	Pickaway silt loam, overwash, 0 to 3 percent slopes	2	1	1	1	3	3	3–4	3–4	1	1	4
PmB	Pickaway silt loam, 3 to 8 percent slopes	2	1	1	1	3	3	4	4	1	1	4
Pn	Pope fine sandy loam	2	1	1	1	3	4	4	4	1	1	4
Po	Pope silt loam	2	1	1	1	3	3	3	3–4	1	1	4
RuB	Rushtown very shaly silt loam, 3 to 8 percent slopes	3	3	2	2	2	4	4	4	3	2	4
SaA	Sees silt loam, 0 to 3 percent slopes	3	2	1	1	3	3	2–3	2–3	2	1	3
SaB	Sees silt loam, 3 to 8 percent slopes	3	2	1	1	3	4	4	3	2	1	4
ScB3	Sees silty clay loam, 3 to 8 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4
TyA	Tygart silt loam, 0 to 3 percent slopes	3	2	1	1	2	2	1	1	2	1	1
TyB	Tygart silt loam, 3 to 8 percent slopes	3	2	1	1	2	4	4	2	2	1	4
WaB	Waynesboro gravelly loam, 3 to 8 percent slopes	2	1	1	1	3	4	4	4	1	1	4
WaC	Waynesboro gravelly loam, 8 to 15 percent slopes	2	1	1	1	3	4	4	4	1	1	4
WaC3	Waynesboro gravelly loam, 8 to 15 percent slopes, severely eroded	3	2	1	1	3	4	4	4	2	1	4

Wetland plants grown for food and cover.—The soils are rated according to their suitability for smartweed, wild millet, rushes, sedges, reeds, wildrice, switchgrass, and cattails. These herbaceous plants grow extensively on moist to wet sites and provide food and cover mainly for wetland forms of wildlife. Soils that are rated well suited produce many kinds of these plants, particularly the annuals, and soils with a rating of suited produce many kinds of perennials. On soils rated poorly suited, stands of a few perennials grow vigorously but normally produce food of little value for wildlife. The growth of wetland plants is so poor on the unsuited soils that not enough food and cover is furnished for wildlife.

Shallow-water developments.—The soils are rated according to their suitability for building or digging low dikes, shallow dugouts, level ditches, and devices that control the water level in marshy streams. Water in developments that are made for migratory birds or muskrats should not exceed 5 feet in depth. Soils that are rated well suited have few or no limitations that interfere with the construction of shallow-water areas and the control of the water at a desired level. Those soils that are suited have moderate limitations, and those that are poorly suited have severe limitations. Soils that are not suited have features that make the use of shallow-water developments impossible or impractical.

Impoundments.—The soils are rated according to their suitability for dug-out water areas, impoundments behind low dikes, or a combination of these, in which the water is at a depth suitable for the production of fish or wildlife. For example, a pond with a surface area of ½ acre or more should have more than one-fourth of the area covered by water 6 feet deep. Soils that are rated well suited are nearly level, occur in suitable locations, and have properties that facilitate construction of impoundments. Soils having a rating of suited are not steeper than gently sloping, and they occur in locations or have properties that make construction somewhat difficult. Soils rated poorly suited are not steeper than strongly sloping; their water-holding qualities may be undependable; and their location or properties make the construction of impoundments difficult. Impoundments are impractical on soils that are rated not suited, because the soils are too steep, or they occur in locations or have properties that are unsuitable for impoundments.

Sites for impounding water in Berkeley County commonly occur in small drainageways. In some of these drainageways the soils are deeper and more favorable for impoundments than the soils shown on the map, but the areas are too narrow to be shown separately and are included in areas mapped as other soils. For this reason, it is important that a field investigation be made to determine the characteristics of the soil at a site considered for an impoundment.

KINDS OF WILDLIFE

Table 9 rates the soils according to their suitability for three kinds of wildlife in the county—openland, woodland, and wetland wildlife.

Openland wildlife.—Examples of openland wildlife are bobwhite quail, mourning dove, cottontail rabbit, and woodchuck. These birds and mammals normally frequent cropland, pasture, meadow, fence rows between fields, and areas overgrown with grasses and shrubs.

Woodland wildlife.—Among the birds and mammals that prefer woodland are ruffed grouse, wild turkey, whitetailed deer, gray squirrel, fox squirrel, raccoon, and red fox. They obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants.

Wetland wildlife.—This kind of wildlife consists of various species of duck and of water-loving animals such as muskrat, mink, and beaver. Ponds, swamps, water-filled quarry holes, and other wet areas furnish suitable habitat for these birds and mammals.

A rating of 1 in table 9 indicates well suited; 2 indicates suited; 3, poorly suited; and 4, not suited. Soils that are well suited have few limitations, those that are suited have moderate limitations, and those that are poorly suited have severe limitations. A rating of not suited denotes soils that have little or no potential for wildlife.

Each rating is based on the ratings listed for the elements of habitat shown in the first part of the table. All elements are considered, but their importance varies from one kind of wildlife to the next. For example, the rating for openland wildlife is based largely on the ratings shown for grain and seed crops and for grasses and legumes, but the ratings for wild herbaceous plants on uplands, for hardwood and coniferous plants, and for other elements also are considered. In determining the suitability rating for woodland wildlife, extra weight is given to ratings for wild herbaceous plants and for hardwood and coniferous trees and shrubs. Because wetland wildlife must have wet or swampy areas, the rating for this kind of wildlife is based principally on the ratings listed for wetland food and cover plants, for shallow water developments, and for impoundments.

Use of Soils in Engineering [4]

This subsection gives the engineering characteristics of the soils of Berkeley County and points out the principal features that are likely to influence engineering practices. It is provided to help interpret for engineering uses the soil survey information contained in this report.

Information in this report can be used to—

(1) Make soil and land use studies that will aid in selecting and developing industrial, business, suburban, and recreational sites.
(2) Make preliminary estimates of the engineering properties of soils that are significant in planning agricultural drainage and irrigation systems, farm ponds, and terraces.
(3) Make preliminary evaluations of soil and site conditions that will aid in selecting locations for highways, airports, pipelines, and cables.
(4) Locate probable sources of materials for road and highway construction.
(5) Correlate performance of engineering structures with soils and thus gain information that will be useful in designing and maintaining the structures.

[4] ARTHUR B. HOLLAND, assistant State conservation engineer, and HAROLD M. RHODES, State conservation engineer, Soil Conservation Service, assisted in preparing this subsection.

(6) Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
(7) Supplement information obtained from other published maps and reports and from aerial photographs for the purpose of making maps and reports that can be readily used by engineers.
(8) Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the use of the soil map for identification, the engineering interpretations in this subsection can be useful for many purposes. It should be emphasized that they may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

At construction sites, major soil variations may occur within the depth of proposed excavation, and several soils may be encountered within a small area. The soil map and profile descriptions, as well as the engineering descriptions given in this subsection, should be used in planning detailed surveys of soils at construction sites. The soil survey information in this report will enable the soils engineer to concentrate on the most significant soils. A minimum number of soil samples will then be required for laboratory testing, and an adequate investigation can be made at least expense.

It is important to note that the limestone underlying the eastern two-thirds of the county is strongly folded, and many strata dip at a steep angle or lie nearly vertical. As a result, there are long narrow outcrops, or

TABLE 10.—*Brief description and estimated engineering*

[Dashes indicate information is not available

Map symbol	Soil	Depth to seasonally high water table	Depth to and kind of bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet			*Inches*
Aa Ab Am	Alluvial land, neutral or slightly acid. Alluvial land, strongly acid. Alluvial land, marl substratum.	0–1	3 feet or more to variable bedrock or marl.	Variable; mixed silt, sand, clay, and gravel; on bottom lands; subject to occasional to frequent flooding.	0–36
At	Atkins silt loam.	0–1	6 feet or more to shale and sandstone.	About 1 foot of silt loam, over 3 feet of silty clay loam, underlain by interbedded sand, clay, and gravel; on bottom lands; poorly drained and subject to overflow.	0–11 11–48+
BcB BcC BcD	Berks channery silt loam, 3 to 10 percent slopes. Berks channery silt loam, 10 to 20 percent slopes. Berks channery silt loam, 20 to 30 percent slopes.	(1)	1½ to 2 feet to folded shale, siltstone, and thin sandstone that can be ripped.	1½ to 2 feet of silt loam or silty clay loam; about 35 percent angular stone fragments 2 to 4 inches across that increase with depth; over strongly folded, thin-bedded shale, siltstone, and some sandstone; on sloping to steep foothills.	0–20
BhB BhC BhD	Berks shaly silt loam, 3 to 8 percent slopes. Berks shaly silt loam, 8 to 15 percent slopes. Berks shaly silt loam, 15 to 25 percent slopes.	(1)	1 to 2 feet to folded, soft, silty shale.	About ½ foot of shaly silt loam over 1 to 1½ feet of shaly silty clay loam or shaly silt loam; 35 to 75 percent soft shale fragments 1 to 3 inches across; over strongly folded, soft silty shale; on rolling shale belts in limestone valley.	0–7 7–21
BkB BkC BkD	Berks-Lehew channery loams, 3 to 10 percent slopes. Berks-Lehew channery loams, 10 to 20 percent slopes. Berks-Lehew channery loams, 20 to 30 percent slopes.	(1)	Variable.	Berks: see description of Berks channery silt loams. Lehew: see description of Lehew channery silt loams.	
BmB3 BmC3 BmD3	Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded. Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded. Berks-Montevallo shaly silt loams, 15 to 25 percent slopes, severely eroded.	(1)	Variable.	Berks: see description of Berks shaly silt loams. Montevallo: see description of Montevallo shaly silt loams.	

See footnote at end of table.

ledges, of limestone that generally lie in a southwest-northeast direction. Although the limestone crops out in many places, the soils nearby may be as deep as 3 to 10 feet. Thus, if pipelines, roads, and other engineering works can be laid out parallel to the ledges, the amount of blasting and rock removal may be materially reduced.

Some terms used by the agricultural soil scientist may be unfamiliar to the engineer, and some terms may have a special meaning in soil science. These terms are defined in the Glossary at the end of this report.

Physical properties

Table 10 gives the estimated soil properties most likely to affect engineering practices. These properties were evaluated on the basis of the data shown in table 12 (see p. 64), or on actual field experience.

Two engineering classifications are given in table 10, the Unified Classification System (*15*), and the system used by the American Association of State Highway Officials (*1*). The terms used to describe texture in the United States Department of Agriculture classification are defined in the Glossary.

In the Unified classification, the soils are grouped on the basis of their texture and plasticity and their performance as material for engineering structures. In this system, two letters are used to designate each of 15 possible classes. The letters G, S, C, M, and O stand for gravel, sand, clay, silt, and organic soils, respectively, and W, P, L, and H refer to well graded, poorly graded, low liquid limit, and high liquid limit, respectively. In this system, SM and GM are sands and gravels that include fines of silt; ML and CL are silts and clays that have a liquid limit below 50; and MH and CH are silts and clays that have a liquid limit above 50. The letters O, W, and P are not used in table 10.

classification and physical properties of soils

for an estimate, or does not apply]

Classification			Percentage passing sieve—			Permeability	Available moisture capacity	Shrink-swell potential
USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
Variable; mainly silt loam and sandy loam.	Variable; mainly ML and SM.	Variable; mainly A-4.	Highly variable.	Variable	Highly variable.	Variable; 0.2–6.3.	Variable	Low or moderate.
Silt loam	ML	A-4	90–100	90–100	70–90	0.63–2.0	0.18+	Low.
Silty clay loam	ML or CL	A-6	95–100	85–100	75–90	0.2–0.63	0.12–0.15	Moderate.
Silt loam or silty clay loam.	ML or CL	A-4 or A-6	70–85	70–80	50–75	2.0–6.3	0.15–0.18	Low.
Shaly silt loam	ML, GM-GC	A-4	50–75	45–65	40–60	6.3+	0.12–0.15	Low.
Shaly silty clay loam.	GM-GC	A-2-4	25–50	25–45	20–35	6.3+	0.08–0.12	Low.

TABLE 10.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to and kind of bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet			*Inches*
BnA	Blairton silt loam, 0 to 3 percent slopes.	0–1	1½ to 2½ feet to strongly folded, soft shale.	About 1 foot of silt loam, on about 1½ feet of silty clay loam or silty clay that is as much as 50 percent shale chips 1 to 2 inches across; underlain by folded, soft shale; somewhat poorly drained soils in depressional areas on shale belts in limestone valley.	0–9
BnB	Blairton silt loam, 3 to 8 percent slopes.				9–33
BtA	Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes.	0–1	1 to 2 feet to strongly folded, clayey shale.	About ½ foot of shaly silt loam, on 1 foot of shaly silty clay that is 35 to 70 percent soft shale chips 1 to 2 inches across; underlain by folded, hard shale; somewhat poorly drained soils in depressional areas on shale belts in limestone valley.	0–8
BtB	Blairton shaly silt loam, thin solum variant, 3 to 8 percent slopes.				8–17
BuB	Buchanan gravelly loam, 3 to 8 percent slopes.	1½–2	6 to 20 feet to sandstone or shale.	About 1½ feet of loam, over about 1½ to 2 feet of sandy clay loam, on 3 to 6 feet or more of dense, firm sandy clay loam; dense massive fragipan, several feet thick, at depth of about 2 feet; moderately well drained soils on lower slopes at base of mountains; 20 to 30 percent sandstone gravel; most areas stony; some seeps.	0–17
BuC	Buchanan gravelly loam, 8 to 15 percent slopes.				17–36
BvC	Buchanan very stony loam, 3 to 15 percent slopes.				36–50+
CaB	Captina silt loam, 3 to 8 percent slopes.	1½–2	3 to 10 feet to shale and limestone.	About 1 foot of silt loam, over about 3 feet of silty clay loam, underlain by folded shale or hard limestone; fragipan, 1 to 1½ feet thick, at depth of 1½ to 2 feet; moderately well drained soils on lime-influenced terraces above overflow.	0–13
					13–22
					22–49
EaC3	Carbo clay, 8 to 15 percent slopes, severely eroded.	(1)	2½ to 6 feet to irregular, hard limestone.	About 1 foot of silty clay loam, over 2 to 3 feet of plastic sticky clay, underlain by massive limestone with irregular surface; a few limestone outcrops; on smooth uplands in limestone valley.	0–8
EbB	Carbo silty clay loam, 2 to 8 percent slopes.				8–36
EcC3	Chilhowie clay, 8 to 15 percent slopes, severely eroded.	(1)	1½ to 2½ feet to hard limestone.	½ to 1 foot of silty clay or clay, over 1 to 1½ feet of plastic, sticky clay, underlain by limestone that is somewhat broken and blocky on top; very rocky soils have numerous outcrops of limestone; occupy mostly gentle slopes in limestone valley.	0–6
EdB	Chilhowie silty clay, 2 to 8 percent slopes.				6–25
EdC	Chilhowie silty clay, 8 to 15 percent slopes.				
EkC3	Chilhowie very rocky clay, 8 to 15 percent slopes, severely eroded.				
EkD3	Chilhowie very rocky clay, 15 to 25 percent slopes, severely eroded.				
EnB	Chilhowie very rocky silty clay, 3 to 8 percent slopes.				
EnC	Chilhowie very rocky silty clay, 8 to 15 percent slopes.				
CnB	Corydon silt loam, 3 to 8 percent slopes.	(1)	1½ to 2½ feet to irregular, slabby, hard limestone.	About ½ foot of silt loam, ranging to silty clay in severely eroded areas, over 1½ to 2½ feet of silty clay or clay, underlain by irregular hard limestone; a few outcrops of limestone; gently to strongly sloping; mostly in limestone section north from Jones Springs.	0–7
CnC	Corydon silt loam, 8 to 20 percent slopes.				7–24
CoC3	Corydon silty clay, 8 to 15 percent slopes, severely eroded.				
CoD3	Corydon silty clay, 15 to 25 percent slopes, severely eroded.				

See footnote at end of table.

classification and physical properties of soils—Continued

Classification			Percentage passing sieve—			Permeability	Available moisture capacity	Shrink-swell potential
USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
Silt loam	ML	A-4	85-95	75-85	70-80	2.0-6.3	0.15-0.18	Low.
Silty clay loam to silty clay.	ML-CL, SM	A-4 or A-7	50-70	45-65	40-65	0.2-0.63	0.08-0.12	Moderate.
Silt loam	ML	A-4	70-85	60-75	50-70	2.0-6.3	0.12-0.15	Low.
Silty clay loam to silty clay.	GC or ML-CL	A-2-4 or A-7	35-65	30-55	25-55	0.2-0.63	0.08-0.12	Moderate.
Loam	SM or ML	A-4	60-85	60-80	35-60	6.3+	0.15-0.18	Low.
Sandy clay loam	SM or ML	A-4	60-80	60-80	40-65	0.63-2.0	0.15-0.18	Low.
Sandy clay loam	GM or SM	A-2-4 or A-4	35-65	35-65	25-50	0.2-0.63	0.12-0.15	Low.
Silt loam	ML	A-4	95-100	95-100	70-80	2.0-6.3	0.15-01.8	Low.
Silty clay loam	CL	A-6	95-100	95-100	75-90	0.63-2.0	0.12-01.5	Moderate.
Silty clay loam	CL	A-6	95-100	95-100	75-90	0.2-0.63	0.08-01.2	Moderate.
Silty clay loam	MH-CH	A-7	95-100	95-100	80-90	0.63-2.0	0.15-0.15	High.
Silty clay or clay	MH-CH	A-7	85-95	85-95	80-90	0.2-0.63	0.08-0.12	High.
Silty clay	MH-CH	A-7-5	85-95	85-95	80-95	0.2-0.63	0.12-0.15	High.
Clay	MH-CH	A-7-5	70-85	70-85	70-85	0.2-0.63	0.08-0.12	High.
Silt loam	CL	A-6	85-95	85-95	80-85	2.0-6.3	0.18+	Moderate.
Silty clay to clay	CH	A-7	80-90	80-90	75-90	0.63-2.0	0.12-0.15	High.

TABLE 10.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to and kind of bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet			*Inches*
DaC	Dekalb channery loam, 5 to 15 percent slopes.	(1)	2 to 3 feet to hard, massive sandstone.	About ½ foot of loam, over 1½ to 2½ feet of fine sandy loam or loam, underlain by massive sandstone; numerous angular fragments of sandstone that increase in number with depth; mainly steep or very steep and very stony with many large stones on surface; on mountain slopes and ridges in western part of county.	0–7
DaD	Dekalb channery loam, 15 to 25 percent slopes.				7–17
DaE	Dekalb channery loam, 25 to 45 percent slopes.				17–31
DbD	Dekalb very stony loam, 0 to 25 percent slopes.				
DbE	Dekalb very stony loam, 25 to 45 percent slopes.				
DbF	Dekalb very stony loam, 45 to 70 percent slopes.				
DfB	Duffield gravelly silt loam, 3 to 8 percent slopes.	(1)	3½ to 8 feet to silty or hard limestone.	About 1 foot of silt loam, over 2 feet of silty clay loam, underlain by 1 to 2 feet of silty clay loam or silty clay, over limestone; 20 to 25 percent angular sandstone fragments in some places; on rolling uplands in limestone valley.	0–14
DfC3	Duffield gravelly silt loam, 8 to 15 percent slopes, severely eroded.				14–34
DgB	Duffield silt loam, 3 to 8 percent slopes.				34–46
DgC	Duffield silt loam, 8 to 15 percent slopes.				
DgC3	Duffield silt loam, 8 to 15 percent slopes, severely eroded.				
DgD3	Duffield silt loam, 15 to 25 percent slopes, severely eroded.				
FbB	Frankstown shaly silt loam, 3 to 8 percent slopes.	(1)	3 to 8 feet to silty limestone that is increasingly hard and massive with depth.	About 1 foot of silt loam, over 1 foot of silty clay loam, underlain by 1 to 5 feet of silty clay loam with pockets of silty clay or clay, over silty limestone or limy shale; on sloping limestone uplands; common on Apple Pie Ridge; very rocky soil has numerous limestone ledges at surface.	0–12
FbC	Frankstown shaly silt loam, 8 to 15 percent slopes.				12–25
FbC3	Frankstown shaly silt loam, 8 to 15 percent slopes, severely eroded.				25–60
FbD	Frankstown shaly silt loam, 15 to 25 percent slopes.				
FbD3	Frankstown shaly silt loam, 15 to 25 percent slopes, severely eroded.				
FcC	Frankstown very rocky silt loam, 8 to 15 percent slopes.				
FdB	Frederick silt loam, 3 to 8 percent slopes.	(1)	4 to 8 feet to irregular, hard, massive limestone.	About 1 foot of silt loam, over 1 to 2 feet of silty clay or silty clay loam, underlain by 2 to 6 feet of clay, on hard limestone with irregular surface; cherty soils are 20 to 25 percent angular chert 1 to 3 inches across, and very rocky soils have numerous limestone ledges at surface; on gentle to strong slopes in limestone valley.	0–9
FdC	Frederick silt loam, 8 to 15 percent slopes.				9–15
FdC3	Frederick silt loam, 8 to 15 percent slopes, severely eroded.				15–27
FfB	Frederick cherty silt loam, 3 to 8 percent slopes.				27–72
FfC	Frederick cherty silt loam, 8 to 15 percent slopes.				
FfC3	Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded.				
FfD	Frederick cherty silt loam, 15 to 25 percent slopes.				
FfD3	Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded.				
FkC	Frederick very rocky silt loam, 3 to 15 percent slopes.				
FgB	Frederick gravelly loam, thick surface, 3 to 8 percent slopes.	(1)	5 to 10 feet to hard, irregular limestone.	1 to 1½ feet of loam that is 20 percent angular sandstone fragments 3 to 6 inches across, on about 2 feet of silty clay to clay, underlain by 2 to 6 feet of clay, on hard limestone; very stony soils have numerous large stones on surface and a few limestone outcrops; in strongly sloping limestone areas north of Jones Springs.	0–15
FgC	Frederick gravelly loam, thick surface, 8 to 15 percent slopes.				15–29
FgC3	Frederick gravelly loam, thick surface, 8 to 15 percent slopes, severely eroded.				29–62+
FgD	Frederick gravelly loam, thick surface, 15 to 25 percent slopes.				
FgD3	Frederick gravelly loam, thick surface, 15 to 25 percent slopes, severely eroded.				
FsC	Frederick very stony loam, thick surface, 8 to 15 percent slopes.				

See footnote at end of table.

classification and physical properties of soils—Continued

Classification			Percentage passing sieve—			Permeability	Available moisture capacity	Shrink-swell potential
USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
Loam	SM	A-4	50–85	40–75	35–50	6.3+	0.15–0.18	Low.
Loam or fine sandy loam.	SM or ML	A-4	50–85	40–75	35–55	2.0–6.3	0.12–0.15	Low.
Fine sandy loam or sandy loam.	SM or GM	A-2-4 or A-4	35–75	30–65	20–40	6.3+	0.08–0.12	Low.
Silt loam	ML	A-4	70–90	70–90	55–70	2.0–6.3	0.18+	Low.
Silty clay loam	ML or CL	A-6	85–95	85–95	70–90	0.63–2.0	0.15–0.18	Moderate.
Silty clay loam or silty clay.	CH	A-7	85–95	85–95	80–95	0.63–2.0	0.15–0.18	Moderate or high.
Silt loam	ML	A-4	75–95	75–90	60–75	2.0–6.3	0.18+	Low.
Silty clay loam	ML–CL	A-7-6	80–95	75–90	60–85	0.63–2.0	0.15–0.18	Moderate or high.
Silty clay loam to silty clay.	CL–CH	A-7-6	60–86	65–85	60–85	0.63–2.0	0.15–0.18	High.
Silt loam	ML–CL	A-4 to A-6	60–90	60–90	55–90	2.0–6.3	0.18+	Low.
Silty clay loam	ML or CL	A-6	70–95	70–95	65–90	0.63–2.0	0.15–0.18	Moderate.
Silty clay	MH–CH	A-7	90–100	90–100	80–95	0.63–2.0	0.15–0.18	High.
Clay	CH	A-7	80–100	80–100	75–95	0.63–2.0	0.15–0.18	High.
Gravelly loam	SM to ML	A-4	60–85	55–85	40–60	6.3+	0.12–0.18	Low.
Silty clay	MH–CH	A-7	80–95	80–95	75–90	0.63–2.0	0.15–0.18	High.
Clay	CH	A-7	85–100	85–100	80–100	0.63–2.0	0.15–0.18	High.

TABLE 10.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to and kind of bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet			*Inches*
FsD	Frederick very stony loam, thick surface, 15 to 25 percent slopes.				
FsE	Frederick very stony loam, thick surface, 25 to 45 percent slopes.				
GpA	Gilpin silt loam, soft shale substratum, 0 to 3 percent slopes.	(1)	1½ to 2½ feet to folded, soft, silty shale.	About 1 foot of silt loam, on 1 to 1½ feet of silty clay loam that is 20 to 40 percent soft shale fragments 1 to 3 inches across, underlain by folded, soft silty shale; on smooth belts of shale in limestone valley.	0–11 11–28
GpB	Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes.				
GpC	Gilpin silt loam, soft shale substratum, 8 to 15 percent slopes.				
HaB	Hagerstown gravelly silt loam, 3 to 8 percent slopes.	(1)	3 to 10 feet to massive limestone.	½ to 1 foot of silt loam or silty clay loam, on ½ to 1 foot of silty clay loam, underlain by 2 to 4 feet or more of silty clay or clay, on hard limestone; very rocky soils have limestone ledges; gravelly soils have gravel only in the surface layer; extensive on gentle slopes in limestone valley.	0–7 7–13 13–39
HaC3	Hagerstown gravelly silt loam, 8 to 15 percent slopes, severely eroded.				
HbA	Hagerstown silt loam, 0 to 3 percent slopes.				
HbB	Hagerstown silt loam, 3 to 8 percent slopes.				
HcB	Hagerstown silty clay loam, 3 to 8 percent slopes.				
HcC	Hagerstown silty clay loam, 8 to 15 percent slopes.				
HcC3	Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded.				
HcD3	Hagerstown silty clay loam, 15 to 25 percent slopes, severely eroded.				
HgB	Hagerstown very rocky silt loam, 3 to 8 percent slopes.				
HgC	Hagerstown very rocky silt loam, 8 to 15 percent slopes.				
HgD	Hagerstown very rocky silt loam, 15 to 25 percent slopes.				
HgF	Hagerstown very rocky silt loam, 25 to 50 percent slopes.				
HkC3	Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded.				
HkD3	Hagerstown very rocky silty clay loam, 15 to 25 percent slopes, severely eroded.				
Hm	Huntington fine sandy loam.	3	10 feet or more to variable bedrock.	About 3 feet of fine sandy loam, on stratified fine sand, silt, and gravel; well-drained soil on flood plains subject to fairly frequent overflow.	0–10 10–40 40–66+
Hn	Huntington silt loam.	3	10 feet or more to variable bedrock.	About 2 feet of silt loam, on 1 foot of loam or silt loam, underlain by stratified silt, fine sand, and silty clay loam; few pebbles; well-drained soil on flood plains subject to overflow of varying frequency.	0–23 23–44 44–72+
Ho	Huntington silt loam, local alluvium.	3	4 to 8 feet or more to hard limestone.	About 3½ feet of silt loam that is about 20 percent sandstone fragments, on several feet of residual silty clay or clay, over limestone; local alluvium along intermittent streams and in sinkholes in limestone valley; occasional overflow from streams or ponding from higher slopes.	0–16 16–44 44–52+

See footnote at end of table.

classification and physical properties of soils—Continued

Classification			Percentage passing sieve—			Permeability	Available moisture capacity	Shrink-swell potential
USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
Silt loam	ML	A–4	85–100	70–85	50–65	0.20–6.3	0.18+	Low.
Silty clay loam	ML–CL, GM–GC.	A–4 or A–7	65–85	60–75	45–65	0.63–2.0	0.15–0.18	Moderate.
Silt loam or silty clay loam.	ML or CL	A–6	90–100	90–100	80–85	2.0–6.3	0.18+	Moderate.
Silty clay loam	CH	A–7–6	95–100	95–100	90–95	0.63–2.0	0.15–0.18	High.
Silty clay or clay	CH or MH	A–7–5 or A–7–6.	90–100	95–100	90–95	0.63–2.0	0.15–0.18	High.
Fine sandy loam	SM or ML	A–4	95–100	95–100	40–60	6.3+	0.15–0.18	Low.
Fine sandy loam	SM or ML	A–4	95–100	95–100	40–60	2.0–6.3	0.12–0.15	Low.
Stratified silt, sand, and gravel.	SM or ML	Variable; A–2, A–4 or A–6.	Variable; 80–90.	Variable	Variable	6.3+	Less than 0.08.	Low.
Silt loam	ML or CL	A–4	95–100	95–100	80–90	2.0–6.3	0.18+	Low.
Silt loam to loam.	ML	A–4	95–100	95–100	60–75	0.63–2.0	0.15–0.18	Low.
Stratified silt, sand, and silty clay.	SM, ML or CL.	Variable; A–4, A–6, or A–7–6.	Variable	Variable	Variable	0.63+	0.12–0.18	Low.
Silt loam	ML or CL	A–4	90–95	90–95	80–90	2.0–6.3	0.18+	Low.
Silt loam or gravelly silt loam.	ML or CL	A–4	75–95	75–95	70–85	0.63–2.0	0 18+	Low.
Silty clay or clay.	MH or CH	A–7–5 or A–7–6.	85–100	85–100	80–95	0.63–2.0	0.15–0.18	Moderate or high.

TABLE 10.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to and kind of bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet			*Inches*
LaB	Laidig gravelly loam, 3 to 8 percent slopes.	3+	6 to 25 feet to sandstone and shale.	1½ to 2 feet of loam or fine sandy loam, on 2 to 3 feet of sandy clay loam, underlain by dense sandy clay loam fragipan several feet thick; on lower slopes at base of mountains; most areas are very stony and consist of 15 to 40 percent stone fragments as much as 12 inches across; a few seeps; receives water from higher slopes.	0–20
LaC	Laidig gravelly loam, 8 to 15 percent slopes.				20–50
LaC3	Laidig gravelly loam, 8 to 15 percent slopes, severely eroded.				50–72+
LaD	Laidig gravelly loam, 15 to 25 percent slopes.				
LbC	Laidig very stony loam, 3 to 15 percent slopes.				
LbD	Laidig very stony loam, 15 to 25 percent slopes.				
LbE	Laidig very stony loam, 25 to 45 percent slopes.				
LdB	Leadvale silt loam, 3 to 8 percent slopes.	1–1½	4 to 10 feet to folded shale.	About 1 foot of silt loam, on 1 foot of silty clay loam, underlain by 2 to 5 feet of silty clay loam or silty clay; dense fragipan, 1 to 3 feet thick, starts at depth of about 2 feet; seepage is common; moderately well drained soils on lower colluvial slopes below sandstone and shale uplands.	0–11
LdC	Leadvale silt loam, 8 to 15 percent slopes.				11–25
LdC3	Leadvale silt loam, 8 to 15 percent slopes, severely eroded.				25–53+
LhB	Lehew channery loam, 3 to 10 percent slopes.	(1)	1½ to 3 feet to tilted, red, fine-grained sandstone.	About 1 foot of loam, on 1 to 1½ feet of fine sandy loam; numerous small fragments of sandstone, increasing in number with depth; on slopes and smooth ridges in foothills in western part of county.	0–7
LhC	Lehew channery loam, 10 to 20 percent slopes.				7–16
LhC3	Lehew channery loam, 10 to 20 percent slopes, severely eroded.				16–25
LhD	Lehew channery loam, 20 to 30 percent slopes.				
LhD3	Lehew channery loam, 20 to 30 percent slopes, severely eroded.				
LhE	Lehew channery loam, 30 to 45 percent slopes.				
Ln	Lindside silt loam.	1–2	5 feet or more to variable bedrock.	About 1 foot of silt loam, on 2 feet of silty clay loam, underlain by 1½ feet or more of silty clay or silty clay loam that, in places, contains some sandy lenses; nearly level, moderately well drained or somewhat poorly drained soil on flood plain; subject to occasional overflow.	0–9
					9–30
					30–47
LoB	Lindside silt loam, local alluvium, 0 to 3 percent slopes.	1–2	3 to 6 feet or more to limestone bedrock.	About 1 foot of silt loam, on 2½ feet of heavy silt loam or silty clay loam, underlain by 1 foot of residual silty clay on limestone; moderately well drained or somewhat poorly drained local alluvial soils in depressions and intermittent drainageways in limestone valley; subject to occasional overflow.	0–10
LoC	Lindside silt loam, local alluvium, 3 to 8 percent slopes.				10–40
					40–52
Ma	Melvin silt loam.	0–½	5 to 10 feet or more to variable bedrock.	About 1 foot of silt loam, on 2½ feet of clay loam or silty clay loam, underlain by several feet of silty clay; poorly drained soil on flood plains; subject to overflow.	0–10
					10–41
					41–55+

See footnote at end of table.

classification and physical properties of soils—Continued

Classification			Percentage passing sieve—			Permeability	Available moisture capacity	Shrink-swell potential
USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
Loam to fine sandy loam.	SM or ML	A-4	65–85	65–85	35–60	6.3+	0.15–0.18	Low.
Sandy clay loam	SC or CL	A-6 or A-7	60–80	60–80	45–65	0.63–2.0	0.15–0.18	Moderate.
Gravelly sandy clay loam.	SC, CL, or GC.	A-2, A-6, or A-7.	40–80	40–80	30–60	0.2–0.63	0.12–0.15	Moderate.
Silt loam	ML	A-4	75–95	70–90	55–80	2.0–6.3	0.18+	Low.
Silty clay loam	ML–CL	A-6	70–95	70–95	55–85	0.63–2.0	0.15–0.18	Moderate.
Silty clay loam to silty clay.	ML–CL	A-6	65–90	65–90	50–85	0.2–0.63	0.12–0.15	Moderate.
Loam	GM, SM, or ML.	A-4	60–85	60–85	40–60	6.3+	0.15–0.18	Low.
Fine sandy loam	GM, SM, or ML.	A-4	60–85	60–85	40–65	2.0–6.3	0.15–0.18	Low.
Loam or fine sandy loam.	GM, SM	A-4	40–75	35–70	25–45	2.0–6.3	0.08–0.15	Low.
Silt loam	ML	A-4	95–100	90–100	90–95	2.0–6.3	0.15–0.18	Low.
Silt loam or silty clay loam.	ML–CL	A-6	95–100	90–100	90–95	0.63–2.0	0.15–0.18	Moderate.
Silty clay loam	ML–CL	A-6	80–95	80–95	75–95	0.2–0.63	0.12–0.15	Moderate.
Silt loam	ML	A-4	85–95	85–95	80–90	0.63–2.0	0.15–0.18	Low.
Silty clay loam	ML–CL	A-6	85–95	85–95	80–90	0.63–2.0	0.15–0.18	Moderate.
Silty clay loam to silty clay.	CL or CH	A-6 or A-7	90–100	90–95	90–95	0.2–0.63	0.12–0.15	Moderate.
Silt loam	ML	A-4	95–100	95–100	80–90	2.0–6.3	0.15–0.18	Low.
Silty clay loam	CL	A-6	95–100	95–100	80–90	0.2–0.63	0.15–0.18	Moderate.
Silty clay loam to silty clay.	CL	A-6	95–100	95–100	85–90	0.2–0.63	0.12–0.15	Moderate.

TABLE 10.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to and kind of bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet			*Inches*
MgB	Monongahela gravelly silt loam, 3 to 8 percent slopes.	1½–2	4 to 12 feet to variable bedrock.	About 1½ feet of silt loam, on ½ foot of heavy silt loam or silty clay loam, underlain by fragipan of massive silt loam to silty clay loam that is 2 to 4 feet or more thick; moderately well drained soils on stream terraces above overflow, commonly in the Back Creek valley; gravelly soil consists of 20 to 30 percent small gravel throughout profile.	0–19 19–25 25–42 42–55+
MhA	Monongahela silt loam, 0 to 3 percent slopes.				
MhB	Monongahela silt loam, 3 to 8 percent slopes.				
MhC3	Monongahela silt loam, 8 to 15 percent slopes, severely eroded.				
MkC3	Montevallo channery silt loam, 10 to 20 percent slopes, severely eroded.	(1)	1 to 1½ feet to shale and thin-bedded sandstone that can be ripped.	About ½ foot of shaly or channery silt loam, on 1 foot of shaly silt loam that is 50 to 70 percent shale fragments as much as 3 inches across, grading to shattered shale bedrock; on rolling to steep uplands in western third of county and on shale belts in great limestone valley; most areas severely eroded.	0–6 6–14
MkD3	Montevallo channery silt loam, 20 to 30 percent slopes, severely eroded.				
MkE	Montevallo channery silt loam, 30 to 50 percent slopes.				
MmB	Montevallo shaly silt loam, 3 to 10 percent slopes.				
MmB3	Montevallo shaly silt loam, 3 to 10 percent slopes, severely eroded.				
MmC	Montevallo shaly silt loam, 10 to 20 percent slopes.				
MmC3	Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded.				
MmD	Montevallo shaly silt loam, 20 to 30 percent slopes.				
MmD3	Montevallo shaly silt loam, 20 to 30 percent slopes, severely eroded.				
MmE	Montevallo shaly silt loam, 30 to 50 percent slopes.				
MmE3	Montevallo shaly silt loam, 30 to 50 percents slopes, severely eroded.				
MnC3	Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded.	(1)	Variable.	Montevallo: see description of Montevallo soils. Lehew: see description of Lehew channery loams.	
MnD3	Montevallo-Lehew channery loams, 20 to 30 percent slopes, severely eroded.				
MnE	Montevallo-Lehew channery loams, 30 to 45 percent slopes.				
MrA	Murrill gravelly silt loam, moderately deep, 0 to 3 percent slopes.	(1)	5 to 8 feet or more to limestone.	About 1 foot of silt loam or loam, over 1 foot of heavy silt loam, underlain by about 2 feet of gravelly loam, on several feet of residual silty clay or clay derived from limestone; surface layer is 5 to 10 percent gravel; well-drained colluvial soils at base of slopes and in depressions in limestone valley; gravelly soils have 2 to 4 feet or more of gravelly loam that is 20 to 30 percent medium-sized gravel, over residual limestone clay; very stony soil has very large stones on surface.	0–14 14–30 30–40 40–50
MrB	Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes.				
MsB	Murrill gravelly loam, 3 to 8 percent slopes.				
MsC	Murrill gravelly loam, 8 to 15 percent slopes.				
MsC3	Murrill gravelly loam, 8 to 15 percent slopes, severely eroded.				
MsD	Murrill gravelly loam, 15 to 25 percent slopes.				
MuA	Murrill silt loam, 0 to 3 percent slopes.				
MvE	Murrill very stony silt loam, 20 to 40 percent slopes.				
Pf	Philo fine sandy loam.	1–2	4 to 10 feet to variable bedrock.	About 1 foot of fine sandy loam, on 2 feet of fine sandy loam that ranges to sandy clay loam, underlain by stratified sand, silt, and clay; moderately well drained or somewhat poorly drained soil on flood plains; subject to occasional to frequent overflow.	0–12 12–36 36–50+

See footnote at end of table.

classification and physical properties of soils—Continued

Classification			Percentage passing sieve—			Permeability	Available moisture capacity	Shrink-swell potential
USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
Silt loam	ML	A–4	90–100	90–100	85–95	2.0–6.3	0.18+	Low.
Silt loam	ML or CL	A–6	90–100	90–100	85–95	2.0–6.3	0.15–0.18	Moderate.
Silt loam or silty clay loam.	ML or CL	A–6	90–100	90–100	75–90	0.2–0.63	0.12–0.15	Moderate.
Silt loam or silty clay loam.	ML or CL	A–6	80–95	80–95	70–85	0.2–0.63	0.12–0.15	Moderate.
Silt loam	ML or GM	A–4	60–80	50–70	40–65	6.3+	0.12–0.15	Low.
Silt loam	GM	A–2	35–50	30–45	20–35	6.3+	0.08–0.12	Low.
Silt loam or loam	ML	A–4	80–95	80–95	50–80	2.0–6.3	0.15–0.18	Low.
Heavy silt loam	ML or CL	A–4 or A–6	80–95	80–95	60–85	0.63–2.0	0.15–0.18	Moderate.
Gravelly loam	ML or CL	A–4 or A–6	65–80	65–80	50–65	2.0–6.3	0.12–0.15	Moderate.
Silty clay or clay	CL or CH	A–6 or A–7	90–100	90–100	80–90	0.63–2.0	0.12–0.15	Moderate or high.
Fine sandy loam	SM	A–2 or A–4	95–100	90–100	30–50	6.3+	0.15–0.18	Low.
Fine sandy loam	SM	A–2 or A–4	95–100	90–100	30–50	2.0–6.3	0.12–0.15	Low.
Stratified	Variable	Variable	Variable	Variable	Variable	6.3+	Less than 0.08.	Low.

TABLE 10.—*Brief description and estimated engineering*

Map symbol	Soil	Depth to seasonally high water table	Depth to and kind of bedrock	Brief description of site and soil	Depth from surface (typical profile)
		Feet			*Inches*
Ph	Philo silt loam.	1–2	4 to 10 feet to variable bedrock.	About 2 feet of silt loam, on 1 foot of silty clay loam, underlain by stratified silty clay loam, silt loam, and sandy loam; moderately well drained or somewhat poorly drained soil on flood plains; subject to occasional overflow.	0–23 23–38 38–50+
PkA	Pickaway silt loam, overwash, 0 to 3 percent slopes.	1½–2½	3 to 8 feet or more to limestone.	About 1½ feet of friable silt loam, on fragipan of dense silty clay loam, 2 feet thick, underlain by 2 feet of silty clay or clay, over limestone; moderately well drained soils in slight depressions and on gentle slopes in limestone valley.	0–17 17–39 39–62 62+
PmB	Pickaway silt loam, 3 to 8 percent slopes.				
Pn	Pope fine sandy loam.	3	6 to 10 feet or more to variable bedrock.	About 3 feet of fine sandy loam, which gets coarser with depth, underlain by stratified sand, silt, and gravel; well-drained level soil on flood plains; subject to overflow of variable frequency.	0–10 10–36 36–48+
Po	Pope silt loam.	3	6 to 10 feet or more to variable bedrock.	About 2½ feet of silt loam to loam, on about 1 foot of fine sandy loam; underlain by stratified sand, silt, and gravel; level, well-drained soil on flood plains; subject to overflow.	0–8 8–32 32–40 40–50+
RuB	Rushtown very shaly silt loam, 3 to 8 percent slopes.	(1)	3 to 8 feet to shale bedrock that can be ripped.	About 2 feet of very shaly silt loam that is 50 to 60 percent fine, rather soft shale fragments, on 2 feet of shaly silt loam that is 70 to 90 percent fine soft shale chips, underlain by shale bedrock; on narrow colluvial foot slopes below shale uplands.	0–8 8–20 20–45+
SaA	Sees silt loam, 0 to 3 percent slopes.	0–1	3 to 7 feet to hard limestone.	About 1 foot of silt loam or silty clay loam, on 2½ feet of silty clay or clay, underlain by 3 to 4 feet of clay to clay loam; underlain by massive limestone; few outcrops; somewhat poorly drained soils in gently sloping and depressed areas in limestone valley, mostly just east of North Mountain.	0–12 12–32 32–72
SaB	Sees silt loam, 3 to 8 percent slopes.				
ScB3	Sees silty clay loam, 3 to 8 percent slopes, severely eroded.				
ShD	Sloping eroded land, shale materials.	(1)	Variable.		
ShE	Steep eroded land, shale materials	(1)	Variable.		
SrF	Steep rock land.	(1)	Sandstone bedrock exposed in many places.		
TyA	Tygart silt loam, 0 to 3 percent slopes.	1–1½	5 to 10 feet to variable bedrock.	About 1 foot of silt loam, on 1 foot of silty clay loam, underlain by 2 feet or more of dense silty clay containing many fine concretions; gently sloping, somewhat poorly drained terrace soil.	0–10 10–18 18–46+
TyB	Tygart silt loam, 3 to 8 percent slopes.				
WaB	Waynesboro gravelly loam, 3 to 8 percent slopes.	(1)	Variable; shale or limestone at depth of 6 to 12 feet or more.	About 1 foot of gravelly loam that is about 20 percent gravel, on 1½ feet of sandy clay loam containing a few pebbles, underlain by 2½ feet or more of sandy clay loam or sandy loam containing a few pebbles, over shale or limestone; on gently sloping, old high terraces above the Potomac River.	0–13 13–30 30–60+
WaC	Waynesboro gravelly loam, 8 to 15 percent slopes.				
WaC3	Waynesboro gravelly loam, 8 to 15 percent slopes, severely eroded.				

[1] Not a factor in these soils.

classification and physical properties of soils—Continued

Classification			Percentage passing sieve—			Permeability	Available moisture capacity	Shrink-swell potential
USDA texture	Unified	AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)			
						Inches per hour	*Inches per inch of soil*	
Silt loam	ML	A-4	95-100	95-100	75-90	6.3+	0.18+	Low.
Silty clay loam	CL	A-6	90-100	90-100	80-95	0.63-2.0	0.15-0.18	Moderate.
Stratified silty clay loam, silt loam, and sandy loam.	Variable	Variable	Variable	Variable	Variable	Variable	Variable	Variable.
Silt loam	ML	A-4	90-100	90-100	70-80	6.3+	0.18+	Low.
Silty clay loam	CL	A-6	90-100	90-100	75-90	0.2-0.63	0.15-0.18	Moderate.
Silty clay or clay	CL or CH	A-6 or A-7	95-100	95-100	75-90	0.2-2.0	0.12-0.15	Moderate or high.
Limestone bedrock.								
Fine sandy loam	SM	A-2 or A-4	95-100	90-100	30-50	6.3+	0.15-0.18	Low.
Fine sandy loam	SM	A-2 or A-4	95-100	90-100	30-50	2.0-6.3	0.12-0.15	Low.
Stratified silt, sand, and gravel.	Variable	Variable	Variable	Variable	Variable	6.3+	Less than 0.08.	Low.
Silt loam	ML	A-4	95-100	95-100	60-80	6.3+	0.18+	Low.
Coarse silt loam	ML	A-4	90-100	90-100	50-70	0.63-2.0	0.15-0.18	Low.
Loam or fine sandy loam.	SM	A-4	85-95	85-95	35-50	2.0-6.3	0.12-0.15	Low.
Stratified sand, loam, and gravel.	Variable	Variable	Variable	Variable	Variable	6.3+	Less than 0.08.	Low.
Very shaly silt loam.	GM	A-2	35-50	30-45	15-30	6.3+	0.12-0.15	Low.
Very shaly silt loam.	GM	A-2	30-45	25-40	15-25	6.3+	0.08-0.12	Low.
Extremely shaly silt loam.	GM	A-2	15-25	15-25	10-20	6.3+	Less than 0.08.	Low.
Silt loam or silty clay loam.	ML-CL	A-6 or A-7-6	90-100	95-100	80-90	0.63-2.0	0.18+	Moderate.
Silty clay or clay.	MH-CH	A-7-6	90-100	90-100	80-95	0.2-0.63	0.08-0.15	High.
Clay to clay loam.	CL or CH	A-6 or A-7-6	85-100	85-100	75-95	0.2-0.63	0.08-0.12	Moderate or high.
Silt loam	ML	A-4	90-100	90-100	70-90	0.63-2.0	0.15-0.18	Low.
Silty clay loam	ML or CL	A-6	95-100	90-100	75-90	Less than 0.2 -0.63.	0.12-0.15	Moderate.
Silty clay	CL	A-6	90-100	85-100	75-85	Less than 0.2 -0.63.	0.08-0.12	Moderate.
Gravelly loam or fine sandy loam.	SM	A-2 or A-4	65-85	65-85	30-50	6.3+	0.12-0.15	Low.
Sandy clay loam	SC or CL	A-6	85-95	85-95	40-60	0.63-2.0	0.12-0.15	Moderate.
Sandy clay loam or sandy loam.	SC or SM	A-4 or A-6	80-95	80-95	35-55	0.63-2.0	0.08-0.15	Moderate.

In the AASHO system, soil materials are classified in seven principal groups. These groups range from A–1, gravelly soils of high bearing capacity, to A–7, clay soils having low bearing capacity when wet. A few soils have been classified A–7–5 and A–7–6. The A–7–5 soils represent A–7 soils that have moderate plasticity indexes in relation to the liquid limit, and they may be highly elastic and subject to considerable volume change. A–7–6 soils represent A–7 soils that have high plasticity indexes in relation to liquid limit and that are subject to extremely high volume change.

The percentage passing sieves is the normal range of soil particles passing the respective screen sizes.

Permeability refers to the rate of movement of water through the undisturbed soil. Permeability depends largely on the soil texture and structure.

Available moisture capacity is the amount of water in a moist soil, at field capacity, that can be removed by plants. These ratings, expressed in inches of water per inch of soil depth, are of particular value to engineers engaged in irrigation.

TABLE 11.—*Engineering*

[Dashes indicate the soils are in complexes; for interpretations

Soil series and map symbols [1]	Suitability as source of—		Susceptibility to frost action	Features and limitations affecting—
	Topsoil	Road fill		Highway location
Alluvial land, neutral or slightly acid (Aa)	Good	Fair to poor	High	Frequent flooding; water table.
Alluvial land, strongly acid (Ab)	Good	Fair to poor	High	Frequent flooding; water table.
Alluvial land, marl substratum (Am)	Good	Fair to poor	High	Frequent flooding; water table.
Atkins (At)	Fair	Fair to poor	High	Water table; flooding
Berks (BcB, BcC, BcD, BhB, BhC, BhD)	Fair	Fair to good	Low to moderate.	Shale bedrock rippable
Berks-Lehew (BkB, BkC, BkD)				
Berks-Montevallo (BmB3, BmC3, BmD3)				
Blairton (BnA, BnB, BtA, BtB)	Fair to poor	Fair to poor	High	Water-table; bedrock rippable.
Buchanan (BuB, BuC, BvC)	Fair to good	Fair to good	Moderate to high.	Water table; seeps
Captina (CaB)	Good	Fair	Moderate	Water table
Carbo (EaC3, EbB)	Fair to poor	Poor	High	Limestone bedrock
Chilhowie (EcC3, EdB, EdC, EkC3, EkD3, EnB, EnC).	Poor	Poor	High	Limestone bedrock
Corydon (CnB, CnC, CoC3, CoD3)	Fair	Poor	Moderate	Limestone bedrock
Dekalb (DaC, DaD, DaE, DbD, DbE, DbF)	Fair	Fair to good	Low	Sandstone bedrock
Duffield (DfB, DfC3, DgB, DgC, DgC3, DgD3)	Good	Fair	Moderate	Shaly limestone bedrock.
Frankstown (FbB, FbC, FbC3, FbD, FbD3, FcC)	Good	Fair	Moderate	Limestone bedrock
Frederick (FdB, FdC, FdC3, FfB, FfC, FfC3, FfD, FfD3, FgB, FgC, FgC3, FgD, FgD3, FkC, FsC, FsD, FsE).	Fair to good	Fair to good	Moderate	Limestone bedrock
Gilpin (GpA, GpB, GpC)	Good	Fair to good	Moderate	Shale bedrock rippable.
Hagerstown (HaB, HaC3, HbA, HbB, HcB, HcC, HcC3, HcD3, HgB, HgC, HgD, HgF, HkC3, HkD3).	Fair to good	Fair to good	Moderate to high.	Limestone bedrock
Huntington (Hm, Hn, Ho)	Good	Fair	Low to moderate.	Flooding; water table
Laidig (LaB, LaC, LaC3, LaD, LbC, LbD, LbE)	Fair	Fair to good	Low to moderate.	No special problems

See footnotes at end of table.

Shrink-swell potential is a rating of the ability of soil material to change volume when subjected to changes in moisture. Those soil materials rated high are normally undesirable from the engineering standpoint, since the increase in volume when the dry soil is wetted is usually accompanied by a loss in bearing capacity. In general, soils classed as CH and A–7 have a high shrink-swell potential. Clean sands and gravels (single-grain structure) and soils having small amounts of nonplastic to slightly plastic fines have a low shrink-swell potential.

Engineering interpretation of soils

The suitability or limitation of each soil in Berkeley County for engineering uses is shown in table 11. The interpretation of these soils was based on estimates taken from table 10, on test data for certain soils (table 12), and on field experience. All soils were considered to be in their undisturbed state when judged for suitability for the various uses, except for use as road fill, as pond embankments, and as topsoil.

interpretation of soils

of properties, see the soils that make up the complexes]

Features and limitations affecting—Continued				Remarks
Farm ponds [2]		Agricultural drainage	Irrigation	
Reservoir area	Embankment			
Flooding; individual site investigation required.	Flooding; individual site investigation required.	Slow permeability; flooding.	Poor drainage; flooding	Features variable; estimates based on general conditions.
Flooding; individual site investigation required.	Flooding; individual site investigation required.	Slow permeability; flooding.	Poor drainage; flooding	Features variable; estimates based on general conditions.
Flooding; individual site investigation required.	Flooding; individual site investigation required.	Slow permeability; flooding.	Poor drainage; flooding	Features variable; estimates based on general conditions.
A few sandy layers; flooding.	Low shear strength	Slow permeability; poor structure.	Poor drainage; slow permeability.	
Shallow over permeable shale.	Limited amount of material.	Well drained	Moderately rapid permeability.	
Permeable substratum in places.	Limited amount of material.	Shallow; slow permeability.	Slow permeability; water table.	
Some sandy layers	No special problems	Fragipan; seep spots	Slow permeability in lower subsoil.	Receives underground water from higher slopes.
May have sandy layers or shaly substratum.	No special problems	Fragipan; seep spots	Slow permeability in fragipan.	
Solution channels in limestone substratum.	Low shear strength	Well drained	Slow permeability	A few limestone ledges crop out.
Solution channels in limestone substratum.	Low shear strength	Well drained	Slow permeability; shallow to limestone.	A few limestone ledges crop out.
Solution channels in limestone substratum.	Low shear strength	Well drained	Shallow to rock.	
Pervious sandstone bedrock at depth of 2 to 3 feet.	Pervious material	Well drained	Moderate to rapid permeability.	
Solution channels in limestone bedrock.	Low shear strength	Well drained	No unfavorable features.	
Cavernous limestone	Low shear strength	Well drained	No unfavorable features.	
Cavernous limestone	Low shear strength	Well drained	No unfavorable features.	
Moderately deep over permeable shale.	No special problems	Well drained	Moderately deep to shale.	
Cavernous limestone	Low shear strength	Well drained	No unfavorable features.	
Sandy lenses in substratum; flooding.	Low shear strength	Well drained	No unfavorable features.	
May have sandy layers	Stone content may be high.	Well drained	Fragipan below 36 inches.	

TABLE 11.—*Engineering*

Soil series and map symbols [1]	Suitability as source of—		Susceptibility to frost action	Features and limitations affecting—
	Topsoil	Road fill		Highway location
Leadvale (LdB, LdC, LdC3)	Good	Poor to fair	Moderate to high.	Seepage; possible slips
Lehew (LhB, LhC, LhC3, LhD, LhD3, LhE)	Fair	Fair to good	Low	Sandstone bedrock
Lindside (Ln, LoB, LoC)	Good	Fair	Moderate to high.	Water table; flooding
Melvin (Ma)	Fair to good	Fair	High	Water table; flooding
Monongahela (MgB, MhA, MhB, MhC3)	Fair to good	Fair	Moderate	Water table; variable bedrock.
Montevallo (MkC3, MkD3, MkE, MmB, MmB3, MmC, MmC3, MmD, MmD3, MmE, MmE3).	Fair	Fair	Low	Shale bedrock rippable
Montevallo-Lehew (MnC3, MnD3, MnE)				
Murrill (MrA, MrB, MsB, MsC, MsC3, MsD, MuA, MvE).	Good	Fair to good	Low to moderate.	Limestone bedrock at depth of 4 feet or more.
Philo (Pf, Ph)	Good	Fair to good	Moderate to high.	Water table; flooding
Pickaway (PkA, PmB)	Good to fair	Fair	Moderate	Water table; limestone bedrock.
Pope (Pn, Po)	Good	Good	Low	Flooding
Rushtown (RuB)	Fair	Good	Low	No special problems
Sees (SaA, SaB, ScB3)	Good	Fair to poor	High	Bedrock; water table
Tygart (TyA, TyB)	Fair to poor	Fair to poor	High	High water table
Waynesboro (WaB, WaC, WaC3)	Good	Fair to good	Moderate	Shale or limestone bedrock.

[1] Excluded from this table because of variable characteristics are Sloping eroded land, shale materials (ShD); Steep eroded land, shale materials (ShE); and Steep rock land (SrF).

Highway engineering.—Soil characteristics, or features, that affect highway engineering practices are shown in the first part of table 11.

The rating of the soil material for road fill is based on the estimated AASHO classification of the soil materials that would normally be used. Coarse-textured soil materials are rated good, and fine-textured materials, fair or poor. The soil materials rated fair are silts with low plasticity; those rated poor are plastic clays that lose strength when wet. In areas where freezing occurs to a depth of more than 6 inches and the water table is within 3 feet of the subgrade surface, silty materials should be rated poor instead of fair because they are susceptible to damage by freezing and thawing.

Highway location is influenced by the depth to bedrock and by the type of bedrock. Blasting normally is required to excavate deep cuts in sandstone and limestone. This problem generally occurs in areas of the Chilhowie, Dekalb, Lehew, Duffield, Hagerstown, Frederick, and Frankstown soils. The difficulty of bedrock excavation and the chance of seepage along bedding planes in the bedrock should be investigated. The presence of undesirable soil material within or slightly below the subgrade affects the stability of the roadbed. A layer of very plastic clay, as in the Sees soils, impedes internal drainage and generally has low stability when wet. Desirable soil material within the soil profile, for example, the sandy material in the Pope soils, makes a naturally stable subgrade.

Highway location is also influenced by local drainage conditions. To provide satisfactory drainage in areas that are occasionally or seasonally flooded, or where the water table is high, the pavement surface should be built at least 3 feet above high water or above the ground water table. By using interceptor ditches or underdrains, subsurface seepage is controlled. Seepage over impermeable strata in the back slopes of cuts can result in the sliding of the overlying material. If serious enough, the sliding sometimes influences both the

interpretation of soils—Continued

Features and limitations affecting—Continued				Remarks
Farm ponds [2]		Agricultural drainage	Irrigation	
Reservoir area	Embankment			
No special problems	No special problems	Moderately well drained; fragipan; seep spots.	Slow permeability in fragipan.	
Pervious substratum	Permeable material	Well drained	Rapid permeability.	
A few sand lenses; flooding.	Low shear strength	Moderately well drained; slow permeability.	High available moisture capacity; moderately high water table.	
Some sand lenses; flooding.	Low shear strength	Poorly drained; slow permeability.	Water table; slow permeability.	
May have sandy lenses	No special problems	Moderately well drained; slowly permeable in fragipan.	Slow permeability in lower subsoil.	
Permeable shale substratum.	Depth of material	Well drained	Low moisture capacity.	
Cavernous limestone	Low shear strength	Well drained	No unfavorable features.	
May have sandy lenses	Low shear strength	Moderately well drained or somewhat poorly drained; moderate to slow permeability.	High available moisture capacity.	
Underlain by cavernous limestone.	Low shear strength	Moderately well drained; slowly permeable in fragipan.	High available moisture capacity.	
Sandy layers; flooding	Material may be permeable.	Well drained	No unfavorable soil features; flooding.	
Permeable substratum	Permeable shaly material	Excessively drained	Low available moisture capacity.	
Variable depth to cavernous limestone.	Low shear strength	Fairly good structure in subsoil.	Slow permeability.	
No unfavorable features	Low shear strength	Somewhat poorly drained.	Slow permeability.	
May have sandy lenses	No special problems	Well drained	No unfavorable features.	

[2] Requirements for shallow-oxidation lagoons for sewage disposal are similar to those for farm ponds.

location and the cross-sectional design of the roadway.

In planning locations for highways in Berkeley County, consideration should be given to problems presented by soils that are underlain by limestone, such as the Chilhowie, Duffield, Frederick, Hagerstown, Frankstown, and Murrill soils. Subterranean features are unpredictable on these soils, and highway construction on them should include adequate investigations of the subsurface.

Conservation engineering.—Soil features that affect water management are shown in the last part of table 11. These features are evaluated on the basis of estimates given in table 10, actual test data from certain soils (table 12), and field experience.

Farm ponds, diversion ditches, waterways, and soil drainage systems are the most important conservation structures used in Berkeley County. There are severe hazards in the construction of ponds and diversions on soils underlain by limestone because massive ledges are likely to crop out.

The features affecting suitability of the soils in the county for farm ponds are shown in table 11. Thin sandy layers, or lenses, occur in places in the Atkins, Captina, Huntington, Lindside, Melvin, Monongahela, and Pope soils. Detailed borings should be made on these soils, and sites that contain sand lenses should be avoided. Lenses in a pond reservoir can sometimes be sealed by thorough mixing with finer material, adequate compaction at proper moisture content, and use of suitable admixtures, such as bentonite. Ponds should not be built on sites where bedrock would be less than 2 feet below the bottom of the pond.

Crevices and solution channels occur in the Duffield, Frederick, Hagerstown, Frankstown, Murrill, and other soils that formed in limestone material. These soils also have strongly aggregated structure that tends to re-form after compaction. Consequently, they generally are not suitable for use as ponds, unless the floor can be sealed by use of polyphosphate or other dispersing agent and adequate compaction.

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An important function of a diversion ditch is to intercept hillside runoff and subsurface water. Such water is the chief cause of wetness on the Leadvale soils, and it causes seepage spots on the Captina and Monongahela soils. Diversion ditches also are useful in diverting water above areas of the Sees and Tygart soils. The ditches should be about 30 inches deep so that they intercept as much subsurface water as possible. On the Frederick, Hagerstown, Duffield, and Frankstown soils, diversion ditches are difficult to construct in places where limestone ledges crop out.

On soils that are used as drainage fields for septic tanks, the limitations may not be present at all times. For example, table 11 shows that a water table limits

TABLE 12.—*Engineering*

[Tests performed by Bureau of Public Roads (BPR) in accordance with standard

Soil name and location	Parent material	Bureau of Public Roads report No.	Depth	Horizon
			Inches	
Berks shaly silt loam:				
0.5 mile SE. of Martinsburg Airport. (Typical shaly profile)	Martinsburg shale.	S38313	0–7	Ap
		S38314	12–21	C
1 mile N. of Falling Waters on State Route 1/3. (Deep shaly profile)	Martinsburg shale.	S38316	3–10	A2 or A3
		S38317	15–35	C
Chilhowie silty clay:				
1.2 miles S. of Falling Waters on U.S. Highway No. 11. (Modal)	Chambersburg limestone.	S38306	0–6	Ap
		S38307	12–18	C21
2 miles E. of Ridgeway on State Route 28 and 200 ft. S. of quarry. (Deep reddish subsoil)	Stones River limestone.	S38308	0–7	Ap
		S38309	7–20	B2
		S38310	20–34	C11
1.2 miles N. of Falling Waters. (Shallow range)	Stones River limestone.	S38311	0–6	Ap
		S38312	6–16	B2
Frankstown shaly silt loam:				
1 mile E. of Gerrardstown. (Modal)	Elbrook limestone (shaly limestone and shale).	S38330	0–8	Ap
		S38331	12–18	B21
		S38332	25–60	C
3.5 miles S. of Hedgesville. (Shallow coarse subsoil)	Elbrook limestone (shaly limestone and shale).	S38333	4–11	A2
		S38334	14–23	B2
		S38335	23–33	C
2 miles S. of Hedgesville. (Fine-textured subsoil)	Elbrook limestone (shaly limestone and shale).	S38336	0–7	Ap
		S38337	13–26	B21
		S38338	32–44	C
Gilpin silt loam, soft shale substratum:				
1.2 miles E. of Bedington on State Route 14/2. (Modal)	Martinsburg shale.	S38318	0–7	Ap
		S38319	11–20	B2
		S38320	20–28	C
Hagerstown silt loam:				
0.5 mile E. of Files Crossroads on State Route 45. (Typical nonstony profile)	Beckmantown limestone.	S38339	0–7	Ap
		S38340	13–23	B22
		S38341	51–60	C1
1 mile S. of Greensburg. (Coarse lower substrata)	Beckmantown limestone.	S38342	0–8	Ap
		S38343	16–33	B22
		S38344	39–61	C1
Hagerstown very rocky silt loam				
0.5 mile E. of Van Clevesville on State Route 40, 200 yards N. of road. (Modal very rocky profile)	Beckmantown limestone.	S38345	9–23	B21
		S38346	36–62+	C

See footnotes at end of table.

the use of some soils, though the table may be high only seasonally. Ratings of permeability are for the soils when they are saturated with water. Flooding is listed as a limitation on some soils, but the hazard occurs only at certain periods. The degree of limitation is given for each soil in another table (see table 13, p. 68).

Engineering test data

Fifteen soil samples were tested to help evaluate the soils of Berkeley County for engineering purposes. The results of these tests are given in table 12. The samples represent the Berks, Chilhowie, Frankstown, Gilpin, Hagerstown, and Sees series.

test data

procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Mechanical analysis [1]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve [2]—						Percentage smaller than [2]—							
3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [3]
	100	95	80	66	60	58	46	25	14	36	7	A–4(5)	ML.
100	72	42	35	30	27	26	23	14	8	33	9	A–2–4(0)	GM–GC.
100	88	50	38	31	28	27	24	16	9	34	8	A–2–4(0)	GM.
100	72	35	27	24	21	20	17	11	7	32	8	A–2–4(0)	GM–GC.
100	94	94	94	93	90	89	83	66	56	67	36	A–7–5(20)	MH–CH.
[4]			85	84	82	82	76	65	59	78	43	A–7–5(20)	MH–CH.
			100	98	95	94	85	62	48	48	22	A–7–6(14)	ML–CL.
				100	99	99	98	91	82	83	48	A–7–5(20)	MH–CH.
				100	99	99	98	92	86	83	46	A–7–5(20)	MH–CH.
100	95	95	94	92	89	88	81	59	47	50	25	A–7–6(16)	CL.
					100	99	96	87	79	87	49	A–7–5(20)	MH–CH.
	100	95	89	80	72	68	54	33	20	36	9	A–4(7)	ML.
			100	99	97	95	84	66	50	44	18	A–7–6(12)	ML–CL.
			100	93	83	81	74	61	53	58	31	A–7–6(20)	CH.
	100	96	91	84	74	71	56	30	16	[5]	[5]	A–4(8)	ML.
	100	95	91	88	78	74	64	43	29	32	10	A–4(8)	ML–CL.
100	95	88	86	82	68	64	54	40	32	39	17	A–6(9)	CL.
100	97	86	78	70	62	59	44	21	9	[5]	[5]	A–4(5)	ML.
			100	98	94	91	82	65	55	66	37	A–7–6(20)	CH.
	100	99	98	93	86	83	74	60	54	61	34	A–7–6(20)	CH.
	100	96	79	63	58	57	47	25	13	32	5	A–4(5)	ML.
100	99	85	74	62	56	55	47	30	18	33	8	A–4(4)	ML–CL.
100	93	77	69	63	59	58	52	36	24	41	14	A–7–6(6)	ML–CL.
	100	98	94	91	86	83	62	38	29	34	15	A–6(10)	CL.
				100	99	97	79	58	51	57	31	A–7–6(19)	CH.
			100	99	96	93	77	60	53	60	34	A–7–6(20)	CH.
100	98	95	92	84	71	66	45	22	13	[5]	[5]	A–4(7)	ML.
100	97	97	97	97	91	87	76	68	64	74	44	A–7–5(20)	CH.
			100	97	89	86	76	57	47	63	29	A–7–5(20)	MH.
			100	99	98	95	83	70	63	74	36	A–7–5(20)	MH.
			100	94	91	89	79	67	60	67	29	A–7–5(20)	MH.

TABLE 12.—*Engineering*

Soil name and location	Parent material	Bureau of Public Roads report No.	Depth	Horizon
			Inches	
Sees silty clay loam:				
1.9 miles N. of Nollville on State Route 16/1. (Modal)	Waynesboro limestone.	S38327	0–8	Ap
		S38328	20–32	B22g
		S38329	52–72+	C2g
Sees silt loam:				
2.3 miles W. of Nollville on State Route 45/8. (Sandstone colluvial influence)	Waynesboro limestone.	S38324	0–8	Ap
		S38325	8–20	B21
		S38326	43–53	C1g
0.6 mile E. of Ridgeway. (Very firm Cg horizon)	Beekmantown limestone.	S38321	0–8	Ap
		S38322	12–26	B2g
		S38323	35–60+	Cg

[1] Mechanical analysis according to AASHO Designation T 88–57 (*1*). Results by this procedure may differ somewhat from results 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 analysis data used in this table are not suitable for naming textural classes for soils.

[2] Based on total material. Laboratory test data corrected for amount discarded in field sampling.

Suburban and Recreational Uses of Soils

In Berkeley County the population is increasing, and the towns and suburbs are expanding into areas that formerly were farms or parts of farms. This expansion is taking place especially near Martinsburg, along U.S. Highway No. 11, and along Interstate Highway 81. In many places industrial plants and groups of homes are scattered among patches of farmland (fig. 15). These expanding areas generally lack a central system for disposing of sewage, and they need roads, parking areas, and other community facilities.

In addition, areas used for outdoor recreation have attracted more and more people from this county and from the heavily populated areas of Washington, D.C., and Baltimore, Md., nearby. As a result, the demand for more recreational areas is increasing.

This subsection gives ratings for the limitations on soils that are used for suburban developments and for recreational areas. Although the proximity of main highways, markets, woods, or streams is important, it is not considered in this part of the report. The ease or difficulty of making improvements is largely controlled by the characteristics of the soils. Most limitations can be overcome if the cost can be justified, but planners and builders must decide how practical it is for them to overcome the existing limitations.

Table 13 lists all the soils in the county and shows the kinds and estimated degree of limitations that affect their use for various purposes. The soil map at the back of this report can be used as a guide for locating the soils. Included in areas mapped as these soils, however, are small areas of other soils that cannot be shown on the map at the scale used and that may have characteristics that differ from those of the mapped soils. These small included areas are not taken into account in table 13, and on-site investigations are needed before suburban and recreational uses are planned. Ratings for the de-

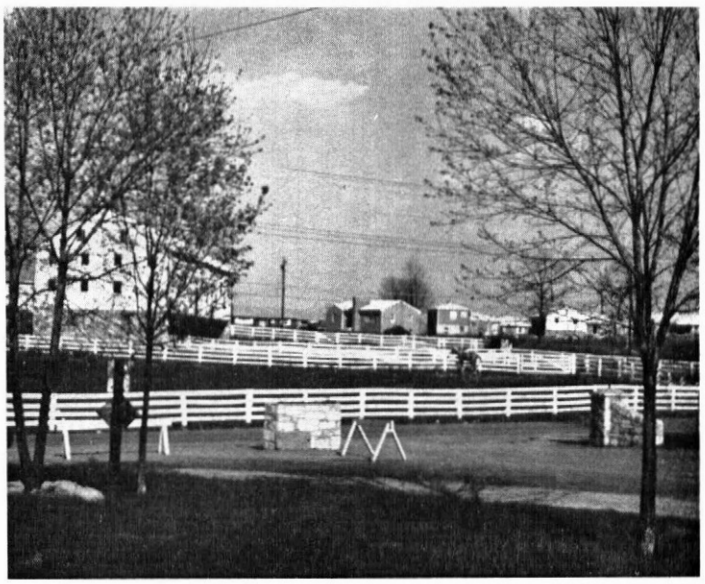

***Figure 15.*—New homes built on Hagerstown and Frederick soils just west of Martinsburg. This suburban area was formerly part of a 180-acre farm.**

test data—Continued

Mechanical analysis										Liquid limit	Plasticity index	Classification	
Percentage passing sieve [2]—						Percentage smaller than [2]—							
3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [3]
------	------	--------	100	94	83	82	70	48	36	44	18	A–7–6(12)----	ML–CL.
------	------	--------	--------	100	94	92	82	65	57	57	28	A–7–6(19)----	MH–CH.
100	99	98	98	95	87	86	78	63	55	61	33	A–7–6(20)----	CH.
------	------	--------	100	96	82	80	67	43	29	33	11	A–6(8)-------	ML–CL.
------	------	--------	100	98	89	88	80	64	54	56	29	A–7–6(19)----	CH.
(4)	------	--------	90	87	78	75	64	43	32	38	15	A–6(10)------	ML–CL.
------	------	--------	100	91	85	83	70	46	29	39	15	A–6(10)------	ML–CL.
------	------	--------	100	99	97	97	92	78	68	73	39	A–7–5(20)----	MH–CH.
------	------	--------	100	99	97	97	94	83	72	73	36	A–7–5(20)----	MH.

[3] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points of the A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are GM–GC, ML–CL, and MH–CH.

[4] Fragments larger than 3 inches were discarded in field sampling. These fragments make up 15 percent of the material in the C2l horizon of Chilhowie silty clay (modal) and 10 percent of the material in the C1g horizon of Sees silt loam (sandstone colluvial influence). Coarse fragments smaller than 3 inches in laboratory samples disintegrated in sample preparation.

[5] Nonplastic.

gree of limitations on soils used for various purposes are expressed in relative terms—slight, moderate, or severe. The suburban and recreational uses rated in table 13 are discussed in the following paragraphs.

Drainage fields for effluent disposal.—The main limiting features of these soils for drainage fields are slow permeability, steepness of slope, shallowness to bedrock, and a seasonally high water table. Furthermore, in soils underlain by cavernous limestone, underground water may be contaminated by seepage through rock crevices or solution channels. The soils with a rating of *slight* generally have few or no limitations that affect their use as drainage fields. Those with a rating of *moderate* may be borderline and should be investigated carefully at the exact site of installation. On many of the soils with a rating of moderate, drainage fields need to be larger than on those with a rating of slight. All the soils with a rating of *severe* should be very carefully investigated. Some soils that have severe limitations may be used for drainage fields if great care is taken in planning and installation, but other soils—for example, those subject to flooding—generally are not suitable and should not be used for this purpose (fig. 16). Flooding in winter and spring, however, does not impose severe limitations on disposal fields that are used only a short time for summer camps, tent sites, and the like.

Impoundments and sewage lagoons.—Impoundments can be used in some places to supply water to provide swimming, boating, fishing, and other forms of recreation. Sewage lagoons are shallow ponds built to dispose of sewage through oxidation. They may be needed in a suburban area if septic tanks or a sewage system is not feasible or practical. The limitations on the soils in this county used for impoundments and sewage lagoons are much the same as those on soils used for farm ponds, as shown in table 11 in the subsection "Use of Soils in Engineering." Among the features that control the degree of limitation are the hazard of flooding, amount of seepage, permeability of the substratum, depth to rock, and degree of slope. Flooding can be controlled by using dikes or other structures.

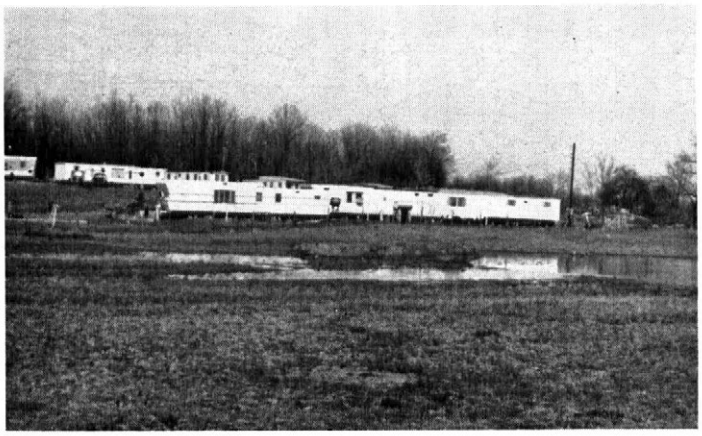

***Figure 16.*—Water from heavy rains ponded on an area of Lindside silt loam, local alluvium, 0 to 3 percent slopes. Local ponding makes this soil unsuitable for use as drainage fields for septic tanks.**

TABLE 13.—*Estimated degree and kind of limitation of*

[Sloping eroded land, shale materials (ShD); Steep eroded land, shale materials (ShE); and Steep rock land

Map symbol	Soil	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Homesites and building locations	Streets and parking lots
Aa	Alluvial land, neutral or slightly acid	Severe: flooding	Severe: flooding	Severe: high water table; flooding.	Severe: high water table; flooding.
Ab	Alluvial land, strongly acid	Severe: flooding	Severe: flooding	Severe: high water table; flooding.	Severe: high water table; flooding.
Am	Alluvial land, marl substratum	Severe: high water table.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
At	Atkins silt loam	Severe: high water table.	Severe: high water table; flooding.	Severe: high water table; flooding.	Severe: high water table; flooding.
BcB	Berks channery silt loam, 3 to 10 percent slopes.	Severe: depth to rock.[1]	Severe: pervious substratum.	Moderate: depth to shale; slope.	Moderate: depth to shale; slope.
BcC	Berks channery silt loam, 10 to 20 percent slopes.	Severe: depth to rock;[1] slope.	Severe: pervious substratum.	Moderate: depth to shale; slope.	Severe: depth; slope.
BcD	Berks channery silt loam, 20 to 30 percent slopes.	Severe: slope	Severe: slope	Severe: depth to shale; slope.	Severe: depth; slope.
BhB	Berks shaly silt loam, 3 to 8 percent slopes.	Severe: depth to shale.[1]	Severe: pervious substratum.	Moderate: depth to shale.	Moderate: depth to rippable shale.
BhC	Berks shaly silt loam, 8 to 15 percent slopes.	Severe: depth to shale.[1]	Severe: pervious substratum.	Moderate: depth; slope.	Severe: depth; slope.
BhD	Berks shaly silt loam, 15 to 25 percent slopes.	Severe: slope	Severe: slope	Severe: depth; slope.	Severe: slope
BkB	Berks-Lehew channery loams, 3 to 10 percent slopes.	Severe: depth to rock.	Severe: pervious substratum.	Moderate: depth to rock; slope.	Moderate or severe: depth to rock; slope.
BkC	Berks-Lehew channery loams, 10 to 20 percent slopes.	Severe: depth to rock; slope.	Severe: pervious substratum.	Moderate: depth to rock; slope.	Severe: slope
BkD	Berks-Lehew channery loams, 20 to 30 percent slopes.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
BmB3	Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded.	Severe: depth to shale.[1]	Severe: pervious substratum.	Moderate: depth to shale.	Moderate or severe: depth to rippable shale.
BmC3	Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded.	Severe: depth to shale.[1]	Severe: pervious substratum.	Moderate: depth to shale.	Severe: slope
BmD3	Berks-Montevallo shaly silt loams, 15 to 25 percent slopes, severely eroded.	Severe: slope	Severe: pervious substratum; slope.	Severe: depth; slope.	Severe: slope
BnA	Blairton silt loam, 0 to 3 percent slopes	Severe: high water table.	Slight	Severe: high water table.	Moderate: high water table.
BnB	Blairton silt loam, 3 to 8 percent slopes	Severe: high water table.	Slight	Severe: high water table.	Moderate: high water table.
BtA	Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes.	Severe: high water table.	Moderate: depth to shale.	Severe: high water table; depth.	Severe: high water table; depth.
BtB	Blairton shaly silt loam, thin solum variant, 3 to 8 percent slopes.	Severe: high water table; depth.	Moderate: depth to shale.	Severe: high water table; depth.	Severe: high water table; depth.
BuB	Buchanan gravelly loam, 3 to 8 percent slopes.	Severe: slow permeability.	Slight	Slight or moderate: gravel.	Moderate: slope
BuC	Buchanan gravelly loam, 8 to 15 percent slopes.	Severe: slow permeability.	Moderate: slope	Moderate: gravel; slope; land slips possible.	Severe: slope
BvC	Buchanan very stony loam, 3 to 15 percent slopes.	Severe: slow permeability.	Moderate: slope; stones.	Moderate: stones; slope; land slips possible.	Moderate or severe: slope; stones.

See footnote at end of table.

soils for suburban and recreational uses

(SrF) generally are not suitable for the uses shown in this table and are not rated]

Lawns	Sanitary land fill	Parks and extensive play areas	Athletic fields	Tent sites	Access roads
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: slow permeability; high water table.	Severe: high water table.	Severe: high water table.
Severe: high water table.	Severe: high water table.	Severe: flooding; water table.	Severe: flooding; water table.	Severe: water table; flooding.	Severe: water table; flooding.
Severe: high water table.	Severe: high water table.	Severe: flooding; water table.	Severe: flooding; water table.	Severe: water table; flooding.	Severe: water table; flooding.
Moderate: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: channery fragments.	Severe: depth to rock.	Slight: depth; slope.	Severe: depth; slope.	Slight	Moderate: depth; slope.
Moderate: depth; slope; droughtiness; channery fragments.	Severe: depth to rock.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: depth; slope; channery fragments.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Moderate: depth; droughtiness; shale fragments.	Moderate or severe: depth to soft shale.	Slight	Severe: depth; slope.	Slight	Slight.
Moderate: depth; droughtiness; shale fragments.	Moderate or severe: depth to soft shale.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate or severe: slope; droughtiness; shale fragments.	Moderate or severe: depth to soft shale.	Severe: slope	Severe: slope	Severe: slope	Moderate: depth; slope.
Slight: may be shaly.	Severe: limited depth to rock.	Slight	Severe: depth; slope.	Slight	Moderate: depth; slope.
Moderate: depth; slope; may be shaly.	Severe: limited depth to rock.	Moderate: slope	Severe: depth; slope.	Moderate: slope	Moderate: depth, slope.
Severe: depth; slope; may be shaly.	Severe: limited depth to rock.	Severe: slope	Severe: depth; slope.	Severe: slope	Severe: depth; slope.
Moderate or severe: depth; droughtiness; shale fragments.	Severe: depth to shale.	Slight	Severe: depth to shale; slope.	Slight	Slight.
Moderate or severe: depth; droughtiness; shale fragments.	Severe: depth	Moderate: slope	Severe: depth to shale.	Moderate: slope	Moderate: depth to shale.
Severe: depth; slope; shale fragments.	Severe: depth	Severe: slope	Severe: depth to shale.	Severe: slope	Severe: depth; slope.
Moderate: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Slight or moderate: gravel.	Slight or moderate: water table.	Slight	Severe: slope; gravel.	Slight	Slight.
Moderate: slope; gravel.	Moderate: water table.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slopes.
Moderate: slope; stones.	Moderate: water table; stones.	Moderate: slope	Severe: stones; slope.	Moderate: slope; stones.	Moderate: slopes.

TABLE 13.—*Estimated degree and kind of limitation of*

Map symbol	Soil	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Homesites and building locations	Streets and parking lots
CaB	Captina silt loam, 3 to 8 percent slopes	Severe: slow permeability.	Moderate: may have sandy layers.	Moderate: moderately high water table.	Moderate: moderately high water table.
CnB	Corydon silt loam, 3 to 8 percent slopes	Severe: depth to limestone.[1]	Severe: cavernous limestone.	Moderate: depth to limestone.	Severe: depth to limestone; slope.
CnC	Corydon silt loam, 8 to 20 percent slopes	Severe: depth to limestone; slope.	Severe: cavernous limestone; slope.	Moderate or severe: depth to limestone; slope.	Severe: depth; slope.
CoC3	Corydon silty clay, 8 to 15 percent slopes, severely eroded.	Severe: depth to limestone.	Severe: cavernous limestone; slope.	Moderate or severe: depth to rock; slope.	Severe: depth; slope.
CoD3	Corydon silty clay, 15 to 25 percent slopes, severely eroded.	Severe: slope	Severe: cavernous limestone; slope.	Severe: depth; slope.	Severe: depth; slope.
DaC	Dekalb channery loam, 5 to 15 percent slopes.	Severe: depth; slope.	Severe: depth to pervious rock.	Moderate: depth to sandstone; slope.	Severe: depth to sandstone; slope.
DaD	Dekalb channery loam, 15 to 25 percent slopes.	Severe: depth; slope.	Severe: pervious bedrock; slope.	Severe: depth; slope.	Severe: depth; slope.
DaE	Dekalb channery loam, 25 to 45 percent slopes.	Severe: slope	Severe: slopes	Severe: slope	Severe: slope
DbD	Dekalb very stony loam, 0 to 25 percent slopes.	Severe: depth; slope; stones.	Severe: pervious bedrock; slope.	Severe: slope; stones.	Severe: slope; stones.
DbE	Dekalb very stony loam, 25 to 45 percent slopes.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
DbF	Dekalb very stony loam, 45 to 70 percent slopes.	Severe: slope	Severe: slope	Severe: slope	Severe: slope
DfB	Duffield gravelly silt loam, 3 to 8 percent slopes.	Moderate: depth to limestone.[1]	Severe: cavernous limestone.	Slight	Moderate: depth to limestone; slope.
DfC3	Duffield gravelly silt loam, 8 to 15 percent slopes, severely eroded.	Severe: depth to limestone; [1] slope.	Severe: cavernous limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth to limestone; slope.
DgB	Duffield silt loam, 3 to 8 percent slopes	Moderate: depth to limestone.[1]	Severe: cavernous limestone.	Slight	Moderate: depth to limestone; slope.
DgC	Duffield silt loam, 8 to 15 percent slopes	Severe: depth to limestone; [1] slope.	Severe: cavernous limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth; slope.
DgC3	Duffield silt loam, 8 to 15 percent slopes, severely eroded.	Severe: depth to limestone; [1] slope.	Severe: cavernous limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth; slope.
DgD3	Duffield silt loam, 15 to 25 percent slopes, severely eroded.	Severe: depth; [1] slope.	Severe: depth; slope.	Moderate or severe: depth to limestone; slope.	Severe: slope
EaC3	Carbo clay, 8 to 15 percent slopes, severely eroded.	Severe: slow permeability.	Moderate or severe: cavernous limestone.	Severe: depth to rock; clayey texture.	Severe: slope; depth to limestone; clayey texture.
EbB	Carbo silty clay loam, 2 to 8 percent slopes.	Severe: slow permeability.	Moderate or severe: cavernous limestone.	Moderate: depth to rock; clayey texture.	Moderate or severe: depth to limestone; slope.
EcC3	Chilhowie clay, 8 to 15 percent slopes, severely eroded.	Severe: slow permeability; depth.	Moderate or severe: cavernous limestone.	Severe: depth to rock; slope.	Severe: depth to limestone; slope; clayey texture.
EdB	Chilhowie silty clay, 2 to 8 percent slopes	Severe: slow permeability.	Moderate or severe: cavernous limestone.	Moderate: depth to rock; clayey texture.	Severe: depth to limestone; texture.
EdC	Chilhowie silty clay, 8 to 15 percent slopes.	Severe: slow permeability.	Severe: slope	Moderate or severe: depth to rock; clayey texture.	Severe: depth; slope.
EkC3	Chilhowie very rocky clay, 8 to 15 percent slopes, severely eroded.	Severe: rock outcrops.	Severe: limestone outcrops; slope.	Severe: limestone outcrops.	Severe: rock outcrops; slope.
EkD3	Chilhowie very rocky clay, 15 to 25 percent slopes, severely eroded.	Severe: slope; rock outcrops.	Severe: slope; outcrops.	Severe: limestone outcrops; slope.	Severe: rock outcrops; slope.
EnB	Chilhowie very rocky silty clay, 3 to 8 percent slopes.	Severe: rock outcrops.	Severe: cavernous limestone; rock outcrops.	Severe: limestone outcrops.	Severe: rock outcrops; slope.

See footnote at end of table.

soils for suburban and recreational uses—Continued

Lawns	Sanitary land fill	Parks and extensive play areas	Athletic fields	Tent sites	Access roads
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table.	Moderate: seasonally high water table; slow permeability.	Moderate: seasonally high water table.
Slight	Severe: depth	Slight	Moderate: slope	Moderate: slope	Severe: rock outcrops.
Moderate: depth; slope.	Severe: depth	Moderate: slope	Severe: slope	Moderate: slope	Severe: rock outcrops.
Moderate or severe: depth; slope; clayey texture.	Severe: depth	Moderate: slope; heavy texture.	Severe: slope; heavy texture.	Moderate: slope	Severe: rock outcrops; slope.
Severe: depth; slope; clayey texture.	Severe: depth	Severe: slope; heavy texture.	Severe: slope; heavy texture.	Severe: slope; heavy texture.	Severe: rock outcrops; slope.
Slight or moderate: depth; slope; texture.	Severe: depth	Severe: slope	Severe: slope	Moderate: slope	Moderate: depth to rock; slope.
Moderate: depth; slope.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Severe: depth; slope.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Moderate or severe: slope; stones.	Severe: depth; stones.	Moderate: slope; stones.	Severe: slope	Moderate or severe: slope; stones.	Severe: depth; slope.
Severe: slope; stones.	Severe: depth; stones.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope; stones.	Severe: depth; stones.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Moderate: depth	Slight	Moderate: slope	Slight	Moderate: slope.
Moderate: slope	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Slight	Moderate: depth	Slight	Moderate: slope	Slight	Moderate: slope.
Moderate: slope	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: slope	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: slope	Moderate: depth	Severe: slope	Severe: slope	Severe: slope	Severe: slope; depth.
Moderate: depth; slope; texture.	Moderate or severe: depth; clayey texture.	Moderate: slope; heavy texture.	Severe: slope	Moderate: slope	Severe: depth to limestone.
Slight	Moderate or severe: depth.	Moderate: heavy texture.	Moderate: heavy texture.	Slight	Severe: depth to limestone.
Moderate: depth; slopes.	Severe: depth to limestone; clayey texture.	Moderate: heavy texture.	Severe: slope	Moderate: slope; heavy texture.	Severe: depth to limestone.
Moderate: depth; clayey texture.	Severe: depth to limestone.	Moderate: heavy texture.	Moderate: heavy texture.	Moderate: heavy texture.	Severe: depth to limestone.
Moderate: depth; clayey texture.	Severe: depth to limestone.	Moderate: heavy texture; slope.	Severe: slope	Moderate: slope	Severe: depth to limestone.
Severe: limestone outcrops; slope.	Severe: depth to limestone.	Moderate: heavy texture; slope.	Severe: slope	Moderate: slope	Severe: depth to limestone.
Severe: limestone outcrops; slope.	Severe: depth to limestone.	Severe: rock outcrops.	Severe: slope; outcrops.	Severe: slope; rock outcrops.	Severe: rock outcrops; slope.
Severe: limestone outcrops; slope.	Severe: depth to limestone.	Severe: rock outcrops.	Severe: slope; outcrops.	Moderate: rock outcrops.	Severe: rock outcrops.

TABLE 13.—*Estimated degree and kind of limitation of*

Map symbol	Soil	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Homesites and building locations	Streets and parking lots
EnC	Chilhowie very rocky silty clay, 8 to 15 percent slopes.	Severe: rock outcrops.	Severe: rock outcrops; slope.	Severe: limestone outcrops; slope.	Severe: rock outcrops; slope.
FbB	Frankstown shaly silt loam, 3 to 8 percent slopes.	Moderate: depth to limestone.[1]	Severe: cavernous limestone.	Slight	Moderate: depth to limestone; slope.
FbC	Frankstown shaly silt loam, 8 to 15 percent slopes.	Severe: depth to limestone; [1] slope.	Severe: limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth; slope.
FbC3	Frankstown shaly silt loam, 8 to 15 percent slopes, severely eroded.	Severe: depth to limestone; [1] slope.	Severe: limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth; slope.
FbD	Frankstown shaly silt loam, 15 to 25 percent slopes.	Severe: slope	Severe: depth; slope.	Moderate: depth to limestone; slope.	Severe: depth; slope.
FbD3	Frankstown shaly silt loam, 15 to 25 percent slopes, severely eroded.	Severe: slope	Severe: depth; slope.	Moderate or severe: depth to limestone; slope.	Severe: depth; slope.
FcC	Frankstown very rocky silt loam, 8 to 15 percent slopes.	Severe: rock outcrops.	Severe: cavernous limestone; slope.	Severe: rock outcrops.	Severe: limestone outcrops; slope.
FdB	Frederick silt loam, 3 to 8 percent slopes	Moderate: depth to limestone. [1]	Severe: cavernous limestone.	Slight	Moderate: depth to limestone; slope.
FdC	Frederick silt loam, 8 to 15 percent slopes	Severe: depth; [1] slope.	Severe: cavernous limestone; slope.	Moderate: a few rock outcrops; slope.	Severe: depth; slope.
FdC3	Frederick silt loam, 8 to 15 percent slopes, severely eroded.	Severe: depth; [1] slope.	Severe: cavernous limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth; slope.
FfB	Frederick cherty silt loam, 3 to 8 percent slopes.	Moderate: depth to limestone. [1]	Severe: cavernous limestone; slope.	Slight	Moderate: depth to limestone; slope.
FfC	Frederick cherty silt loam, 8 to 15 percent slopes.	Severe: depth; [1] slope.	Severe: cavernous limestone; slope.	Moderate: slope; a few rock outcrops.	Severe: depth to limestone; slope.
FfC3	Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded.	Severe: depth; [1] slope.	Severe: cavernous limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth to limestone; slope.
FfD	Frederick cherty silt loam, 15 to 25 percent slopes.	Severe: slope	Severe: depth; slope.	Moderate or severe: depth to limestone; slope.	Severe: depth; slope
FfD3	Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded.	Severe: slope	Severe: depth; slope.	Moderate or severe: depth to limestone; slope.	Severe: depth; slope.
FgB	Frederick gravelly loam, thick surface, 3 to 8 percent slopes.	Moderate: depth to limestone. [1]	Severe: cavernous limestone.	Slight	Moderate: depth to limestone; slope.
FgC	Frederick gravelly loam, thick surface, 8 to 15 percent slopes.	Severe: depth; [1] slope.	Severe: cavernous limestone; slope.	Moderate: slope; a few rock outcrops.	Severe: depth; slope.
FgC3	Frederick gravelly loam, thick surface, 8 to 15 percent slopes, severely eroded.	Severe: depth; [1] slope.	Severe: cavernous limestone; slope.	Moderate: depth to rock; slope.	Severe: depth; slope.
FgD	Frederick gravelly loam, thick surface, 15 to 25 percent slopes.	Severe: slope	Severe: depth; slope.	Moderate: depth to rock; slope.	Severe: depth; slope.
FgD3	Frederick gravelly loam, thick surface, 15 to 25 percent slopes, severely eroded.	Severe: slope	Severe: depth; slope.	Moderate or severe: depth to rock; slope.	Severe: depth; slope.
FkC	Frederick very rocky silt loam, 3 to 15 percent slopes.	Severe: rock outcrops.[1]	Severe: cavernous limestone; outcrops.	Severe: limestone outcrops.	Severe: limestone outcrops; slope.
FsC	Frederick very stony loam, thick surface, 8 to 15 percent slopes.	Severe: depth; [1] slope.	Severe: cavernous limestone; stones.	Moderate: stones; slope.	Severe: slope; stones.
FsD	Frederick very stony loam, thick surface, 15 to 25 percent slopes.	Severe: slope	Severe: depth; slope.	Moderate or severe: depth to rock; stones; slope.	Severe: slope; stones.
FsE	Frederick very stony loam, thick surface, 25 to 45 percent slopes.	Severe: slope	Severe: slope	Severe: slope	Severe: slope

See footnote at end of table.

soils for suburban and recreational uses—Continued

Lawns	Sanitary land fill	Parks and extensive play areas	Athletic fields	Tent sites	Access roads
Severe: limestone outcrops; slope.	Severe: depth to limestone.	Severe: rock outcrops.	Severe: slope; outcrops.	Severe: outcrops; slope.	Severe: rock outcrops; slope.
Slight	Moderate: depth	Slight	Moderate: slope	Slight	Moderate.
Moderate: slope; shale fragments.	Moderate: depth	Moderate: depth; slope.	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: slope; shale fragments.	Moderate: depth	Moderate: depth; slope.	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: slope; shale fragments.	Moderate or severe: depth to limestone.	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Moderate: slope; runoff; shale fragments.	Moderate or severe: depth to limestone.	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Severe: limestone outcrops.	Severe: outcrops; depth.	Moderate: slope; rock outcrops.	Severe: slope	Severe: rock outcrops; slope.	Severe: rock outcrops; slope.
Slight	Moderate: depth	Slight	Moderate: depth; slope.	Slight	Moderate: slope.
Moderate: slope	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: slope; runoff.	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Slight: chert fragments.	Moderate: depth	Slight	Moderate: slope	Slight	Moderate: slope.
Moderate: slope; chert fragments.	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: slope; runoff; chert fragments.	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: slope; runoff; chert fragments.	Moderate: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Moderate or severe: slope; runoff; chert fragments.	Moderate: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Slight	Moderate: depth	Slight	Moderate: slope; depth.	Slight	Moderate: slope.
Moderate: slope	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate: slope	Moderate: depth	Moderate: slope	Severe: slope	Moderate: slope	Moderate: depth; slope.
Moderate or severe: slope; runoff.	Moderate: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Moderate or severe: slope; runoff.	Moderate: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Severe: limestone outcrops.	Severe: limestone outcrops; depth.	Moderate: slope; rock outcrops.	Severe: rock outcrops; slope.	Severe: slope; rock outcrops.	Severe: rock outcrops; depth.
Moderate: slope; stones.	Moderate: depth; stones.	Moderate: slope; stones.	Severe: slope; stones.	Moderate: slope	Moderate: depth; slope.
Moderate or severe: slope; stones.	Moderate: depth; stones.	Severe: slope	Severe: slope; stones.	Severe: slope	Severe: depth; slope.
Severe: slope	Severe: depth; stones.	Severe: slope	Severe: slope; stones.	Severe: slope	Severe: depth; slope.

TABLE 13.—*Estimated degree and kind of limitation of*

Map symbol	Soil	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Homesites and building locations	Streets and parking lots
GpA	Gilpin silt loam, soft shale substratum, 0 to 3 percent slopes.	Moderate: depth to shale.	Moderate or severe: depth; permeable substratum.	Slight	Moderate: depth to shale.
GpB	Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes.	Moderate: depth to shale.	Moderate or severe: depth; permeable substratum.	Moderate: depth to shale.	Moderate: depth to shale; slope.
GpC	Gilpin silt loam, soft shale substratum, 8 to 15 percent slopes.	Moderate: depth to shale.	Severe: permeable substratum; slope.	Moderate: depth; slope.	Severe: depth to shale; slope.
HaB	Hagerstown gravelly silt loam, 3 to 8 percent slopes.	Moderate: depth to limestone.[1]	Severe: cavernous limestone.	Slight	Moderate: depth to limestone; gravelly texture.
HaC3	Hagerstown gravelly silt loam, 8 to 15 percent slopes, severely eroded.	Severe: depth; [1] slope.	Severe: cavernous limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth to limestone; slope; texture.
HbA	Hagerstown silt loam, 0 to 3 percent slopes.	Moderate: depth to limestone.[1]	Severe: cavernous limestone.	Slight: a few outcrops.	Slight or moderate: depth to limestone; texture.
HbB	Hagerstown silt loam, 3 to 8 percent slopes.	Moderate: depth to limestone.[1]	Severe: cavernous limestone.	Slight: a few outcrops.	Moderate: depth to rock; slope; texture.
HcB	Hagerstown silty clay loam, 3 to 8 percent slopes.	Moderate: depth to limestone.[1]	Severe: cavernous limestone.	Slight: a few outcrops.	Moderate: depth to rock; slope; texture.
HcC	Hagerstown silty clay loam, 8 to 15 percent slopes.	Severe: depth; [1] slope.	Severe: cavernous limestone; slope.	Moderate: depth to limestone; slope.	Severe: depth to rock; slope; texture.
HcC3	Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded.	Severe: depth; slope.	Severe: slope	Moderate: depth to limestone; slope.	Severe: depth to rock; slope; texture.
HcD3	Hagerstown silty clay loam, 15 to 25 percent slopes, severely eroded.	Severe: depth; slope.	Severe: slope	Moderate or severe: depth to limestone; slope.	Severe: depth to rock; slope; texture.
HgB	Hagerstown very rocky silt loam, 3 to 8 percent slopes.	Severe: rock outcrops.[1]	Severe: rock outcrops; solution channels.	Severe: limestone outcrops.	Severe: limestone outcrops.
HgC	Hagerstown very rocky silt loam, 8 to 15 percent slopes.	Severe: rock outcrops; slope.	Severe: slope; outcrops; solution channels.	Severe: limestone outcrops.	Severe: limestone outcrops; slope.
HgD	Hagerstown very rocky silt loam, 15 to 25 percent slopes.	Severe: rock outcrops; slope.	Severe: slope	Severe: limestone outcrops.	Severe: limestone outcrops; slope.
HgF	Hagerstown very rocky silt loam, 25 to 50 percent slopes.	Severe: slope	Severe: slope	Severe: limestone outcrops; slope.	Severe: limestone outcrops; slope.
HkC3	Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded.	Severe: rock outcrops; slope.	Severe: slope; outcrops; solution channels.	Severe: limestone outcrops.	Severe: limestone outcrops; slope.
HkD3	Hagerstown very rocky silty clay loam, 15 to 25 percent slopes, severely eroded.	Severe: rock outcrops; slope.	Severe: slope	Severe: limestone outcrops.	Severe: limestone outcrops; slope.
Hm	Huntington fine sandy loam	Severe: flooding	Severe: flooding; sandy layers.	Severe: flooding	Severe: flooding
Hn	Huntington silt loam	Severe: flooding	Severe: flooding; sandy layers.	Severe: flooding	Severe: flooding
Ho	Huntington silt loam, local alluvium	Slight to severe: local ponding.	Moderate or severe: depth to cavernous limestone.	Slight to severe: local ponding.	Slight to severe: local ponding.
LaB	Laidig gravelly loam, 3 to 8 percent slopes	Moderate: slope	Moderate: slope	Slight or moderate: gravel.	Moderate: slope
LaC	Laidig gravelly loam, 8 to 15 percent slopes.	Severe: slope	Severe: slope	Moderate: slope; possible slips.	Severe: slope; possible slips.
LaC3	Laidig gravelly loam, 8 to 15 percent slopes, severely eroded.	Severe: slope	Severe: slope	Moderate: slope; possible slips.	Severe: slope; possible slips.
LaD	Laidig gravelly loam, 15 to 25 percent slopes.	Severe: slope	Severe: slope	Moderate: slope; possible slips.	Severe: slope; possible slips.
LbC	Laidig very stony loam, 3 to 15 percent slopes.	Moderate: slope; stones.	Severe: slope; stones.	Moderate: stones; slope; possible slips.	Moderate or severe: slope; stones.

See footnote at end of table.

soils for suburban and recreational uses—Continued

Lawns	Sanitary land fill	Parks and extensive play areas	Athletic fields	Tent sites	Access roads
Slight	Moderate or severe: depth to soft shale.	Slight	Slight	Slight	Slight.
Slight	Moderate or severe: depth to soft shale.	Slight	Moderate: depth to shale; slope.	Slight	Moderate: depth to shale; slope.
Moderate: slope	Moderate or severe: depth to soft shale.	Moderate: slope	Severe: depth to shale; slope.	Moderate: slope	Moderate or severe: depth; slope.
Slight	Moderate: depth	Slight	Severe: texture; slope.	Slight	Moderate: depth to limestone.
Moderate: slope; runoff.	Moderate: depth	Moderate: slope	Severe: slope; gravel.	Moderate: slope	Severe: depth to limestone; slope.
Slight	Moderate: depth	Slight	Slight	Slight	Moderate: depth to limestone.
Slight	Moderate: depth	Slight	Moderate: slope	Slight	Moderate: depth to limestone.
Slight	Moderate or severe: depth to rock.	Moderate: texture	Moderate: slope; texture.	Slight	Moderate: depth to limestone.
Moderate: slope	Moderate or severe: depth to rock.	Moderate: slope	Severe: slope	Moderate: slope	Severe: depth to limestone; slope.
Moderate: slope; runoff.	Moderate or severe: depth to rock.	Moderate: slope	Severe: slope	Moderate: slope	Severe: depth to limestone; slope.
Moderate or severe: slope; runoff.	Severe: depth to rock.	Severe: slope	Severe: slope	Severe: slope	Severe: depth to limestone; slope.
Severe: limestone outcrops.	Severe: limestone outcrops; depth.	Moderate: rock outcrops.	Severe: rock outcrops.	Moderate: rock outcrops.	Severe: limestone outcrops.
Severe: limestone outcrops.	Severe: limestone outcrops; depth.	Moderate: rock outcrops; slope.	Severe: rock outcrops; slope.	Moderate: rock outcrops.	Severe: limestone outcrops.
Severe: limestone outcrops; slope.	Severe: limestone outcrops; depth.	Severe: slope; rock outcrops.	Severe: slope; rock outcrops.	Severe: slope; rock	Severe: slope; rock outcrops.
Severe: limestone outcrops; slope.	Severe: limestone outcrops; depth.	Severe: slope; rock outcrops.	Severe: slope	Severe: slope; rock	Severe: slope; rock outcrops.
Severe: limestone outcrops; slope.	Severe: limestone outcrops; depth.	Moderate: slope; rock outcrops.	Severe: slope; rock outcrops.	Moderate: slope; rock outcrops.	Severe: slope; limestone outcrops.
Severe: limestone outcrops; slope.	Severe: limestone outcrops; depth.	Severe: slope; rock outcrops.	Severe: slope	Severe: slope	Severe: slope; limestone outcrops.
Slight or moderate: flooding.	Slight or moderate: flooding.	Moderate: flooding	Slight or moderate: flooding.	Moderate: flooding	Slight.
Slight or moderate: flooding.	Slight or moderate: flooding.	Moderate: flooding	Slight or moderate: flooding.	Moderate: flooding	Slight.
Slight	Slight	Slight	Slight	Moderate: flooding	Slight.
Slight or moderate: gravel.	Slight	Slight	Moderate: gravel; slope.	Slight	Moderate: slope.
Moderate: slope; gravel.	Slight	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope; possible slips.
Moderate: slope; gravel.	Slight	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope; possible slips.
Moderate: slope; gravel.	Slight	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: slope; stones.	Moderate: stones	Moderate: slope	Severe: slope; stones.	Moderate: slope; stones.	Moderate or severe: slope.

TABLE 13.—*Estimated degree and kind of limitation of*

Map symbol	Soil	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Homesites and building locations	Streets and parking lots
LbD	Laidig very stony loam, 15 to 25 percent slopes.	Severe: slope	Severe: slope	Moderate or severe: slope; stones; possible slips.	Severe: slope; stones; possible slips.
LbE	Laidig very stony loam, 25 to 45 percent slopes.	Severe: slope	Severe: slope	Severe: slope; possible slips.	Severe: slope; stones; possible slips.
LdB	Leadvale silt loam, 3 to 8 percent slopes	Severe: slow permeability.	Moderate: slope	Moderate: water table; seeps; possible slips.	Moderate: water table; slope; possible slips.
LdC	Leadvale silt loam, 8 to 15 percent slopes	Severe: slow permeability; slope.	Severe: slope	Moderate: water table; seeps; possible slips.	Severe: water table; slope; possible slips.
LdC3	Leadvale silt loam, 8 to 15 percent slopes, severely eroded.	Severe: slow permeability; slope.	Severe: slope	Moderate: water table; seeps; possible slips.	Severe: water table; slope; possible slips.
LhB	Lehew channery loam, 3 to 10 percent slopes.	Moderate: depth to rock.	Severe: pervious bedrock; slope.	Slight or moderate: depth to rock; slope.	Moderate or severe: depth to sandstone; slope.
LhC	Lehew channery loam, 10 to 20 percent slopes.	Severe: depth; slope.	Severe: slope	Slight or moderate: depth to rock; slope.	Severe: depth; slope.
LhC3	Lehew channery loam, 10 to 20 percent slopes, severely eroded.	Severe: depth; slope.	Severe: slope	Slight or moderate: depth to rock; slope.	Severe: depth; slope.
LhD	Lehew channery loam, 20 to 30 percent slopes.	Severe: slope	Severe: slope	Severe: depth to rock; slope.	Severe: depth; slope.
LhD3	Lehew channery loam, 20 to 30 percent slopes, severely eroded.	Severe: slope	Severe: slope	Severe: depth to rock; slope.	Severe: depth; slope.
LhE	Lehew channery loam, 30 to 45 percent slopes.	Severe: slope	Severe: slope	Severe: depth to rock; slope.	Severe: depth; slope.
Ln	Lindside silt loam	Severe: flooding	Moderate: sandy layers in places; flooding.	Severe: water table; flooding.	Severe: water table; flooding.
LoB	Lindside silt loam, local alluvium, 0 to 3 percent slopes.	Severe: flooding	Moderate or severe: depth to limestone; flooding.	Severe: water table; flooding.	Severe: water table; flooding.
LoC	Lindside silt loam, local alluvium, 3 to 8 percent slopes.	Severe: water table; slow permeability.	Moderate or severe: depth to limestone; slope.	Severe: water table; flooding.	Severe: water table; flooding.
Ma	Melvin silt loam	Severe: water table; flooding.	Severe flooding	Severe: high water table; flooding.	Severe: high water table; flooding.
MgB	Monongahela gravelly silt loam, 3 to 8 percent slopes.	Severe: slow permeability.	Moderate: sandy layers in places; slope.	Moderate: water table.	Moderate: water table; slope.
MhA	Monongahela silt loam, 0 to 3 percent slopes.	Severe: slow permeability.	Moderate: sandy layers in places.	Moderate: water table.	Moderate: water table; seepy spots.
MhB	Monongahela silt loam, 3 to 8 percent slopes.	Severe: slow permeability.	Moderate: sandy layers in places.	Moderate: water table.	Moderate: water table; seepy spots.
MhC3	Monongahela silt loam, 8 to 15 percent slopes, severely eroded.	Severe: slow permeability; slope.	Severe: slope	Moderate: water table; slope.	Severe: slope; water table.
MkC3	Montevallo channery silt loam, 10 to 20 percent slopes, severely eroded.	Severe: depth to shale; slope.	Severe: slope; permeable bedrock.	Moderate or severe: depth to shale; slope.	Severe: depth to shale; slope.
MkD3	Montevallo channery silt loam, 20 to 30 percent slopes, severely eroded.	Severe: depth; slope.	Severe: slope	Severe: depth to shale; slope.	Severe: depth to shale; slope.

See footnote at end of table.

soils for suburban and recreational uses—Continued

Lawns	Sanitary land fill	Parks and extensive play areas	Athletic fields	Tent sites	Access roads
Moderate or severe: slope; stones.	Moderate: stones	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope; stones.	Moderate: stones	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: water table.	Moderate: water table; seepage.	Slight	Moderate: moderately high water table.	Moderate: water table.	Moderate: water table.
Moderate: water table.	Moderate: water table; seepage.	Moderate: slope	Severe: slope	Moderate: water table.	Moderate: slope; water table.
Moderate: water table.	Moderate: water table; seepage.	Moderate: slope	Severe: slope	Moderate: water table.	Moderate: slope; water table.
Slight or moderate: shallowness; channery fragments.	Severe: shallowness.	Moderate: slope	Moderate: slope	Slight	Moderate: depth to rock; slope.
Moderate: shallowness; slope; channery fragments.	Severe: shallowness.	Moderate: slope	Severe: slope	Moderate: slope	Severe: slope.
Moderate or severe: shallowness; slope.	Severe: shallowness.	Moderate: slope	Severe: slope	Moderate: slope	Severe: slope.
Severe: depth; slope.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: depth slope.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: depth; slope.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight or moderate: water table; flooding.	Severe: water table; flooding.	Moderate: flooding	Moderate: water table; flooding.	Moderate: water table; flooding.	Moderate: water table.
Slight or moderate: water table; flooding.	Severe: water table; flooding.	Moderate: flooding	Moderate: water table; flooding.	Moderate: water table; flooding.	Moderate: water table.
Slight or moderate: water table; flooding.	Severe: water table; flooding.	Slight	Moderate: water table; flooding.	Moderate: water table; flooding.	Moderate: water table.
Moderate: water table; flooding.	Severe: water table; flooding.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Slight	Moderate: water table.	Moderate: moderately high water table.	Moderate: water table; slope.	Moderate: moderately high water table.	Moderate: water table.
Slight	Moderate: water table.	Moderate: moderately high water table.	Moderate: water table.	Moderate: moderately high water table.	Moderate: water table.
Slight	Moderate: water table.	Moderate: moderately high water table.	Moderate: water table.	Moderate: moderately high water table.	Moderate: water table.
Moderate: slope	Moderate: water table.	Moderate: slope	Severe: slope	Moderate: water table; slope.	Moderate: water table; slope.
Severe: depth; slope.	Severe: depth	Severe: slope	Severe: slope	Moderate or severe: slope.	Severe: slope.
Severe: depth; slope.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 13.—*Estimated degree and kind of limitation of*

Map symbol	Soil	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Homesites and building locations	Streets and parking lots
MkE	Montevallo channery silt loam, 30 to 50 percent slopes.	Severe: slope	Severe: slope	Severe: slope	Severe: depth to shale; slope.
MmB	Montevallo shaly silt loam, 3 to 10 percent slopes.	Severe: depth to shale.	Severe: depth; slope; permeable shale.	Moderate: depth to shale.	Moderate or severe: depth to shale; slope.
MmB3	Montevallo shaly silt loam, 3 to 10 percent slopes, severely eroded.	Severe: depth to shale.	Severe: depth; slope; permeable shale.	Moderate or severe: depth to shale.	Severe: depth to shale; slope.
MmC	Montevallo shaly silt loam, 10 to 20 percent slopes.	Severe: depth to shale; slope.	Severe: depth to shale; slope.	Moderate: depth to shale; slope.	Severe: depth; slope.
MmC3	Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded.	Severe: depth to shale; slope.	Severe: depth to shale; slope.	Moderate or severe: depth to shale; slope.	Severe: depth; slope
MmD	Montevallo shaly silt loam, 20 to 30 percent slopes.	Severe: slope	Severe: slope	Severe: depth; slope.	Severe: depth; slope.
MmD3	Montevallo shaly silt loam, 20 to 30 percent slopes, severely eroded.	Severe: slope	Severe: slope	Severe: depth; slope.	Severe: depth; slope.
MmE	Montevallo shaly silt loam, 30 to 50 percent slopes.	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
MmE3	Montevallo shaly silt loam, 30 to 50 percent slopes, severely eroded.	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
MnC3	Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded.	Severe: depth to rock; slope.	Severe: slope; permeable bedrock.	Moderate or severe: depth; slope.	Severe: depth to rock; slope.
MnD3	Montevallo-Lehew channery loams, 20 to 30 percent slopes, severely eroded.	Severe: slope	Severe: slope	Severe: depth; slope.	Severe: depth to rock; slope.
MnE	Montevallo-Lehew channery loams, 30 to 45 percent slopes.	Severe: slope	Severe: slope	Severe: slope	Severe: depth to rock; slope.
MrA	Murrill gravelly silt loam, moderately deep, 0 to 3 percent slopes.	Slight	Moderate or severe: underlain by cavernous limestone.	Slight	Slight
MrB	Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes.	Moderate: slope	Severe: slope; underlain by limestone.	Slight	Moderate: slope
MsB	Murrill gravelly loam, 3 to 8 percent slopes.	Moderate: slope	Severe: slope; underlain by limestone.	Slight	Moderate: slope
MsC	Murrill gravelly loam, 8 to 15 percent slopes.	Severe: slope	Severe: slope; underlain by limestone.	Moderate: slope; possible slips.	Severe: depth to limestone; slope.
MsC3	Murrill gravelly loam, 8 to 15 percent slopes, severely eroded.	Severe: slope	Severe: slope; underlain by limestone.	Moderate: slope; possible slips.	Severe: depth to limestone; slope.
MsD	Murrill gravelly loam, 15 to 25 percent slopes.	Severe: slope	Severe: slope	Moderate: slope; possible slips.	Severe: depth to limestone; slope.
MuA	Murrill silt loam, 0 to 3 percent slopes	Slight [1]	Moderate or severe: depth to limestone.	Slight	Slight
MvE	Murrill very stony silt loam, 20 to 40 percent slopes.	Severe: slope	Severe: slope	Severe: slope; stones.	Severe: slope; stones.
Pf	Philo fine sandy loam	Severe: flooding	Severe: sandy layers; flooding.	Severe: flooding; water table.	Severe: flooding; water table.
Ph	Philo silt loam	Severe: flooding	Moderate or severe: sandy layers; flooding.	Severe: flooding; water table.	Severe: flooding; water table.
PkA	Pickaway silt loam, overwash, 0 to 3 percent slopes.	Severe: slow permeability.	Moderate or severe: depth to cavernous limestone.	Slight	Slight or moderate: water table.
PmB	Pickaway silt loam, 3 to 8 percent slopes	Severe: slow permeability.	Severe: depth to limestone; slope.	Moderate: water table.	Moderate: slope; water table.

See footnote at end of table.

soils for suburban and recreational uses—Continued

Lawns	Sanitary land fill	Parks and extensive play areas	Athletic fields	Tent sites	Access roads
Severe: depth; slope.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: depth; slope; droughtiness.	Severe: depth	Moderate: slope	Moderate or severe: depth; slope.	Slight	Moderate: depth to shale; slope.
Moderate: depth; slope; droughtiness.	Severe: depth	Moderate: slope	Moderate or severe: depth; slope.	Slight	Moderate: depth to shale; slope.
Moderate or severe: depth; slope; droughtiness.	Severe: depth	Moderate: slope	Severe: slope	Moderate or severe: slope.	Severe: depth; slope.
Moderate or severe: depth; slope; droughtiness.	Severe: depth	Moderate: slope	Severe: slope	Moderate or severe: slope.	Severe: depth; slope.
Severe: depth; slope; shale fragments.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Severe: depth; slope; shale fragments.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Severe: depth; slope; shale fragments.	Severe: depth	Severe. slope	Severe: slope	Severe: slope	Severe: depth; slope.
Severe: depth; slope; shale fragments.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Moderate or severe: depth; slope; channery fragments.	Severe: depth	Moderate: slope	Severe: slope	Moderate or severe: slope.	Severe: depth; slope.
Severe: depth; slope; channery fragments.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Severe: depth; slope; channery fragments.	Severe: depth	Severe: slope	Severe: slope	Severe: slope	Severe: depth; slope.
Slight or moderate: depth to limestone.	Slight or moderate: depth.	Slight	Slight	Slight	Slight.
Slight: gravel	Slight or moderate: depth.	Slight	Moderate: slope	Slight	Moderate: slope.
Slight	Slight or moderate: depth.	Slight	Moderate: slope	Slight	Moderate: slope.
Moderate: slope	Slight or moderate: depth.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: slope	Slight or moderate: depth.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: slope	Slight or moderate: depth.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight or moderate: depth.	Slight	Slight	Slight	Slight.
Severe: slope; stones.	Severe: depth; stones.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight or moderate: flooding.	Moderate: flooding; water table.	Moderate: flooding	Moderate: water table; flooding.	Moderate: water table; flooding.	Moderate: water table.
Slight or moderate: flooding.	Moderate: flooding; water table.	Moderate: flooding	Moderate: water table; flooding.	Moderate: water table; flooding.	Moderate: water table.
Slight	Moderate: water table; depth.	Slight	Slight or moderate: water table.	Slight	Slight.
Moderate: water table.	Moderate: water table; depth.	Slight	Moderate: slope; water table.	Moderate: moderately high water table.	Moderate: water table; depth to limestone.

TABLE 13.—*Estimated degree and kind of limitation of*

Map symbol	Soil	Drainage fields for effluent disposal	Impoundments and sewage lagoons	Homesites and building locations	Streets and parking lots
Pn	Pope fine sandy loam	Severe: flooding	Severe: sandy layers; flooding.	Severe: flooding	Severe: flooding
Po	Pope silt loam	Severe: flooding	Severe: sandy layers, flooding.	Severe: flooding	Severe: flooding
RuB	Rushtown very shaly silt loam, 3 to 8 percent slopes.	Moderate: slope; rapid permeability.	Severe: permeable shale substratum.	Slight or moderate: possible slips.	Moderate: possible slips.
SaA	Sees silt loam, 0 to 3 percent slopes	Severe: high water table.[1]	Slight to severe: depth to cavernous limestone.	Severe: high water table.	Severe: high water table.
SaB	Sees silt loam, 3 to 8 percent slopes	Severe: high water table.[1]	Moderate or severe: depth to limestone; slope.	Severe: high water table.	Severe: high water table.
ScB3	Sees silty clay loam, 3 to 8 percent slopes, severely eroded.	Severe: high water table.[1]	Moderate or severe: depth to limestone; slope.	Severe: high water table.	Severe: high water table.
TyA	Tygart silt loam, 0 to 3 percent slopes	Severe: high water table.	Slight	Severe: high water table.	Severe: high water table.
TyB	Tygart silt loam, 3 to 8 percent slopes	Severe: high water table.	Slight	Severe: high water table.	Severe: high water table.
WaB	Waynesboro gravelly loam, 3 to 8 percent slopes.	Moderate: slope	Moderate: slope	Slight	Moderate: slope
WaC	Waynesboro gravelly loam, 8 to 15 percent slopes.	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
WaC3	Waynesboro gravelly loam, 8 to 15 percent slopes, severely eroded.	Severe: slope	Severe: slope	Moderate: slope	Severe: slope

[1] Underground water may be contaminated by seepage of waste liquid through rock crevices or solution channels.

Homesites and building locations.—Table 13 rates the soils as homesites and as locations for service buildings in recreational areas. These buildings are two stories or less in height and have less than an 8-foot excavation for basements. Considered in rating the soils are depth to a seasonally high water table, depth to and kind of bedrock, degree of slope, hazard of flooding, and need for land shaping and other kinds of landscaping. Flooding is a severe hazard where it occurs. The depth to rock and to a high water table (see table 10 in the subsection "Use of Soils in Engineering") are less severe limitations for buildings that do not have a basement than for those that do. Suitable soil material is needed in sufficient amounts so that desirable trees and other plants can survive and grow well.

Streets and parking lots.—Soil requirements and limitations for streets and parking lots are similar to those for highways (see tables 10 and 11 in the subsection "Use of Soils in Engineering"). Table 10 shows the depth to and kind of bedrock, depth to the water table, and soil texture. In table 11 are shown the suitability of each soil in the county for road fill, the limitations that affect highway location, and the susceptibility to frost action. Other limiting features are steepness of slope and flooding. Soils that have slopes of more than 8 percent are of severely limited use for parking lots.

Lawns.—It is assumed that sufficient lime and fertilizer are used for lawns, and the need for these elements is not considered in this part of the report. Among the important soil properties that determine whether a good lawn can be established are soil depth, texture, slope, droughtiness, depth to the water table, and the presence of stones or rocks.

Sanitary land fill.—A sanitary land fill is an area that is used for the disposal of refuse or garbage by covering it with soil material that is deep enough to meet the requirements of sanitation and stability of the fill. The main requirement is for enough soil material to cover the refuse and garbage. If trenches must be dug, the depth to underlying rock is especially important. Among features that limit use for land fill are shallowness, flooding, a high water table, and the presence of stones or rocks. Slope is not necessarily a limiting feature of soils, because many steep draws can be used with little or no excavation. Sinkholes in limestone areas should not be used, for refuse is likely to seep through solution channels and contaminate the underground water. Esthetic, economic, and sociological factors are important but are not considered in the ratings shown in table 13 for sanitary land fill.

Parks and extensive play areas.—This county has fairly large areas that are used for hiking, picnicking, and other kinds of recreation and are left mostly in their natural state. Only trails, picnic sites, and other small areas

soils for suburban and recreational uses—Continued

Lawns	Sanitary land fill	Parks and extensive play areas	Athletic fields	Tent sites	Access roads
Slight or moderate: sandy texture; flooding.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight or moderate: flooding.	Slight.
Slight or moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Moderate: flooding.	Slight or moderate: flooding.	Slight.
Moderate or severe: shale fragments; droughtiness.	Slight: some material suitable, but soil occurs in narrow strips.	Moderate: texture.	Moderate: slope.	Slight.	Moderate: slope.
Moderate: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: water table.
Severe: water table.	Severe: water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: water table.
Slight or moderate: gravel.	Slight or moderate: depth.	Slight.	Moderate: slope.	Slight.	Moderate: slope.
Moderate: slope; gravel.	Slight or moderate: depth.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Moderate: slope; gravel.	Slight or moderate: depth.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.

have been cleared and are kept in sod. The main features that restrict use of the soils for parks and play areas are strong slopes, flooding, a high water table, soil texture, and the presence of rocks or stones. Some areas that are steep or rocky, however, can be used as scenic spots or for nature trails.

Athletic fields.—These are fairly small areas used for baseball, tennis, volleyball, and other sports. Because the areas must be nearly level, considerable shaping may be needed. Normally, a soil that has a clayey or gravelly surface layer is not suitable. Other limiting features are slope, depth to and kind of bedrock, a high water table, rockiness or stoniness, and flooding or local ponding. The Frederick, Hagerstown, and other limestone soils have outcrops of rock that are troublesome.

Tent sites.—Tent sites should be level, accessible, and large enough to include a parking area, picnic tables, and fireplaces. Among the features that limit use of the soils in this county for tent sites are slope, texture of the surface layer, flooding, a high water table, and the presence of rocks or stones.

Access roads.—In the last column of table 13, the soils are rated according to the severity of limitations on light or medium traffic to recreational areas and to buildings and homesites. Soil features that cause these limitations are mainly texture, slope, depth to and kind of bedrock, a high water table, rocks, and land slips. The limitations are similar to those for highways. (See tables 10 and 11 in the subsection "Use of Soils in Engineering") Table 10 shows the depth to and kind of bedrock, depth to the water table, and soil texture. Table 11 lists the suitability of each soil in the county for road fill and limitations affecting highway locations. Ratings for access roads generally are less severe than those for parking lots, ratings for which also are shown on table 13.

Limitations on the use of soils for bridle trails and footpaths are similar to those on the use for access roads, but generally they are somewhat less severe. For example, soils used for bridle trails and footpaths are not severely limited by stones, rocks, or strong slopes.

Descriptions of the Soils

This section describes the soil series (groups of soils) and single soils (mapping units) of Berkeley County. The acreage and proportionate extent of each mapping unit are given in table 14.

The procedure in this section is first to describe the soil series, and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs. As mentioned in the section "How Soils Are Mapped and

Classified," not all mapping units are members of a soil series. Sloping eroded land, shale materials, and Steep rock land are miscellaneous land types and do not belong to a soil series but, nevertheless, are listed in alphabetic order along with the soil series.

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

Many terms used in the soil descriptions and other sections of the report are defined in the Glossary.

TABLE 14.—*Approximate acreage and proportionate extent of the soils*

Map symbol	Soil or land type	Area	Extent	Map symbol	Soil or land type	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
Aa	Alluvial land, neutral or slightly acid	206	0.1	CnB	Corydon silt loam, 3 to 8 percent slopes	215	.1
Ab	Alluvial land, strongly acid	1,960	1.0	CnC	Corydon silt loam, 8 to 20 percent slopes	126	.1
Am	Alluvial land, marl substratum	840	.4	CoC3	Corydon silty clay, 8 to 15 percent slopes, severely eroded	564	.3
At	Atkins silt loam	1,429	.7	CoD3	Corydon silty clay, 15 to 25 percent slopes, severely eroded	349	.2
BcB	Berks channery silt loam, 3 to 10 percent slopes	2,116	1.0	DaC	Dekalb channery loam, 5 to 15 percent slopes	284	.1
BcC	Berks channery silt loam, 10 to 20 percent slopes	951	.5	DaD	Dekalb channery loam, 15 to 25 percent slopes	334	.2
BcD	Berks channery silt loam, 20 to 30 percent slopes	1,380	.7	DaE	Dekalb channery loam, 25 to 45 percent slopes	261	.1
BhB	Berks shaly silt loam, 3 to 8 percent slopes	8,427	4.2	DbD	Dekalb very stony loam, 0 to 25 percent slopes	3,275	1.6
BhC	Berks shaly silt loam, 8 to 15 percent slopes	1,484	.7	DbE	Dekalb very stony loam, 25 to 45 percent slopes	4,126	2.0
BhD	Berks shaly silt loam, 15 to 25 percent slopes	2,152	1.1	DbF	Dekalb very stony loam, 45 to 70 percent slopes	9,120	4.5
BkB	Berks-Lehew channery loams, 3 to 10 percent slopes	529	.3	DfB	Duffield gravelly silt loam, 3 to 8 percent slopes	1,776	.9
BkC	Berks-Lehew channery loams, 10 to 20 percent slopes	543	.3	DfC3	Duffield gravelly silt loam, 8 to 15 percent slopes, severely eroded	782	.4
BkD	Berks-Lehew channery loams, 20 to 30 percent slopes	353	.2	DgB	Duffield silt loam, 3 to 8 percent slopes	808	.4
BmB3	Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded	430	.2	DgC	Duffield silt loam, 8 to 15 percent slopes	164	.1
BmC3	Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded	8,704	4.3	DgC3	Duffield silt loam, 8 to 15 percent slopes, severely eroded	1,085	.5
BmD3	Berks-Montevallo shaly silt loams, 15 to 25 percent slopes, severely eroded	3,197	1.6	DgD3	Duffield silt loam, 15 to 25 percent slopes, severely eroded	184	.1
BnA	Blairton silt loam, 0 to 3 percent slopes	707	.3	FbB	Frankstown shaly silt loam, 3 to 8 percent slopes	1,699	.8
BnB	Blairton silt loam, 3 to 8 percent slopes	1,031	.5	FbC	Frankstown shaly silt loam, 8 to 15 percent slopes	357	.2
BtA	Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes	571	.3	FbC3	Frankstown shaly silt loam, 8 to 15 percent slopes, severely eroded	2,431	1.2
BtB	Blairton shaly silt loam, thin solum variant, 3 to 8 percent slopes	1,087	.5	FbD	Frankstown shaly silt loam, 15 to 25 percent slopes	118	.1
BuB	Buchanan gravelly loam, 3 to 8 percent slopes	417	.2	FbD3	Frankstown shaly silt loam, 15 to 25 percent slopes, severely eroded	727	.4
BuC	Buchanan gravelly loam, 8 to 15 percent slopes	325	.2	FcC	Frankstown very rocky silt loam, 8 to 15 percent slopes	260	.1
BvC	Buchanan very stony loam, 3 to 15 percent slopes	2,165	1.1	FdB	Frederick silt loam, 3 to 8 percent slopes	2,705	1.3
CaB	Captina silt loam, 3 to 8 percent slopes	645	.3	FdC	Frederick silt loam, 8 to 15 percent slopes	339	.2
EaC3	Carbo clay, 8 to 15 percent slopes, severely eroded	276	.1	FdC3	Frederick silt loam, 8 to 15 percent slopes, severely eroded	1,022	.5
EbB	Carbo silty clay loam, 2 to 8 percent slopes	1,156	.6	FfB	Frederick cherty silt loam, 3 to 8 percent slopes	1,999	1.0
EcC3	Chilhowie clay, 8 to 15 percent slopes, severely eroded	901	.4	FfC	Frederick cherty silt loam, 8 to 15 percent slopes	477	.2
EdB	Chilhowie silty clay, 2 to 8 percent slopes	2,008	1.0	FfC3	Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded	1,834	.9
EdC	Chilhowie silty clay, 8 to 15 percent slopes	243	.1	FfD	Frederick cherty silt loam, 15 to 25 percent slopes	162	.1
EkC3	Chilhowie very rocky clay, 8 to 15 percent slopes, severely eroded	548	.3	FfD3	Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded	148	.1
EkD3	Chilhowie very rocky clay, 15 to 25 percent slopes, severely eroded	189	.1				
EnB	Chilhowie very rocky silty clay, 3 to 8 percent slopes	362	.2				
EnC	Chilhowie very rocky silty clay, 8 to 15 percent slopes	178	.1				

See footnote at end of table.

TABLE 14.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Soil or land type	Area	Extent	Map symbol	Soil or land type	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
FgB	Frederick gravelly loam, thick surface, 3 to 8 percent slopes	428	.2	LbE	Laidig very stony loam, 25 to 45 percent slopes	582	.3
FgC	Frederick gravelly loam, thick surface, 8 to 15 percent slopes	366	.2	LdB	Leadvale silt loam, 3 to 8 percent slopes	685	.3
FgC3	Frederick gravelly loam, thick surface, 8 to 15 percent slopes, severely eroded	246	.1	LdC	Leadvale silt loam, 8 to 15 percent slopes	76	(1)
FgD	Frederick gravelly loam, thick surface, 15 to 25 percent slopes	247	.1	LdC3	Leadvale silt loam, 8 to 15 percent slopes, severely eroded	109	.1
FgD3	Frederick gravelly loam, thick surface, 15 to 25 percent slopes, severely eroded	297	.1	LhB	Lehew channery loam, 3 to 10 percent slopes	997	.5
FkC	Frederick very rocky silt loam, 3 to 15 percent slopes	434	.2	LhC	Lehew channery loam, 10 to 20 percent slopes	835	.4
FsC	Frederick very stony loam, thick surface, 8 to 15 percent slopes	550	.3	LhC3	Lehew channery loam, 10 to 20 percent slopes, severely eroded	1, 198	.6
FsD	Frederick very stony loam, thick surface, 15 to 25 percent slopes	1, 184	.6	LhD	Lehew channery loam, 20 to 30 percent slopes	1, 269	.6
FsE	Frederick very stony loam, thick surface, 25 to 45 percent slopes	382	.2	LhD3	Lehew channery loam, 20 to 30 percent slopes, severely eroded	618	.3
GpA	Gilpin silt loam, soft shale substratum, 0 to 3 percent slopes	184	.1	LhE	Lehew channery loam, 30 to 45 percent slopes	319	.2
GpB	Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes	3, 106	1.5	Ln	Lindside silt loam	1, 722	.9
GpC	Gilpin silt loam, soft shale substratum, 8 to 15 percent slopes	203	.1	LoB	Lindside silt loam, local alluvium, 0 to 3 percent slopes	1, 237	.6
HaB	Hagerstown gravelly silt loam, 3 to 8 percent slopes	1, 326	.7	LoC	Lindside silt loam, local alluvium, 3 to 8 percent slopes	143	.1
HaC3	Hagerstown gravelly silt loam, 8 to 15 percent slopes, severely eroded	589	.3	Ma	Melvin silt loam	604	.3
HbA	Hagerstown silt loam, 0 to 3 percent slopes	601	.3	MgB	Monongahela gravelly silt loam, 3 to 8 percent slopes	346	.2
HbB	Hagerstown silt loam, 3 to 8 percent slopes	12, 593	6.2	MhA	Monongahela silt loam, 0 to 3 percent slopes	265	.1
HcB	Hagerstown silty clay loam, 3 to 8 percent slopes	986	.5	MhB	Monongahela silt loam, 3 to 8 percent slopes	780	.4
HcC	Hagerstown silty clay loam, 8 to 15 percent slopes	665	.3	MhC3	Monongahela silt loam, 8 to 15 percent slopes, severely eroded	182	.1
HcC3	Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded	2, 668	1.3	MkC3	Montevallo channery silt loam, 10 to 20 percent slopes, severely eroded	876	.4
HcD3	Hagerstown silty clay loam, 15 to 25 percent slopes, severely eroded	251	.1	MkD3	Montevallo channery silt loam, 20 to 30 percent slopes, severely eroded	718	.4
HgB	Hagerstown very rocky silt loam, 3 to 8 percent slopes	4, 648	2.3	MkE	Montevallo channery silt loam, 30 to 50 percent slopes	1, 442	.7
HgC	Hagerstown very rocky silt loam, 8 to 15 percent slopes	2, 888	1.4	MmB	Montevallo shaly silt loam, 3 to 10 percent slopes	3, 314	1.6
HgD	Hagerstown very rocky silt loam, 15 to 25 percent slopes	432	.2	MmB3	Montevallo shaly silt loam, 3 to 10 percent slopes, severely eroded	299	.1
HgF	Hagerstown very rocky silt loam, 25 to 50 percent slopes	297	.1	MmC	Montevallo shaly silt loam, 10 to 20 percent slopes	3, 013	1.5
HkC3	Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded	1, 089	.5	MmC3	Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded	4, 872	2.4
HkD3	Hagerstown very rocky silty clay loam, 15 to 25 percent slopes, severely eroded	415	.2	MmD	Montevallo shaly silt loam, 20 to 30 percent slopes	4, 279	2.1
Hm	Huntington fine sandy loam	807	.4	MmD3	Montevallo shaly silt loam, 20 to 30 percent slopes, severely eroded	2, 590	1.3
Hn	Huntington silt loam	710	.3	MmE	Montevallo shaly silt loam, 30 to 50 percent slopes	8, 939	4.4
Ho	Huntington silt loam, local alluvium	2, 463	1.2	MmE3	Montevallo shaly silt loam, 30 to 50 percent slopes, severely eroded	570	.3
LaB	Laidig gravelly loam, 3 to 8 percent slopes	151	.1	MnC3	Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded	422	.2
LaC	Laidig gravelly loam, 8 to 15 percent slopes	710	.3	MnD3	Montevallo-Lehew channery loams, 20 to 30 percent slopes, severely eroded	184	.1
LaC3	Laidig gravelly loam, 8 to 15 percent slopes, severely eroded	195	.1	MnE	Montevallo-Lehew channery loams, 30 to 45 percent slopes	185	.1
LaD	Laidig gravelly loam, 15 to 25 percent slopes	512	.2	MrA	Murrill gravelly silt loam, moderately deep, 0 to 3 percent slopes	471	.2
LbC	Laidig very stony loam, 3 to 15 percent slopes	853	.4	MrB	Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes	1, 479	.7
LbD	Laidig very stony loam, 15 to 25 percent slopes	3, 220	1.6	MsB	Murrill gravelly loam, 3 to 8 percent slopes	1, 032	.5
				MsC	Murrill gravelly loam, 8 to 15 percent slopes	317	.2

See footnote at end of table.

TABLE 14.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Soil or land type	Area	Extent	Map symbol	Soil or land type	Area	Extent
		Acres	*Percent*			*Acres*	*Percent*
MsC3	Murrill gravelly loam, 8 to 15 percent slopes, severely eroded	305	.2	ScB3	Sees silty clay loam, 3 to 8 percent slopes, severely eroded	289	.1
MsD	Murrill gravelly loam, 15 to 25 percent slopes	124	.1	ShD	Sloping eroded land, shale materials	1,123	.6
MuA	Murrill silt loam, 0 to 3 percent slopes	722	.4	ShE	Steep eroded land, shale materials	1,476	.7
MvE	Murrill very stony silt loam, 20 to 40 percent slopes	210	.1	SrF	Steep rock land	1,780	.9
Pf	Philo fine sandy loam	404	.2	TyA	Tygart silt loam, 0 to 3 percent slopes	718	.4
Ph	Philo silt loam	1,269	.6	TyB	Tygart silt loam, 3 to 8 percent slopes	1,095	.5
PkA	Pickaway silt loam, overwash, 0 to 3 percent slopes	2,598	1.3	WaB	Waynesboro gravelly loam, 3 to 8 percent slopes	1,153	.6
PmB	Pickaway silt loam, 3 to 8 percent slopes	917	.4	WaC	Waynesboro gravelly loam, 8 to 15 percent slopes	326	.2
Pn	Pope fine sandy loam	567	.3	WaC3	Waynesboro gravelly loam, 8 to 15 percent slopes, severely eroded	434	.2
Po	Pope silt loam	617	.3		Miscellaneous land (urban areas, roads, quarries, and other land)	4,256	2.1
RuB	Rushtown very shaly silt loam, 3 to 8 percent slopes	193	.1		Water	844	.4
SaA	Sees silt loam, 0 to 3 percent slopes	1,131	.6				
SaB	Sees silt loam, 3 to 8 percent slopes	783	.4		Total	202,240	100.0

[1] Less than 0.05 of 1 percent.

Alluvial Land, Neutral or Slightly Acid (Aa)

This miscellaneous land type borders small streams that drain limestone uplands in the central and eastern parts of Berkeley County. It occurs in small areas and has only a small total acreage in the county. In some places it occupies the entire flood plain, and in others it occurs with the Huntington, Lindside, and Melvin soils that occupy positions slightly higher on the flood plain.

This land ranges from silty clay loam to fine sandy loam and, within short distances, from well drained to poorly drained. It is neutral or slightly acid throughout. Because soil material is frequently removed or deposited by floods, a normal soil profile has not developed.

About half of this land is wooded. Most of the rest is in pasture, and small areas are cropped. Because of frequent flooding, the land is not suited to cultivated crops and is best kept in pasture or trees. Pasture is better suited to Alluvial land, neutral or slightly acid, than to Alluvial land, strongly acid. (Capability unit VIw–1; woodland suitability group 10)

Alluvial Land, Strongly Acid (Ab)

This land occurs along small and medium-sized streams that drain uplands of acid sandstone and shale in the western part of the county. It is fairly extensive along Meadow Branch, but most areas are small. Within short distances drainage ranges from good to poor. Texture ranges from silty clay loam to sandy loam. Gravel or large boulders are on the surface in some areas. This land is likely to be flooded, and a normal soil profile has not had time to develop, because streams normally deposit new material and gouge out the old.

In some places Alluvial land, strongly acid, occupies the entire flood plain but in others it occurs with the Pope, Philo, or Atkins soils that are slightly higher on the flood plain. A few small, very poorly drained areas occur around the head of streams at the base of mountain slopes.

Almost all of this land is wooded, but small areas are pastured or cropped. The land is well suited to pasture or woodland. Because flooding is frequent and drainage is poor, cultivated crops are not suited. (Capability unit VIw–1; woodland suitability group 10)

Alluvial Land, Marl Substratum (Am)

This miscellaneous land type borders streams that drain the limestone uplands in the central and eastern parts of the county. It consists of neutral or mildly alkaline material that is 1 to 3 feet thick and is underlain by marl. The marl ranges from a few feet to many feet in thickness and, along Rockymarsh Run and in other places, is pure enough for use as liming material in commercial quantities (fig. 17).

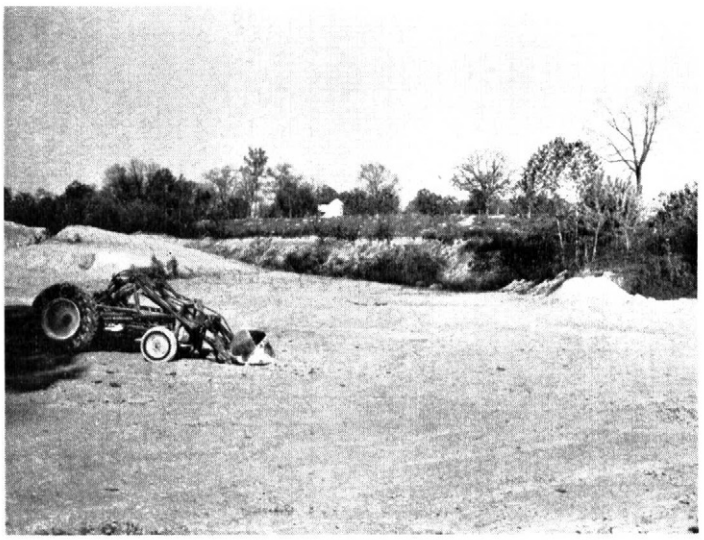

Figure 17.—**Marl quarry on Alluvial land, marl substratum, along Rockymarsh Run.**

In most places a normal soil profile has not formed, but the material in much of the acreage resembles the Melvin soils in texture and drainage. The surface layer ranges from silt loam to silty clay loam and from gray to dark brown or almost black. Drainage ranges from moderately good to very poor but is mainly poor. The acreage is likely to be flooded at times, and much of it is difficult to drain because the water table is permanently high.

About half of this land is used for crops. The wettest part occupies about 10 percent of the acreage and is wooded, and the rest is in pasture. Where drainage is adequate, this land is fairly well suited to corn and is especially well suited to pasture consisting of water-tolerant grasses and legumes. Some areas are ponded and used for growing watercress (fig. 18). (Capability unit IIIw–1; woodland suitability group 10)

Atkins Series

The Atkins series consists of deep, poorly drained, nearly level soils on bottom lands that are subject to flooding. These soils developed in recent alluvium that washed from uplands of acid sandstone and shale occupied largely by the Dekalb and Berks soils.

Atkins soils have a gray surface layer and a grayish, slowly permeable, clayey subsurface layer that is mottled with yellowish brown and strong brown. They have moderate to high capacity for holding water available to plants, but their use is limited by a high water table and slow permeability.

In this county the Atkins soils occur extensively along Back Creek and its tributaries in the western part. They occur with the well drained Pope soils and the moderately well drained Philo soils, generally along the side of bottoms nearest the uplands. In some places Atkins soils adjoin Tygart soils, which are on terraces above flooding. About half the acreage of Atkins soils is in crops or pasture.

Figure 18.—Watercress in ponded area of Alluvial land, marl substratum, near Bedington, W. Va., along U.S. Highway No. 11.

Representative profile of Atkins silt loam (0 to 3 percent slopes) in pasture along Back Creek—

Apg—0 to 11 inches, dark-gray (10 YR 4/1) silt loam; common fine mottles of strong brown (7.5YR 5/6); very weak, fine, granular structure; friable; many fine roots; neutral; clear, wavy boundary. Layer is 8 to 12 inches thick.

C1g—11 to 18 inches, gray (10YR 5/1) coarse silty clay loam; common fine and medium mottles of strong brown (7.5YR 5/6); weak, fine and medium, subangular blocky structure; some mixing of material from Apg horizon; common, fine pores; strongly acid; clear, wavy boundary. Layer is 6 to 10 inches thick.

C2g—18 to 33 inches, splotched gray (10YR 6/1) and yellowish-brown (10YR 5/8) silty clay loam; massive (structureless) to weak, coarse, subangular blocky structure; firm when moist, slightly plastic and slightly sticky when wet; few manganese concretions; few shiny films; very strongly acid; clear, wavy boundary. Layer is 12 to 16 inches thick.

C3g—33 to 48 inches +, similar to C2g horizon but is a little firmer and contains common to many concretions of manganese or iron; black films on many cracks. Layer is 10 to 20 inches thick.

Range in characteristics: The surface layer is dominantly silt loam but ranges to silty clay loam. The subsoil is heavy silt loam to silty clay. In some places a substratum of stratified coarse sand occurs at a depth of 5 to 6 feet.

Location: Nearly level bottom lands along streams draining the acid uplands.

Drainage: Poorly drained in most places, but very poorly drained in small areas.

Overflow hazard: Moderate; flooding is frequent in small areas.

Permeability: Slow.

Water table: High; on or near the surface during winter and early in spring.

Atkins silt loam (0 to 3 percent slopes) (At).—This soil has the profile described for the Atkins series. Runoff is slow or very slow, surface drainage is generally poor, and erosion is not a serious problem. Included in areas mapped as this soil are small areas of very poorly drained soils that have a very slowly permeable subsoil.

About half of Atkins silt loam is wooded, a third is cropped, and the rest is in pasture. The soil can be drained fairly well by tile or open ditches. If adequately drained, it is suited to corn and to pasture consisting of water-tolerant grasses and legumes, but large applications of lime are needed. (Capability unit IIIw–1; woodland suitability group 10)

Berks Series

The Berks series consists of moderately deep to shallow, well-drained to excessively drained soils on uplands. These soils developed from acid shale, siltstone, and fine-grained sandstone under mixed oak forest. In most places fragments of shale or sandstone make up a large part of their subsoil. Berks soils are gently sloping to very steep, and their surface is generally broken by many small drainageways into short, rounded slopes.

These soils have a surface layer of dark grayish-brown channery or shaly silt loam and a thin subsoil of yellowish-brown very shaly or very channery silt loam. These layers are weakly developed and not distinct. The

soils are very strongly acid throughout and are low in content of plant nutrients.

In the western third of Berkeley County, the Berks soils are extensive and generally occur below the moderately deep, loamy or sandy Dekalb soils. Here, they have a channery surface layer and are underlain by shale, siltstone, or thin-bedded sandstone. The Berks soils also are extensive in the eastern part of the county, or the limestone valley, where they have a shaly surface layer and are underlain by soft Martinsburg shale.

The Berks soils occur with the Gilpin soils, but they contain more rock fragments than those soils, and their subsoil is coarser textured and less strongly developed. They also occur with the somewhat poorly drained Blairton soils and the moderately well drained Leadvale soils. In the limestone valley they are commonly next to the Hagerstown, Frederick, and other soils derived from limestone.

In the western part of the county, the Berks soils occur with the reddish, sandy Lehew soils and are mapped in complexes of Berks-Lehew channery loams. In severely eroded areas of the limestone valley, Berks soils occur with the shallower Montevallo soils and are mapped in complexes with them as Berks-Montevallo shaly silt loams.

Representative profile of Berks channery silt loam, 20 to 30 percent slopes, in woodland—

O1—3 inches to ¾ inch, hardwood leaf litter.
O2—¾ inch to 0, partly compacted leaf mull mixed with soil. Layer is 0 to 1 inch thick.
A1—0 to 1½ inches, very dark grayish-brown (10YR 3/2) channery silt loam; moderate, medium, granular structure; very friable or loose; many fine roots; very strongly acid; abrupt, wavy boundary. Layer is ½ to 2 inches thick.
A2—1½ to 6 inches, light olive-brown (2.5Y 5/4) channery silt loam; weak, medium, granular and weak, fine, subangular blocky structure; very friable; common roots; very strongly acid; clear, wavy boundary. Layer is 2 to 6 inches thick.
B2—6 to 13 inches, yellowish-brown (10YR 5/6) channery silt loam; moderate, medium, subangular blocky structure; friable; a few films on some peds; 35 percent siltstones as much as 6 inches in diameter; very strongly acid; gradual, wavy boundary. Layer is 5 to 10 inches thick.
B3—13 to 22 inches, yellowish-brown (10YR 5/6) channery silt loam; weak, moderate, subangular blocky structure; friable to firm; few roots; 60 percent siltstones as much as 6 inches in diameter; very strongly acid; diffuse boundary. Layer is 5 to 12 inches thick.
R—22 inches +, siltstone and fine-grained sandstone; strongly folded and broken.

Range in characteristics: In places the surface layer is shaly silt loam. The weak B horizon ranges from about 12 to 24 inches in thickness and from silt loam to light silty clay loam in texture. Coarse fragments make up between 50 and 80 percent of the lower B horizon. In most areas the content of clay shows little increase in the lower layers. The depth to bedrock ranges from 18 to 30 inches.

Location: Middle and lower mountain slopes in the western part of Berkeley County and shale belts in the central and eastern parts.

Slopes: Gently sloping to steep.

Drainage: Well drained to excessively drained.

Permeability: Moderate to rapid.

Parent material: Shale, siltstone, and fine-grained sandstone in the western part of the county; soft silty shale in the central and eastern parts.

Berks channery silt loam, 3 to 10 percent slopes (BcB).—This soil has a profile a few inches deeper to bedrock but otherwise similar to the one described as representative of the series. Included in areas mapped are small areas of Montevallo shaly silt loam, 3 to 10 percent slopes.

This soil is moderately productive of trees, and more than three-fourths of it is wooded. Although cultivated crops can be grown, yields are low because the soil is droughty and does not respond to additions of lime and fertilizer. (Capability unit IIe–10; woodland suitability group 4)

Berks channery silt loam, 10 to 20 percent slopes (BcC).—In places this soil has a profile slightly deeper than the one described as representative of the series. Included in areas mapped as this soil are small areas of Montevallo shaly silt loam, 10 to 20 percent slopes.

About 90 percent of the acreage is in fairly large tracts that are wooded and almost inaccessible. Erosion is a moderately severe hazard. The soil is suited to crops commonly grown in the county but produces low yields. (Capability unit IIIe–10; woodland suitability group 4)

Berks channery silt loam, 20 to 30 percent slopes (BcD).—This soil has the profile described as representative of the Berks series. It occupies large wooded areas in the western part of the county. Included in areas mapped as this soil are small areas of Montevallo shaly silt loam, 20 to 30 percent slopes, and of Dekalb soils.

About one-fourth of this soil is in crops and pasture, and much of the rest remains wooded. Because the erosion hazard is severe, cleared areas are best suited to hay, but row crops can be grown occasionally. The soil produces moderate to high yields of timber. (Capability unit IVe–3; woodland suitability group 4)

Berks shaly silt loam, 3 to 8 percent slopes (BhB).—This soil occupies belts of smooth shale in the Great Valley. The underlying shale is soft, silty, and easily weathered. This soil has a large amount of shale in the surface layer (fig. 19). It is easily tilled but is droughty, and because it erodes readily, practices are needed that help to control erosion.

About one-third of the soil is woodland, a small part is in orchards, and the rest is in crops and pasture. Although the soil is suited to crops commonly grown in the county, it is too shallow and droughty for orchard fruits and does not produce high yields of other crops. (Capability unit IIIe–32; woodland suitability group 4)

Representative profile in a pasture—

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) shaly silt loam; weak, medium, granular structure; very friable; 25 percent soft shale chips as much as ½ inch across; neutral; abrupt, smooth boundary. Layer is 6 to 8 inches thick.
B2—7 to 12 inches, yellowish-brown (10YR 5/6) shaly silty clay loam; moderate, fine and medium, subangular blocky structure; somewhat firm; 35 percent soft shale fragments as much as 2 inches across; medium acid; clear, wavy boundary. Layer is 4 to 8 inches thick.
B3—12 to 21 inches, yellowish-brown (10YR 5/6) very shaly silty clay loam; common streaks and faces of strong brown (7.5YR 5/6); firm in place, friable when broken out; 80 percent silty shale fragments as much as 4 inches across; few manganese concretions; very

Figure 19.—**Profile of Berks shaly silt loam, 3 to 8 percent slopes. The surface layer has a large amount of shale, and the substratum is mainly tilted and broken, soft shale.**

strongly acid; gradual, irregular boundary. Layer is 6 to 10 inches thick.

R—21 inches +, soft blocky and platy shale that has interior colors of yellowish brown (10YR 5/4), gray (10YR 5/1), and light olive brown (2.5Y 5/4); strongly tilted and fractured; large blocks of shale break easily to platy fragments; about 5 percent fine material deposited in cracks and on faces of shale, as much as ⅛ to ¼ inch thick in places; shale can be carved with a knife.

Berks shaly silt loam, 8 to 15 percent slopes (BhC).—This soil is similar to Berks shaly silt loam, 3 to 8 percent slopes, but it occupies strong side slopes instead of smooth ridges. Runoff is medium to rapid. Included in areas mapped as this soil are a few small, severely eroded areas and small areas of the Gilpin soils.

About two-thirds of this soil remains in woods, and the rest is used for crops or hay. Although the soil occurs in nearly inaccessible areas, it is suited to row crops and hay crops grown in a long rotation. Woodland is moderately productive. (Capability unit IVe–32; woodland suitability group 4)

Berks shaly silt loam, 15 to 25 percent slopes (BhD).—This soil is similar to Berks shaly silt loam, 3 to 8 percent slopes, but it is on short side slopes that are generally just above streams. In addition, it contains more and larger shale fragments, is more droughty, and has rapid or very rapid runoff.

Almost all of this soil is wooded. The soil occurs in poorly accessible areas and is best suited to trees or pasture. It is not a good soil for bluegrass but is suited to tall grasses that are drought resistant. It can produce moderate yields of wood products. (Capability unit VIe–31; woodland suitability group 4)

Berks-Lehew Complexes

These complexes are on rounded foothills that extend north and south in a long, narrow band just east of Third Hill Mountain. They consist mainly of Berks channery silt loam and Lehew channery loam in about equal acreages. These soils are so intermingled that mapping them separately is not practical.

Berks-Lehew channery loams, 3 to 10 percent slopes (BkB).—This complex is on smooth ridges and is made up chiefly of Berks soil and Lehew soil in about equal parts. Included in the areas mapped as this complex are small, stony areas and small, severely eroded areas. Runoff is medium, the erosion hazard is moderate, and the available moisture capacity is moderate.

More than half the acreage of these soils is wooded, and small parts are in orchards and cultivated crops. If the soils are adequately fertilized and limed, they are suited to all crops commonly grown. Although orchards have been extensive; many are being abandoned because the soils are droughty and do not produce well. (Capability unit IIe–10; woodland suitability group 4)

Berks-Lehew channery loams, 10 to 20 percent slopes (BkC).—This complex occupies strong side slopes instead of smooth ridges, but in other respects it is similar to Berks-Lehew channery loams, 3 to 10 percent slopes. Included in mapping are small stony areas and small areas of Dekalb soils. Runoff is medium and creates a moderate hazard of erosion. The available moisture capacity is moderate.

These soils are suitable for commonly grown crops and for orchards, but most of the acreage is in mountainous areas that are inaccessible and still wooded. (Capability unit IIIe–10; woodland suitability group 4)

Berks-Lehew channery loams, 20 to 30 percent slopes (BkD).—This complex occurs on poorly accessible side slopes. The Berks soil is dominant, and the Lehew soil makes up a smaller part. Included in areas mapped as this complex are some very stony Dekalb soils. Because runoff is medium to rapid, the erosion hazard is moderate. The available moisture capacity is moderate.

Almost all the acreage of this complex remains wooded, but a few areas are in crops and pasture. If long rotations are used, the soils are suited to all crops commonly grown. (Capability unit IVe–3; woodland suitability group 4)

Berks-Montevallo Complexes

These complexes are on belts of shale in the limestone valley. They consist of severely eroded Berks and Montevallo shaly silt loams that are so intermingled that mapping them separately is not practical.

Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded (BmB3).—This complex is made up of Berks soil and Montevallo soil in about equal acreages. These soils have lost most of their original surface

layer through erosion, and their present surface layer contains much shale. The Montevallo soil generally occupies the most severely eroded areas and is shallower than the Berks soil.

The soils of this complex are droughty and easily eroded. They are best suited to long rotations that include only an occasional row crop, and they are better for small grain than for corn. Stripcropping and other conservation practices are needed to control loss of soil and water. (Capability unit IVe–32; woodland suitability group 6)

Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded (BmC3).—This complex is somewhat shallower than Berks-Montevallo shaly silt loams, 3 to 8 percent slopes, severely eroded. About half the acreage is in crops or pasture, and most of the rest is wooded. Because the soils are droughty and susceptible to further erosion, they are best kept in permanent plants. Pasture mixtures containing tall grasses are fairly well suited, but bluegrass does not grow well. (Capability unit VIe–31; woodland suitability group 6)

Berks-Montevallo shaly silt loams, 15 to 25 percent slopes, severely eroded (BmD3).—The soils of this complex are slightly shallower than Berks-Montevallo shaly silt loams, 8 to 15 percent slopes, severely eroded. They occur on short slopes and commonly receive runoff from higher lying soils.

About half the acreage of this complex is wooded. The rest is used for pasture and crops, but yields are low. Because the soils are droughty and eroded, they are best suited to trees. (Capability unit VIIe–3; woodland suitability group 6)

Blairton Series

The Blairton series consists of shallow or moderately deep, somewhat poorly drained soils that are in slightly depressed areas on flats or gentle slopes and in areas at the head of streams. These soils developed mainly in residuum that was fairly high in clay content and that weathered from firm, grayish, acid Martinsburg shale. They have received some colluvial material from the surrounding Berks soils and contain a fairly large amount of fine shale.

Blairton soils have a surface layer of grayish-brown silt loam or shaly silt loam. Their upper subsoil is yellowish-brown silty clay loam or shaly silty clay loam that is strongly mottled, and their lower subsoil is very shaly silty clay. Blairton soils are strongly acid, have a slowly permeable subsoil, and are low to moderate in available moisture capacity.

In this county the Blairton soils are scattered throughout the broad belt of Martinsburg shale in the eastern part of the county and are on the narrow belt of shale just east of North Mountain. They are surrounded by the Berks soils or are adjacent to them, and they occur with the Chilhowie, Carbo, and other limestone soils and, in places, with the moderately well drained Leadvale soils.

Representative profile of Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes, in meadow—

Ap—0 to 8 inches, grayish-brown (10YR 5/2) shaly silt loam; weak, medium, granular structure; very friable; many fine roots; 25 percent chips of soft shale, ¼ to 1 inch in diameter; medium acid; abrupt, smooth boundary. Layer is 6 to 9 inches thick.

B2t—8 to 12 inches, yellowish-brown (10YR 5/6) shaly silty clay loam; common medium mottles of strong brown (7.5YR 5/8) and light brownish gray (2.5Y 6/2); moderate, medium, subangular blocky structure; friable; common roots; a few clay films; 35 percent chips of soft shale as much as 1 inch in diameter; strongly acid; clear, wavy boundary. Layer is 3 to 7 inches thick.

B3—12 to 17 inches, light olive-brown (2.5Y 5/6) very shaly silty clay; many medium mottles of light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/8); massive, breaking to moderate, medium, subangular blocky structure; firm in place but friable when broken out; silty clay fraction is plastic and slightly sticky when wet; 70 percent shale fragments as much as 2 inches in diameter; few roots; strongly acid; gradual, wavy boundary. Layer is 3 to 8 inches thick.

R—17 inches +, rather hard, grayish Martinsburg shale; strongly folded and fractured.

Range in characteristics: The surface layer is silt loam containing about 5 percent shale chips or shaly silt loam containing about 30 percent shale chips. The B horizon ranges from silty clay loam containing 10 percent shale chips to very shaly silty clay. Within short distances the C horizon ranges from silty clay loam to clay.

Location: In slightly depressed areas and at the head of streams on Martinsburg shale in the eastern and central parts of the county.

Parent material: Mainly residual material but some colluvial material derived from firm, gray, clayey strata of Martinsburg shale.

Drainage: Somewhat poorly drained. Seepy areas are few to common.

Permeability: Slow.

Slope: Nearly level or gently sloping.

Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes (BtA).—This soil has the profile described for the Blairton series. In most places it is somewhat poorly drained, but small areas are poorly drained. Runoff is slow, and the erosion hazard is slight.

About half of this soil is in crops, about a third is wooded, and the rest is in pasture. If the soil is artificially drained and limed, it is suitable for crops and for pasture consisting of water-tolerant grasses and legumes. Because it is shallow, the soil can be drained more effectively by open or interceptor ditches than by tile. (Capability unit IIIw–5; woodland suitability group 9)

Blairton shaly silt loam, thin solum variant, 3 to 8 percent slopes (BtB).—This soil is similar to Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes, but it is a little better drained. Included in areas mapped as this soil are small, severely eroded areas. Runoff is medium, and the erosion hazard is moderate.

About half of this soil remains in woods, and most of the rest is in pasture. Use and management requirements are about the same as for Blairton shaly silt loam, thin solum variant, 0 to 3 percent slopes. The soil contains frost pockets and is too shallow for good orchards. (Capability unit IIIw–5; woodland suitability group 9)

Blairton silt loam, 0 to 3 percent slopes (BnA).—This soil is commonly at the head of small streams. In most places it has had a little more colluvial influence than the soil described as typical of the series. In a few areas the depth to hard shale is as much as 36 inches. Included in areas mapped as this soil are spots of Berks soil that occur between small draws and are moderately well drained.

Representative profile in meadow—

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, medium, granular structure; very friable; many roots; 5 percent small chips as much as 1 inch in diameter; slightly acid; abrupt, smooth boundary. Layer is 6 to 10 inches thick.

B2t—9 to 21 inches, yellowish-brown (10YR 5/6) coarse silty clay loam; common medium mottles of strong brown (7.5YR 5/8) and gray (5Y 6/1); moderate, fine, subangular blocky structure; somewhat firm; common clay films; common roots; 10 percent chips of shale as much as 1 inch in diameter; strongly acid; clear, wavy boundary. Layer is 8 to 14 inches thick.

B3—21 to 30 inches, yellowish-brown (10YR 5/6) very shaly silty clay; many coarse mottles and streaks of strong brown (7.5YR 5/8) and gray (5Y 6/1); weak, medium, subangular blocky structure; firm when moist, slightly plastic and slightly sticky when wet; few roots; 60 to 70 percent shale fragments as much as 2 inches in diameter; strongly acid; gradual, wavy boundary. Layer is 8 to 14 inches thick.

R—30 inches +, grayish and rather hard Martinsburg shale; strongly folded.

About two-thirds of this soil is in crops, 20 percent is in woods, and the rest is in pasture. If drainage is adequate, this soil is suited to most crops and pasture plants, but it is not well suited to alfalfa. Diversion ditches or terraces are effective in removing excess water. (Capability unit IIIw–5; woodland suitability group 9)

Blairton silt loam, 3 to 8 percent slopes (BnB).—This soil is slightly better drained than Blairton silt loam, 0 to 3 percent slopes, though it receives considerable runoff from higher slopes. Small areas along the bottom of small draws are poorly drained. Included in areas mapped as this soil are small areas of Leadvale soils and small areas of Berks soils between small draws.

About half of this soil is cropped, about a third is wooded, and the rest is pastured. Use and management requirements are about the same as those for Blairton silt loam, 0 to 3 percent slopes. In some places diversion ditches or terraces are needed to remove excess water. (Capability unit IIIw–5; woodland suitability group 9)

Buchanan Series

The Buchanan series consists of deep, moderately well drained soils that developed in colluvium derived from acid sandstone and some shale on uplands. These soils have a surface layer of grayish-brown very stony loam or loam and a subsoil of yellowish-brown sandy clay loam. The lower subsoil is a compact fragipan. Many small to medium-sized, unoriented sandstone fragments occur throughout the profile. The soils are very strongly acid.

The Buchanan soils are subject to surface runoff and subsurface seepage from higher mountain slopes. They are slightly or moderately susceptible to erosion. Their available moisture capacity is high.

In this county the Buchanan soils occur on the lower slopes of North Mountain, Third Hill Mountain, and Sleepy Creek Mountain in the western part. They occur below the well-drained Dekalb and Berks soils, are close to the well-drained Laidig soils, and in a few places are just above the poorly drained Sees soils. They are coarser textured throughout than the Leadvale soils, which developed in colluvium below the silty Berks and Montevallo soils. Most of the acreage of Buchanan soils remains wooded.

Representative profile of Buchanan very stony loam, 3 to 15 percent slopes, in woodland—

O1—3 inches to 1 inch, leaf litter from hardwoods.

O2—1 inch to 0, black, compacted leaf mull; some soil mixing.

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) very stony loam; moderate, fine, granular structure; loose; many fine roots; strongly acid; abrupt, irregular boundary. Layer is 1 to 3 inches thick.

A2—2 to 8 inches, dark grayish-brown (10YR 4/2) very stony loam; weak, fine, granular and weak, fine, subangular blocky structure; common roots; very friable; very strongly acid; clear, irregular boundary. Layer is 5 to 8 inches thick.

B21t—8 to 17 inches, yellowish-brown (10YR 5/6) coarse silty clay loam; moderate, medium, subangular blocky structure; friable; common roots; few clay films; many medium pores; 20 percent channery-sized sandstone; very strongly acid; clear, wavy boundary. Layer is 7 to 10 inches thick.

B22t—17 to 22 inches, yellowish-brown (10YR 5/4) channery sandy clay loam; common medium mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; firm; 25 percent channery sandstone; common discontinuous clay films, common medium pores; very strongly acid; clear, wavy boundary. Layer is 4 to 6 inches thick.

Bx—22 to 36 inches, yellowish-brown (10YR 5/4) channery sandy clay loam fragipan; many medium mottles of strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2); massive, breaking to weak, medium, subangular blocky; some evidence of weak, coarse polygons; firm or very firm; common clay films; many medium pores; 30 percent channery sandstone fragments; very few roots; very strongly acid; gradual, wavy boundary. Layer is 12 to 16 inches thick.

Cx—36 to 50 inches +, yellowish-brown (10YR 5/4) very channery sandy clay loam fragipan that grades to fine sandy loam with depth; common coarse mottles of light brownish gray (10YR 6/2) and yellowish red (5YR 4/6); massive; firm; 60 percent channery sandstone fragments; a few large stones; no roots; very strongly acid; total estimated depth of colluvium over sandstone is 15 feet.

Range in characteristics: The surface layer is mainly gravelly loam or very stony loam, but in small areas it is channery silt loam or very stony sandy loam. The subsoil is coarse silty clay loam or sandy clay.

Location: Colluvial toe slopes below uplands occupied by Dekalb and Berks soils in the western part of the county.

Parent material: Colluvium from acid, gray sandstone and some shale.

Drainage: Moderately well drained. Seepy areas are few to common.

Slope: Between 3 and 15 percent.

Buchanan gravelly loam, 3 to 8 percent slopes (BuB).—Large stones are lacking in this soil, but in other respects the profile is similar to that of Buchanan very stony loam, 3 to 15 percent slopes. The gravel consists mostly of partly rounded sandstone fragments as much as 6 to 8 inches in diameter. This soil occurs below uplands consisting of Berks and Dekalb soils, and it contains less coarse sand than those soils. Included in areas mapped as this soil are small areas of gravelly silt loam or very stony loam. Runoff and erosion are slight to moderate hazards; small seeps are common.

About a third of this soil is in crops, about a fourth is in pasture, and the rest is in woods. A few orchards are maintained, but air drainage is poor. This soil can be used for commonly grown crops, though alfalfa may be short

lived because of damage in winter. (Capability unit IIe–13; woodland suitability group 2)

Buchanan gravelly loam, 8 to 15 percent slopes (BuC).—Except for steeper slopes, this soil is similar to Buchanan gravelly loam, 3 to 8 percent slopes. In most areas there are a few large stones on the surface and thoughout the profile. Included in areas mapped as this soil, especially in woodland, are small areas of Buchanan very stony loam. Runoff causes a moderate hazard of erosion.

About one-fourth of this soil is in crops and orchards, two-thirds is in woods, and the rest is in pasture. The soil is suitable for crops grown in rotations, but in some areas large stones interfere with plowing and mowing. Because this soil generally is higher on the slopes, it has better air drainage than Buchanan gravelly loam, 3 to 8 percent slopes. (Capability unit IIIe–13; woodland suitability group 2)

Buchanan very stony loam, 3 to 15 percent slopes (BvC).—This soil has the profile described for the Buchanan series. It generally occurs immediately below the Dekalb soils and, in some places, is fairly high on the mountain slopes. Included in areas mapped as this soil are small areas of extremely stony Buchanan soils and small areas of Laidig very stony loam, 3 to 15 percent slopes. Runoff is slow, and the erosion hazard is slight.

Almost none of this soil has been cleared, but a few small areas are in pasture. Although pasture or woodland is suited, the acreage probably will remain wooded because most areas are isolated and inaccessible. If the woodland is well managed, the soil is productive of trees. (Capability unit VIs–2; woodland suitability group 2)

Captina Series

The Captina series consists of deep, moderately well drained soils that have a fragipan in their lower subsoil. These soils occur on smooth terraces that are rather low but are well above overflow. They developed in alluvial sediments that washed from uplands of limestone and some shale.

The Captina soils have a brown silt loam surface layer, a dark-brown silty clay loam upper subsoil, and a dark-brown silty clay loam fragipan at a depth of about 2 feet. The soils are moderately leached, and their surface layer is strongly acid in areas that have not been limed. The subsoil is moderately acid. Permeability is slow in the fragipan; the available moisture capacity is moderate to high.

In this county the Captina soils are mostly along Opequon Creek and the Potomac River. They occur with the somewhat poorly drained Tygart soils, above the Huntington, Lindside, and Melvin soils, and adjacent to the Berks, Hagerstown, and Frederick soils. Nearly all areas of the Captina soils have been cleared and are used for general farming.

Representative profile of Captina silt loam, 3 to 8 percent slopes, in meadow above Opequon Creek—

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many roots; few fine shale fragments; slightly acid; abrupt, smooth boundary. Layer is 7 to 10 inches thick.

B1—9 to 13 inches, brown (7.5YR 5/4) silt loam; weak, fine and medium, subangular blocky structure; friable; common roots; few fine shale chips; medium acid; clear, smooth boundary. Layer is 4 to 6 inches thick.

B2t—13 to 22 inches, dark-brown (7.5YR 4/4) coarse silty clay loam; moderate, medium, subangular blocky structure; somewhat firm; common clay films; common roots; few light brownish-gray (10YR 6/2) mottles in lower part; few shale chips; medium acid; clear, smooth boundary. Layer is 8 to 10 inches thick.

Bx—22 to 34 inches, dark-brown (7.5YR 4/4) silty clay loam fragipan; common medium mottles of red (2.5YR 5/6) and light brownish gray (10YR 6/2); massive, breaking to weak, medium blocky; firm or very firm; common, fine manganese concretions and a few shale chips; common, medium pores; a few roots; medium acid; gradual, smooth boundary.

C—34 to 49 inches, dark-brown (7.5YR 4/4) silty clay loam; few medium mottles of red (2.5YR 5/6) and light brownish gray (10YR 6/2); massive; friable or firm; common fine shale chips, few manganese concretions; medium acid; gradual, wavy boundary.

HR—49 inches +, soft, brownish Martinsburg shale.

Range in characteristics: Fragments of fine shale range from few to common. The B horizon ranges from heavy silt loam to silty clay, and the fragipan begins at a depth of 18 to 26 inches. The total depth to shale or limestone ranges from 3 to 12 feet.

Location: Smooth terraces above overflow, mainly along Opequon Creek and the Potomac River.

Slope: Gently sloping.

Drainage: Moderately well drained.

Permeability: Moderate in the upper B horizon; slow in the fragipan.

Parent material: Alluvial sediments derived from limestone and some shale.

Water table: Tends to be perched on top of fragipan during winter and is near the surface at times.

Captina silt loam, 3 to 8 percent slopes (CaB).—This soil has the profile described for the Captina series. Small, seepy spots generally occur near the base of upland slopes. Runoff and erosion are moderate hazards.

About two-thirds of this soil is in crops, about one-fourth is in pasture, and the rest is in woods. The soil is suited to crops commonly grown, but alfalfa and other deep-rooted crops are damaged at times in winter because of the seasonally high water table. Yields can be increased by draining seep spots. (Capability unit IIe–14; woodland suitability group 3)

Carbo Series

In the Carbo series are moderately deep or deep, well-drained soils that developed in residuum from clayey limestone, mainly of the Stones River and Chambersburg series. In most areas there are outcrops of limestone.

The Carbo soils have a surface layer of dark-brown silty clay loam. The subsoil is strong-brown or yellowish-brown silty clay or clay that is plastic and sticky, slowly permeable, and neutral to medium acid. These soils do not take in water readily. Permeability is slow in the subsoil, and the available moisture capacity is moderate to low.

In this county the Carbo soils occur in narrow strips and bands in the limestone valley, mostly along and south of U.S. Highway No. 11. They occur closely with the moderately permeable Frederick, Hagerstown, and Duffield soils, the shallow Chilhowie soils, and the moderately well drained Pickaway soils. Most areas of Carbo soils have been cleared and are used for pasture or general farming. These fine-textured soils are difficult to till, however, and are susceptible to severe erosion.

Representative profile of Carbo silty clay loam, 2 to 8 percent slopes, in a meadow—

Ap—0 to 9 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, granular structure; friable when moist, slightly plastic and slightly sticky when wet; many roots; neutral; clear, smooth boundary. Layer is 6 to 10 inches thick.

B2t—9 to 21 inches, strong-brown (7.5YR 5/6) silty clay; moderate to strong, medium, subangular blocky structure; firm when moist, very plastic and very sticky when wet; on most peds there are continuous clay films of strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6); common fine roots; few blocky limestone fragments as much as 6 inches across; medium acid; clear, wavy boundary. Layer is 8 to 15 inches thick.

B3—21 to 28 inches, yellowish-brown (10YR 5/6) clay; weak, fine and medium, subangular blocky structure; firm when moist, very plastic and very sticky when wet; common thin films of clay; few roots; few small limestone fragments; medium acid; gradual, wavy boundary. Layer is 6 to 14 inches thick.

C1—28 to 36 inches, dark yellowish-brown (10YR 4/4) clay; common medium spots of olive-brown (2.5Y 4/4); massive; firm when moist, very plastic and very sticky when wet; few clay films; few black films on ped faces; few limestone fragments; occasional roots; slightly acid; clear, wavy boundary. Layer is 6 to 12 inches thick.

C2—36 to 39 inches, dark yellowish-brown (10YR 4/4) clay; massive; firm when moist, plastic and sticky when wet; common fine concretions of lime and common, small, soft lumps of grayish limestone that increase in number with depth; calcareous; abrupt, irregular boundary. Layer is 0 to 6 inches thick.

R—39 inches +, grayish limestone.

Range in characteristics: The texture ranges from heavy silt loam to clay in the surface layer and is silty clay or clay in the subsoil. The soils are deep to bedrock in most places, but the depth varies within short distances and ranges from 30 inches to 8 feet.

Location: The limestone valley in the central and eastern parts of the county; extensive along and east of U.S. Highway No. 11.

Parent material: Mostly Stones River and Chambersburg limestones.

Permeability: Slow.

Reaction: Medium acid to neutral in subsoil.

Drainage: Well drained.

Carbo clay, 8 to 15 percent slopes, severely eroded (EaC3).—This soil has a profile similar to the one described for the Carbo series, but most of its original surface layer has been removed through erosion, and the plow layer is sticky, plastic clay. The soil occurs in small spots, generally on shoulders and slope breaks, and receives water from higher slopes. Runoff is rapid, and the erosion hazard is severe or very severe.

This soil is mostly in crops and pasture, though it is difficult to till. In many places it is farmed with adjoining areas of less severely eroded Hagerstown or similar soils. This soil is well suited to pasture plants and, where it occurs in large enough areas, should be kept in permanent pasture for erosion control. Diversions and other water-control measures are useful in reducing runoff. (Capability unit VIe–1; woodland suitability group 7)

Carbo silty clay loam, 2 to 8 percent slopes (EbB).—This soil has the profile described as typical of the Carbo series. It normally occurs as small strips within areas of other limestone soils. Outcrops of limestone are few to common. Areas mapped as this soil include small areas of Pickaway, Hagerstown, and Frederick soils. Runoff is rapid, and the erosion hazard is severe.

Most of this soil is cropped, and some is pastured or used for urban areas. Although the soil is naturally fertile, it is difficult to till. It is suited to crops commonly grown in the county and is well suited to alfalfa, but practices are needed to control runoff. (Capability unit IIIe–30; woodland suitability group 7)

Chilhowie Series

The Chilhowie series consists of shallow or moderately deep, well-drained, fine-textured soils that developed in material weathered from almost pure limestone. They are underlain by strongly dipping Stones River and Chambersburg limestones.

These soils show little textural development. They have a surface layer of dark-brown silty clay or clay that swells when wet and shrinks as it dries. Their subsoil is dark-brown clay that is plastic and sticky. Limestone blocks of channery size commonly occur on the surface and throughout the profile. The soils are neutral or slightly alkaline. They are slowly permeable in the subsoil and have low available moisture capacity.

The Chilhowie soils occupy a narrow band along and just east of U.S. Highway No. 11, which crosses the east-central part of the county from north to south. They occur with the deep Carbo soils and with the Frederick, Hagerstown, and other deep limestone soils that are redder than Chilhowie soils and have a silt loam surface layer. They also occur with the moderately well drained Pickaway soils. The Chilhowie soils are not so red as the Corydon soils and show less profile development. In addition, they have a finer textured surface layer, a more plastic and sticky subsoil, and a higher content of lime.

Almost all the acreage of Chilhowie soils has been cleared and generally is used for pasture. A large acreage is held by limestone companies as sites for future quarries. Along U.S. Highway No. 11 the soils are used as homesites.

Representative profile of Chilhowie silty clay, 2 to 8 percent slopes, in pasture (see tables 16 and 17, sample No. S60–WVa–2–5–(1–4), for chemical and physical properties)—

Ap—0 to 6 inches, dark-brown (10YR 3/3) silty clay; strong, fine, subangular blocky and blocky structure; somewhat hard when dry, firm when moist, plastic and sticky when wet; many surface cracks, ⅛ to ½ inch wide, form rough polygons 6 to 12 inches across; 10 to 15 percent limestone fragments as much as 4 inches across; neutral; clear, wavy boundary. Layer is 6 to 10 inches thick.

B2t—6 to 12 inches, dark yellowish-brown (10YR 4/4) to dark-brown (7.5YR 4/4) clay; strong, fine and medium, subangular blocky structure; hard when dry, firm when moist, plastic and sticky when wet; continuous yellowish-brown (10YR 5/4) clay films; 20 percent limestone fragments as much as 4 inches across; common concretionary limestone nodules ¼ to ½ inch across; neutral; clear, wavy boundary. Layer is 5 to 8 inches thick.

C1—12 to 18 inches, dark-brown (10YR 4/3 to 7.5YR 4/4) clay; massive, breaking to weak, medium and coarse, subangular blocky structure; hard when dry, firm when moist, plastic and very sticky when wet; common clay films; 20 percent limestone fragments as much as 4 inches across; many rounded concre-

tionary limestone nodules ¼ to ¾ inch across; neutral; clear, wavy boundary. Layer is 6 to 8 inches thick.

C2—18 to 25 inches, yellowish-brown (10YR 5/4 to 10YR 5/6) clay; some faces and cracks of dark grayish brown (10YR 4/2); hard when dry, firm when moist, plastic and very sticky when wet; massive; many small concretionary limestone nodules; few slickensides just above limestone bedrock; neutral; abrupt, irregular boundary. Layer is 7 to 10 inches thick.

R—25 inches +, gray (2.5Y 5/0) Chambersburg limestone; weathers on top to many blocky fragments about 2 by 3 by 6 inches; becomes massive with depth.

Range in characteristics: The surface layer is silty clay or clay and, in some Chilhowie soils, is very rocky. The subsoil ranges from 10YR to 7.5YR in hue, or dominant spectral color. The total depth to bedrock is variable within short distances and ranges from 15 to 30 inches.

Location: A narrow strip along U.S. Highway No. 11 in the limestone valley.

Slope: Mostly gently sloping, but ranges from nearly level to moderately steep (0 to 25 percent).

Permeability: Slow.

Parent material: Material weathered from almost pure Stones River and Chambersburg limestones.

Chilhowie silty clay, 2 to 8 percent slopes (EdB).—This soil has the profile described for the Chilhowie series. Included in mapped areas are small very rocky areas. Runoff is medium or rapid, and the erosion hazard is moderate to severe.

About half of this soil is in crops, a third is in pasture and woods, and the rest is used for urban developments. The crops commonly grown are suited if they are rotated properly and if conservation practices are adequate. Because the soil is shallow, contains many rocks, and is slowly permeable, it is generally unsuitable for use as drainage fields for septic tanks. (Capability unit IIIe–30; woodland suitability group 7)

Chilhowie silty clay, 8 to 15 percent slopes (EdC).—This soil is similar to Chilhowie silty clay, 2 to 8 percent slopes, but it has stronger slopes, a larger number of shallow areas, and a slightly higher content of loose stones. In addition, runoff is rapid and the erosion hazard is severe. Included in areas mapped as this soil are small areas that are very rocky, small areas that are severely eroded, and a few areas that are steeper than 15 percent.

About a fourth of this soil is in crops, a third is in woods, a third is in pasture, and the rest is in towns. If the soil is used for row crops, these should be grown in long rotations that include a row crop only once in 5 years. Alfalfa and other deep-rooted legumes are well suited to this soil, but practices are needed to control erosion. (Capability unit IVe–30; woodland suitability group 7)

Chilhowie clay, 8 to 15 percent slopes, severely eroded (EcC3).—Erosion has removed most of the original surface layer of this soil, and the present surface layer is plastic clay that is sticky and difficult to plow. Runoff is rapid or very rapid, and the erosion hazard is severe. Included in areas mapped as this soil are small areas of very rocky soils.

About a third of this soil is in crops, a third is in pasture and woods, and the rest is in urban developments. Because the soil is severely eroded and difficult to plow, it is best suited to permanent pasture. Applying adequate fertilizer and properly managing pasture are needed to maintain a good sod and to control further erosion. (Capability unit VIe–1; woodland suitability group 7)

Chilhowie very rocky silty clay, 3 to 8 percent slopes (EnB).—Except for its ledges and loose fragments of limestone that make cultivation impractical, this soil resembles Chilhowie silty clay, 2 to 8 percent slopes. Runoff is medium.

About half of this soil is in pasture, less than 10 percent is used for crops and orchards, and the rest is wooded. The soil is best suited to permanent pasture or woodland, but areas in pasture need adequate fertilizer and good management. (Capability unit VIs-1; woodland suitability group 7)

Chilhowie very rocky silty clay, 8 to 15 percent slopes (EnC).—This soil has more shallow areas and tends to be more rocky than Chilhowie very rocky silty clay, 3 to 8 percent slopes. Runoff is rapid, and the erosion hazard is moderate or severe.

About two-thirds of this soil remains in woods, and the rest is in pasture or crops. Pasture or woodland is the best use. Pasture can be readily seeded and mowed, but adequate fertilization and good pasture management are needed. (Capability unit VIs–1; woodland suitability group 7)

Chilhowie very rocky clay, 8 to 15 percent slopes, severely eroded (EkC3).—This soil is similar to Chilhowie very rocky silty clay, 3 to 8 percent slopes, but has lost most of its original surface layer through erosion. In places the present surface layer of very rocky clay is cut by small gullies. Included in areas mapped as this soil are small areas of extremely rocky soils. Runoff is rapid or very rapid, and the erosion hazard is severe.

More than half the acreage of this soil is pastured, about a fourth is wooded, and the rest is cropped or in urban areas. Because the soil is very rocky and is susceptible to further erosion, it is best used for woodland or pasture. The smoother areas are fairly well suited to permanent pasture if they are adequately fertilized and well managed. (Capability unit VIIs–1; woodland suitability group 7)

Chilhowie very rocky clay, 15 to 25 percent slopes, severely eroded (EkD3).—This soil is shallower than Chilhowie very rocky silty clay, 3 to 8 percent slopes, because it has had most of the original surface layer removed through erosion. Areas of extremely stony soils are included and are more numerous than in the more gently sloping Chilhowie soil.

About 80 percent of this soil is in pasture, and the rest is in woods. Areas used for pasture have rapid runoff and are subject to further erosion and loss of rainfall. For suggestions on the management of this soil when used for trees, see the subsection "Use of Soils as Woodland." (Capability unit VIIs–1; woodland suitability group 7)

Corydon Series

The Corydon series consists of shallow or moderately deep, well-drained soils that developed in residuum weathered from nearly pure limestone. These soils have a surface layer of dark-brown silt loam and a thin, moderately well developed subsoil of yellowish-red, plastic and sticky clay. Throughout the profile there are few to common limestone fragments. The soils are moderately permeable in the subsoil, have moderate to low available moisture capacity, and are medium acid.

The Corydon soils occur mainly in an oblong band between Jones Springs and Soho in the western part of the county. They are near the deep Frederick soils and adjoin the Berks and, to a lesser extent, the Dekalb soils. Corydon soils are redder, are more acid, and show more soil development than the Chilhowie soils. They resemble the Hagerstown soils but are shallower, and they are redder and shallower than the Carbo soils.

Representative profile of Corydon silt loam, 3 to 8 percent slopes, in meadow—

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; moderate, medium, granular structure; friable; many grass and legume roots; neutral; abrupt, smooth boundary. Layer is 6 to 9 inches thick.

B2t—7 to 15 inches, yellowish-red (5YR 5/6) silty clay; common continuous clay films of dark brown (7.5YR 4/4); moderate, fine and medium, blocky structure; firm when moist, hard when dry, plastic and sticky when wet; common roots; medium acid; clear, wavy boundary. Layer is 6 to 10 inches thick.

C1—15 to 22 inches, yellowish-red (5YR 5/6) clay; few coarse splotches of yellowish brown (10YR 5/8); massive, breaking to weak, fine and medium, blocky structure; firm when moist, plastic and sticky when wet, hard when dry; few manganese concretions, few black films on ped faces; few roots; medium acid; clear, wavy boundary. Layer is 6 to 14 inches thick.

C2—22 to 24 inches, strong-brown (7.5YR 5/6) and dark yellowish-brown (10YR 4/4) clay; about 25 percent gray (10YR 5/1), soft, marllike material; massive; calcareous; abrupt, wavy boundary. Layer is 1 to 5 inches thick.

R—24 inches +, grayish limestone (Rondout waterlime).

Range in characteristics: The surface layer ranges from silt loam to silty clay, and the subsoil, from silty clay to clay. The total depth to hard limestone varies within short distances and ranges from 16 to 30 inches.

Location: Small, outlying limestone area in the western part of Berkeley County.

Parent material: Slabby, grayish Silurian limestones (Bossardville and Rondout waterlime).

Drainage: Well drained.

Permeability: Moderate in the subsoil.

Slope: Between 3 and 25 percent.

Corydon silt loam, 3 to 8 percent slopes (CnB).—This soil has the profile described for the Corydon series. Limestone bedrock varies in depth but is near the surface in many places and crops out in a few places (fig. 20). Runoff is medium, and the erosion hazard is moderate to severe. Included in areas mapped as this soil are small areas of Hagerstown soils.

About three-fourths of this soil is in crops, a small part is in orchards and woods, and the rest is in pasture. Although the soil tends to be droughty, it is suited to the crops grown locally and to alfalfa and other drought-resistant legumes. (Capability unit IIIe–30; woodland suitability group 7)

Corydon silt loam, 8 to 20 percent slopes (CnC).—This soil occurs in small areas and has a small total acreage. It has more shallow areas and more limestone outcrops than Corydon silt loam, 3 to 8 percent slopes. Runoff is rapid, and the erosion hazard is severe. Included in mapped areas are small areas of Hagerstown soils.

About one-fourth of this soil is in pasture, a small part is cropped, and the rest is wooded. The soil is best suited to long-term hay and an occasional row crop. Runoff and erosion should be controlled by use of conservation practices. (Capability unit IVe–30; woodland suitability group 7)

Figure 20.—**Profile of Corydon silt loam, 3 to 8 percent slopes, showing hard limestone bedrock.**

Corydon silty clay, 8 to 15 percent slopes, severely eroded (CoC3).—This soil has a profile similar to the one described for the Corydon series, but erosion has removed three-fourths or more of its original surface layer, and the plow layer is now a plastic and sticky silty clay. In many places the soil is less than 20 inches deep to limestone, and limestone outcrops are few to common. Runoff is rapid, and the erosion hazard is severe or very severe. In a few areas mapped as this soil there are a few areas of deep Hagerstown soils.

About half of this soil is in crops, a small part is in orchards, and the rest is in pasture and woods. Pasture or woodland is the best use, but good pasture management is needed to maintain sod. (Capability unit VIe–1; woodland suitability group 7)

Corydon silty clay, 15 to 25 percent slopes, severely eroded (CoD3).—This moderately steep soil is similar to Corydon silty clay, 8 to 15 percent slopes, severely eroded, but it generally occurs in small areas that are in fields consisting mainly of Frederick and other limestone soils. It occupies short side slopes and, in many places receives runoff from higher slopes. Included in areas mapped as this soil are small areas of very severely eroded soils.

Most of this soil is in pasture, but small areas remain in crops and orchards. The soil is best suited to permanent pasture or woodland, but it is commonly farmed with adjoining soils that are not so steep. In farmed areas practices are needed that control runoff. (Capability unit VIe–1; woodland suitability group 7)

Dekalb Series

Soils of the Dekalb series are moderately deep, well drained to excessively drained, and mostly stony. These soils developed on uplands in material weathered from acid, gray, fine- and coarse-grained sandstone, mostly of Mississippian age, mixed with some interbedded gray shale.

The Dekalb soils have a surface layer of dark grayish-brown very stony loam or channery loam and a yellowish-brown loamy subsoil that contains many coarse fragments. These layers are weakly developed and not distinct. The soils are low to moderate in content of plant nutrients. Runoff is slight to medium, permeability is moderate to rapid, and the available moisture capacity is low to moderate.

Dekalb soils occur extensively on the middle and upper slopes of ridges on North Mountain, Third Hill Mountain, and Sleepy Creek Mountain in the western part of the county. They occur with the more silty Berks soils, the colluvial Laidig and Buchanan soils, and Steep rock land.

Dekalb soils are mostly wooded and are moderately productive of trees.

Representative profile of Dekalb very stony loam, 25 to 45 percent slopes, in woodland—

O1—4 inches to 1 inch, loose leaf litter from hardwoods.
O2—1 inch to 0, black, partly decayed leaf mull mixed with soil material.
A1—0 to 1½ inches, very dark grayish-brown (10YR 3/2) very stony loam; weak, fine, granular structure; very friable; many fine tree roots; strongly acid; clear, irregular boundary. Layer is 1 to 3 inches thick.
A2—1½ to 7 inches, brown (10YR 5/3) very stony loam; weak, medium, granular structure; contains common tongues and streaks of A1 material along stones and in root channels; very strongly acid; clear, irregular boundary. Layer is 3 to 8 inches thick.
B2—7 to 17 inches, yellowish-brown (10YR 5/4) channery loam that is slightly finer textured than A2 horizon; weak, fine and medium, subangular blocky structure; some drift from A2 horizon on some peds; 25 percent channery sandstone fragments; few roots; very strongly acid; gradual, irregular boundary. Layer is 8 to 12 inches thick.
C—17 to 31 inches, yellowish-brown (10YR 5/4) channery loam that grades to channery fine sandy loam or channery sandy loam with depth; massive; slightly firm in place, but friable when broken out; 50 percent of layer is sandstone fragments; few roots; very strongly acid; gradual, irregular boundary. Layer is 10 to 16 inches thick.
R—31 inches +, broken, hard, grayish sandstone that is acid and somewhat weathered and fissured.

Range in characteristics: The surface layer ranges from very stony loam to channery loam, and the subsoil ranges from loam to sandy loam. In addition to channery material, a few large stones occur in the profile. The total depth to firm bedrock ranges from 24 to 36 inches.

Location: Middle and upper mountain slopes in the western part of the county.

Parent material: Residuum from acid, gray, coarse-grained sandstone and some shale; reddish sandstone in some places.

Permeability: Moderate to rapid.

Slope: Mostly steep and very steep, but ranges from gently sloping to very steep (5 to 70 percent slopes).

Dekalb channery loam, 5 to 15 percent slopes (DaC).—This soil has a profile similar to that of Dekalb very stony loam, 25 to 45 percent slopes, but it is slightly more shallow and has no large stones. Throughout the profile there are common, flat and angular sandstone fragments, as much as 12 inches long, and on the surface are a few large sandstone fragments. The soil is on smooth ridges and upper benches on mountain slopes. Included in areas mapped as this soil are small areas that are shallow or very stony. Runoff is slow to medium, and the erosion hazard is slight to moderate.

About a third of this soil has been cleared and is in crops, orchards, and pasture; the rest is wooded. Although the soil is somewhat droughty and has frost pockets in places, it is moderately productive of orchard fruits. It is also suited to the crops commonly grown, but more than average amounts of fertilizer are needed. (Capability unit IIIe–10; woodland suitability group 5)

Dekalb channery loam, 15 to 25 percent slopes (DaD).—This soil is a little more channery and stony than Dekalb channery loam, 5 to 15 percent slopes. Runoff is medium, and the erosion hazard is moderate.

About a fourth of this soil has been cleared and is in orchards, crops, and pasture. The rest is wooded. Long-term hay and an occasional row crop are suited. (Capability unit IVe–3; woodland suitability group 5)

Dekalb channery loam, 25 to 45 percent slopes (DaE).—This soil is considerably more channery and stony than Dekalb channery loam, 5 to 15 percent slopes. In some places the stones are large enough to interfere with tillage and mowing. The soil is droughty, has medium to rapid runoff, and is moderately susceptible to erosion. Included in areas mapped as this soil are small areas of Dekalb very stony loam.

This soil generally is best suited to trees, and almost all the acreage is wooded. Some of the smoother, more gently sloping areas can be used for pasture, but yields are low, even with adequate fertilizer. (Capability unit VIIe–2; woodland suitability group 5)

Dekalb very stony loam, 0 to 25 percent slopes (DbD).—This soil is similar to Dekalb very stony loam, 25 to 45 percent slopes, but it is less strongly sloping, is shallow in more places, and occurs mostly on the smoother ridges and upper benches instead of the middle and upper slopes. Included in areas mapped as this soil are small extremely stony areas and small areas of Buchanan soils. Runoff causes a slight hazard of erosion.

In most places this soil occupies inaccessible mountain ridges, and almost none of it has been cleared. It is best suited to trees, though some of the less stony areas can produce fair pasture. Woodland must be protected from fire. (Capability unit VIIs–2; woodland suitability group 5)

Dekalb very stony loam, 25 to 45 percent slopes (DbE).—This soil has the profile described for the Dekalb series. It occurs mainly on the middle and upper mountain slopes. Runoff is slow to medium, and the erosion hazard is slight. Included in mapped areas are small extremely stony areas and small areas of Laidig and Buchanan soils.

All of this soil remains wooded, and most of its acreage is inaccessible. The soil is best used as woodland and is moderately to highly productive of trees. Extensive woodland management is justified. (Capability unit VIIs–2; woodland suitability group 5)

Dekalb very stony loam, 45 to 70 percent slopes (DbF).—This soil occupies very steep breaks and escarpments on the mountains. It has a larger acreage of shallow areas and has more extremely stony areas than the soil described as representative of the Dekalb series. Slopes tend to be shorter than those of the less steep Dekalb soils. Runoff is medium to rapid, and the erosion hazard is moderate.

All of this very steep soil is wooded. Woodland is best suited and is moderately productive, but good management is needed, and protection from fire is especially important. (Capability unit VIIs–2; woodland suitability group 5)

Duffield Series

The Duffield series consists of deep, well-drained soils that developed in the residuum of limestone that had a fairly high content of impurities from silty shale. These soils are underlain extensively by Conococheague limestone and, to a lesser extent, by the Elbrook and Beekmantown limestones. In the Conococheague limestone are inclusions of sandstone, and after the limestone has been weathered away in solution, the sandstone is left as rough, coarse-grained blocks having open spaces where the lime weathered out. Most areas of Duffield soils in Berkeley County have few to common fragments of sandstone on the surface and throughout the profile.

The surface layer is dark-brown gravelly silt loam or silt loam, and the subsoil is thick, strong-brown, rather friable silty clay loam to silty clay. Underlying the subsoil is a substratum of strong-brown silty clay loam or silty clay that contains soft siltstone fragments. These soils are moderately permeable, have high available moisture capacity, are strongly acid in areas not limed, and are highly productive of crops and orchard fruits.

The Duffield soils are in the limestone valley in the central and eastern parts of the county. They occupy rather short, smooth to somewhat irregular slopes that have shallow sinkholes in places. The soils are most extensive on the west side of the limestone valley and occur in a north-south band extending from an area just east of Gerrardstown to Little Georgetown.

The Duffield soils occur with the Frankstown soils, which have a somewhat thinner subsoil; with the Frederick soils, which have a redder, finer textured subsoil; and with the Hagerstown soils, which are browner, finer textured, and less acid. Duffield soils also occur with the moderately well drained Pickaway soils and with the Murrill soils, which developed in colluvium having a high content of sandstone fragments.

Duffield soils are among the most productive in the county. Most areas have been cleared and are used for orchards and general farming.

Representative profile of Duffield gravelly silt loam, 3 to 8 percent slopes, in an orchard—

Ap—0 to 7 inches, dark-brown (10YR 4/3) gravelly silt loam; weak, medium, granular structure; very friable; 20 percent sandstone fragments 1 to 3 inches in diameter; contains a little coarse sand; neutral; abrupt, wavy boundary. Layer is 6 to 9 inches thick.

A2—7 to 9 inches, light yellowish-brown (10YR 6/4) silt loam; weak, fine, subangular blocky and weak, medium, platy structure; friable; 15 percent sandstone fragments as much as 3 inches in diameter; slightly acid; clear, wavy boundary. Layer is 1 to 4 inches thick.

B1—9 to 14 inches, yellowish-brown (10YR 5/6) to strong-brown (7.5YR 5/6) silt loam; weak, fine and medium, subangular blocky structure; friable; common grass roots; 15 percent sandstone fragments as much as 3 inches in diameter; medium acid; clear, wavy boundary. Layer is 4 to 8 inches thick.

B21t—14 to 23 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; friable to firm; common clay films; 15 percent sandstone fragments; strongly acid; gradual, wavy boundary. Layer is 7 to 12 inches thick.

B22—23 to 34 inches, strong-brown (7.5YR 5/6) silty clay loam that approaches silty clay; common clay films and spots of yellowish red (5YR 5/6); moderate, fine and medium, subangular blocky structure; a few manganese concretions and a few black faces on peds; common, small, soft siltstone fragments; 10 percent sandstone fragments; strongly acid; gradual, wavy boundary. Layer is 10 to 14 inches thick.

C—34 to 46 inches +, strong-brown (7.5YR 5/6) gritty silty clay; common pockets and lenses of red (2.5YR 5/6) silty clay; massive, breaking to weak, medium, subangular blocky; firm; 15 percent soft siltstone fragments that increase in number with depth; common sandstone fragments, common manganese concretions and black faces on cracks; strongly acid.

Range in characteristics: The surface layer is gravelly silt loam or silt loam, and the content of chert fragments ranges from none to common. The B horizon ranges from silty clay loam to silty clay and extends to a depth of 30 to 38 inches. The B2 horizon ranges from 18 to 28 inches in thickness. Total depth to hard limestone ranges from 4 to 8 feet. Outcrops of limestone are none or few and are more common on the silt loams than on the gravelly silt loams. Sandstone fragments range from 1 to about 4 inches in diameter in the gravelly silt loams.

Location: Smooth and rolling slopes in the limestone valley; extensive along the western side of the valley, on and east of Apple Pie Ridge.

Parent material: Residuum from limestones that contain silt and silty shale and some sandstone and chert impurities; Conococheague, Elbrook and Beekmantown limestones.

Permeability: Moderately permeable.

Slope: Gently sloping to moderately steep (0 to 25 percent slopes).

Duffield gravelly silt loam, 3 to 8 percent slopes (DfB).—This soil has the profile described as representative of the Duffield series. It occurs in fairly large areas and is an excellent soil for orchards. Much of it has good air drainage (fig. 21). Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are a few limestone outcrops, a few very small, very rocky areas, and small areas of Frederick and Frankstown soils.

Almost all of this soil has been cleared, and nearly half is in orchards. The rest is mainly in crops and some pasture. This soil is well suited to all commonly grown crops and orchard fruits, and because it is highly productive, a high level of management is justified. Gravel in the surface layer does not seriously interfere with normal tillage or harvesting. This soil is suitable for irrigation. (Capability unit IIe–1; woodland suitability group 1)

Duffield gravelly silt loam, 8 to 15 percent slopes, severely eroded (DfC3).—This soil occupies more irregular slopes and has more sinkholes than Duffield gravelly silt loam, 3 to 8 percent slopes. Most of the original surface layer has been removed through erosion, and the present surface layer is slightly finer textured than that in the less sloping soil. Runoff is medium or moderately rapid, and the erosion hazard is severe. Included in areas mapped as this soil are a few moderately deep areas.

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Figure 21.—**Apple orchard on Duffield gravelly silt loam, 3 to 8 percent slopes, south of Hedgesville on Apple Pie Ridge.**

Almost all of this soil is in crops, and a small part is in pasture. The soil is well suited to commonly grown crops and to orchard trees, but stripcropping, diversions, and sod waterways are needed for slowing down runoff and controlling erosion. (Capability unit IVe–1; woodland suitability group 1)

Duffield silt loam, 3 to 8 percent slopes (DgB).—This soil contains less sandstone gravel than Duffield gravelly silt loam, 3 to 8 percent slopes. Normally, a few pieces of gravel and a few soft siltstone fragments occur throughout the profile. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are a few limestone outcrops, a few small, very stony areas, a few level areas, and small areas of the Frederick, Hagerstown, and Frankstown soils.

Almost all of this soil has been cleared and is used mainly for crops and orchards. All the common crops and orchard fruits produce well, and a high level of management is justified. The soil is suitable for irrigation. (Capability unit IIe–1; woodland suitability group 1)

Duffield silt loam, 8 to 15 percent slopes (DgC).—This soil occurs in small areas and contains few to common limestone outcrops. Runoff is medium, and the erosion hazard is moderately severe.

About a third of this soil is in farm woodlots, and the rest is in crops, orchards, and some pasture. The erosion hazard is a little more severe on this soil than on Duffield silt loam, 3 to 8 percent slopes, and more intensive management is needed, but the soils can be used and managed in about the same way. (Capability unit IIIe–1; woodland suitability group 1)

Duffield silt loam, 8 to 15 percent slopes, severely eroded (DgC3).—This soil has lost most of its original surface layer through erosion. It is slightly more shallow to bedrock and contains a few more outcrops of limestone than Duffield silt loam, 3 to 8 percent slopes. The soil is extensive on the northern end of Apple Pie Ridge. It occurs on long moderate slopes and, in some places, receives runoff from higher areas.

Runoff is medium to moderately rapid, and the erosion hazard is severe. Included in areas mapped as this soil are small areas of Frederick, Frankstown, and Hagerstown soils.

Almost all of this soil has been cleared and is used chiefly for crops, orchards, and some pasture. The soil is suited to orchard trees and to common crops grown in a 5- or 6-year rotation, but management should include stripcropping, diversions, sod waterways, and other conservation practices. (Capability unit IVe–1; woodland suitability group 1)

Duffield silt loam, 15 to 25 percent slopes, severely eroded (DgD3).—This soil is similar to Duffield silt loam, 8 to 15 percent slopes, severely eroded, but it is in small areas on short, moderately steep side slopes. Included in mapped areas are some moderately deep areas and some limestone outcrops.

About a third of this soil is in woods, and the rest is about equally in crops, orchards, and pasture. The soil is best suited to pasture plants or other permanent vegetation. It is commonly used for orchards in fields where it occurs with less strongly sloping soils, but it is too steep and too eroded for good orchards. The use of machinery is limited. (Capability unit VIe–1; woodland suitability group 1)

Frankstown Series

In the Frankstown series are deep or moderately deep, well-drained soils that developed in residuum from limestone containing much silt or from calcareous silty shale. In most places these soils are underlain by the Elbrook limestone. The shaly material in the profile consists of fine soft fragments of siltstone from which lime has weathered. A few hundred acres are very stony. Small, rough sandstone fragments occur on the surface but are not so common as on the Duffield and Hagerstown soils.

The Frankstown soils have a surface layer of mellow, dark-brown shaly silt loam, a moderately thick subsoil of strong-brown, rather friable silty clay loam, and a thick substratum of strong-brown silty clay loam that contains much soft siltstone and some pockets of silty clay or clay. These soils have high available moisture capacity, are moderately permeable, and are strongly acid unless limed. They are in excellent tilth and permit roots of orchard trees to penetrate deeply. Air drainage is excellent throughout much of their acreage, and orchards are highly productive.

These soils occur extensively on a series of low ridges at the western edge of the limestone valley. These ridges are locally called Apple Pie Ridge. They are roughly 1 mile wide and extend in a north-south direction across the county just east of North Mountain. The Frankstown soils occur with the redder, finer textured Frederick soils, many of which are cherty; with the Duffield soils, which have a thicker subsoil; and with the browner, finer textured Hagerstown soils. The Frankstown soils generally are thinner than all of these soils. Frankstown soils also occur with the colluvial Murrill soils and the moderately well drained Pickaway soils.

Almost all the acreage of Frankstown soils has been cleared. More than half of it is in orchards, and much of the rest is in crops. These soils are well suited to crops and are among the best in the county for orchards.

Representative profile of Frankstown shaly silt loam, 8 to 15 percent slopes, in an orchard—

Ap—0 to 8 inches, dark-brown (10YR 4/3) coarse shaly silt loam; weak, fine, granular structure; friable; shaly material is about 20 percent soft, blocky, light yellowish-brown shale chips ¼ to ¾ inches long; neutral; abrupt, smooth boundary. Layer is 6 to 10 inches thick.

B1—8 to 12 inches, yellowish-brown (10YR 5/8) silt loam; weak, fine, subangular blocky structure; somewhat firm in place, but friable when broken out; common soft shale fragments as much as 1 inch in diameter; medium acid; clear, wavy boundary. Layer is 0 to 6 inches thick.

B21t—12 to 18 inches, strong-brown (7.5YR 5/6) fine silt loam; moderate, medium, subangular blocky structure; friable; common soft shale fragments as much as 1 inch in diameter; a few clay films; medium acid; clear, wavy boundary. Layer is 4 to 8 inches thick.

B22t—18 to 25 inches, strong-brown (7.5YR 5/6) silty clay loam; common small pockets of clay loam; common clay films of yellowish red (5YR 5/6); moderate, medium, blocky and subangular blocky structure; common soft shale fragments as much as 2 inches in diameter; firm; medium acid; gradual, wavy boundary. Layer is 6 to 10 inches thick.

B and C—25 to 60 inches, strong-brown (7.5YR 5/6) silty clay loam; many faces and splotches of yellowish red (5YR 5/6); contains common small pockets and lenses of silty clay or clay; 50 percent soft, blocky, light yellowish-brown shale fragments, as much as 4 inches in diameter, that occur irregularly and that increase in number with depth; common clay films on some cracks; massive with some weak, coarse, subangular blocky cleavage; firm; plastic and slightly sticky when wet; strongly acid; diffuse boundary.

R—60 inches +, light yellowish-brown shale that grades to hard shaly limestone; irregular on top and may contain a few pockets of fine material from the B and C horizon.

Range in characteristics: The surface layer is shaly silt loam or very rocky silt loam, and the B horizon ranges from silt loam to silty clay. The B2 horizon extends to a depth of 22 to 33 inches, and the total thickness of the B21 and B22 horizons ranges from 9 to 19 inches. Hard limestone generally is more than 5 feet below the surface, but the depth ranges from 3 to 8 feet.

Location: Mostly at the western edge of the limestone valley, in a long narrow band on low ridges including Apple Pie Ridge.

Parent material: Silty limestone or calcareous shale; derived mostly from Elbrook limestone.

Permeability: Moderate.

Slope: Gently sloping to moderately steep (3 to 25 percent slopes).

Drainage: Well drained

Frankstown shaly silt loam, 3 to 8 percent slopes (FbB).—This soil is less sloping and generally is smoother than the soil described as representative of the Frankstown series. It occurs in fairly large areas on smooth ridges and gentle side slopes. A few limestone outcrops, a few pieces of sandstone gravel, and a few chert fragments occur. Runoff is medium, and the erosion hazard is slight to moderate. Included in areas mapped as this soil are a few small areas of Duffield and Frederick soils; a few, small, very stony areas; and small, slightly steeper areas.

Almost all of this soil has been cleared, and more than half is in orchards. The rest is mainly in crops, but some is in pasture. This soil is good for crops and is especially well suited to orchard fruits. Air drainage is generally good. Intensive management is justified, and only simple conservation practices are needed. The soil is suitable for irrigation. (Capability unit IIe–1; woodland suitability group 1)

Frankstown shaly silt loam, 8 to 15 percent slopes (FbC).—This soil has the profile described as representative of the Frankstown series. It is similar to Frankstown shaly silt loam, 3 to 8 percent slopes, but it occupies smooth to irregular slopes, has a few limestone outcrops, and in some areas is moderately deep to limestone bedrock. Runoff is medium, and the erosion hazard is moderate to severe.

This soil is used mainly for crops, pasture, and orchards. Small areas have outcrops of rock and remain wooded. The soil is well suited to orchard fruits and to other crops. In most places air drainage is good. Needed to help control erosion are suitable crop rotations, stripcropping where practical, and the use of cover in orchards. (Capability unit IIIe–1; woodland suitability group 1)

Frankstown shaly silt loam, 8 to 15 percent slopes, severely eroded (FbC3).—This extensive soil has long been used for crops and orchards, and it has lost most of its original surface layer through erosion. Consequently, the soil is more shallow than typical, though most areas still are deep to hard limestone bedrock, and outcrops of limestone are few in most places. Because runoff is moderately rapid, the hazard of further erosion is severe. Included in areas mapped as this soil are small areas that are very stony, small areas of Duffield and Frederick soils, and small areas that have gravel or chert on the surface.

Almost all of this soil has been cleared, and much more than half is in orchards. Most of the rest is in crops, and a small part is in pasture. Although this soil is suited to all the commonly grown crops, row crops should not be planted oftener than once in 5 or more years. The soil is well suited to apple orchards if it is kept in continuous cover and to stone fruits if it is clean cultivated on the contour. (Capability unit IVe–1; woodland suitability group 1)

Frankstown shaly silt loam, 15 to 25 percent slopes (FbD).—This inextensive soil occupies short, steep breaks and side slopes. It is moderately deep to limestone in most places and has some limestone outcrops. Runoff is moderately rapid, and the erosion hazard is severe.

About half of this soil is in woods, a large part is in pasture, and some is in crops and orchards. The soil generally is farmed in fields consisting mainly of less strongly sloping soils, and it is suited to all the common crops if row crops are not grown more often than once in 5 or 6 years. The soil also is suited to apple orchards if it is kept in continuous cover. (Capability unit IVe–1; woodland suitability group 1)

Frankstown shaly silt loam, 15 to 25 percent slopes, severely eroded (FbD3).—This soil is shallower than the one described as typical of the Frankstown series, and it contains a few more limestone outcrops. Much of the acreage is only moderately deep to limestone. Erosion has removed most of the original surface layer, and the present shaly surface layer commonly has a few sandstone and chert fragments. This soil occupies steep breaks and side slopes that ordinarily are short and, in places, receive water from higher areas. Runoff is rapid, and the erosion hazard is severe. Included in mapped areas are a few small spots that are very severely eroded.

Much of this soil has been cleared and is used for orchards, crops, and pasture. Because the hazard of further erosion is severe and slopes are moderately steep, this soil

is best suited to permanent pasture and is only fairly well suited to orchards. The use of machinery is somewhat difficult. (Capability unit VIe–1; woodland suitability group 1)

Frankstown very rocky silt loam, 8 to 15 percent slopes (FcC).—This soil occupies very rocky areas within larger areas of Frankstown shaly soils. It is moderately deep to bedrock, and the limestone ledges that crop out are mostly very narrow. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are small areas of very stony Frederick soils, small areas that are severely eroded, and small areas that are steeper than 15 percent.

More than half of this soil is in pasture, and most of the rest is in open woods. Machinery can be used on much of the acreage, but because of the rocks, this soil is best suited to permanent pasture. (Capability unit VIs–1; woodland suitability group 1)

Frederick Series

Soils of the Frederick series are deep, well drained, and moderately permeable. These soils developed in the residuum of stratified siliceous limestone having a fairly high content of angular chert fragments and containing some sandstone. They are underlain mainly by the Conococheague limestone and partly by the Elbrook and Beekmantown limestones. Most of the nonstony Frederick soils have a few limestone outcrops.

In Berkeley County the Frederick soils have a surface layer of dark-brown loam or silt loam. Many of the soils have been influenced by sandstone that remained after the parent limestone was leached out, and the surface layer in these soils is cherty, gravelly, very rocky, or very stony. Apparently the sandstone was concentrated in some areas by local colluvial action. The subsoil is yellowish-red silty clay or clay, and the substratum is splotched yellowish-red clay that grades abruptly to hard limestone.

Frederick soils have high available moisture capacity and are strongly acid in areas that have not been limed. In most places the soils are highly productive.

The Frederick soils occur throughout the limestone valley in the central and eastern parts of the county and in the outlying area of limestone north of Jones Springs. They are most common in a rather broad band that extends north and south from Spring Mills to Nollville and Ridgeway. They are on smooth to somewhat irregular limestone uplands that have some shallow sinkholes. The Frederick soils occur with the browner, less leached Hagerstown soils and with the coarser, less red Frankstown and Duffield soils, which contain more soft siltstone in their subsoil and substratum. They also occur with the finer textured, slowly permeable Carbo and Chilhowie soils and the Murrill and Pickaway soils. Most of the Frederick soils have been cleared and are used for general crops, pasture, and orchards.

Representative profile of Frederick cherty silt loam, 3 to 8 percent slopes, in a meadow—

Ap—0 to 7 inches, dark-brown (10YR 4/3) cherty silt loam; weak, fine, granular structure; friable; many grass roots; 20 percent chert fragments as much as 2 inches in diameter; slightly acid; abrupt, wavy boundary. Layer is 6 to 9 inches thick.

A2—7 to 9 inches, light yellowish-brown (10YR 6/4) cherty silt loam; weak, fine, subangular blocky structure; friable; 15 percent chert fragments as much as 2 inches in diameter; slightly acid; clear, wavy boundary. Layer is 0 to 4 inches thick.

B1—9 to 15 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, fine and medium, subangular blocky structure; somewhat firm; 15 percent chert fragments; slightly acid; clear, wavy boundary. Layer is 2 to 7 inches thick.

B21t—15 to 27 inches, yellowish-red (5YR 5/6) silty clay; strong, fine and medium, blocky structure; firm when moist, slightly plastic and slightly sticky when wet, and hard when dry; continuous clay films; few black coatings on peds; 15 percent chert; medium acid; gradual, wavy boundary. Layer is 10 to 14 inches thick.

B22t—27 to 38 inches, yellowish-red (5YR 5/6) clay; common spots and faces of red (2.5YR 4/6); strong, fine and medium, blocky structure; firm when moist, slightly plastic and slightly sticky when wet, and hard when dry; prominent continuous clay films; common black films on ped faces; 10 percent chert; strongly acid; gradual, wavy boundary. Layer is 9 to 14 inches thick.

C—38 to 72 inches +, splotched yellowish-red (5YR 5/6) and red (2.5YR 5/6) clay; common small spots and lenses of yellowish-brown (10YR 5/8), soft, silty soapstone; massive, but breaks to weak, medium, subangular blocky structure; firm when moist, slightly plastic and slightly sticky when wet, and hard when dry; 10 percent chert; few clay films; common black faces; few manganese concretions; strongly acid.

Range in characteristics: The surface layer is silt loam, cherty silt loam, gravelly loam, very stony loam, or very rocky silt loam. The gravelly loams and very stony loams are thick-surfaced soils in which sandstone material ranges from about 10 to 22 inches in thickness and is underlain by limestone residuum. The subsoil is silty clay or clay. The depth to hard limestone ranges from about 4 to 8 feet, and varies within short distances.

Location: Limestone uplands in the central and eastern parts of the county and in the limestone valley near Jones Springs.

Parent material: Siliceous limestone containing some chert and sandstone; Conococheague, Elbrook, and Beekmantown limestones.

Permeability: Moderate.

Drainage: Well drained.

Slope: Gently sloping to steep (3 to 45 percent slopes).

Frederick cherty silt loam, 3 to 8 percent slopes (FfB).— This soil has the profile described as representative of the Frederick series. It is extensive and occurs in fairly large areas. Slopes are smooth to irregular, and there are shallow sinkholes. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are small areas of Frederick silt loam, a few limestone outcrops, and a few small, very stony areas.

About 10 percent of this soil remains wooded. The rest is mainly in crops and orchards, and some areas are in pasture. The soil is well suited to all commonly grown crops and to orchard fruits. Chert is neither abundant nor large enough to interfere seriously with tillage, and only simple conservation measures are needed to help control runoff and erosion. This soil is suitable for irrigation. (Capability unit IIe–1; woodland suitability group 1)

Frederick cherty silt loam, 8 to 15 percent slopes (FfC).—This soil is a little more irregular in slope and has

slightly more rock outcrops than Frederick cherty silt loam, 3 to 8 percent slopes. Wooded areas normally have more outcrops than other areas. Runoff is medium to moderately rapid, and the erosion hazard is moderate to severe. Included in areas mapped as this soil are a few severely eroded areas.

About half of this soil is wooded. Most of the rest is in crops and pasture, and some is in orchards. Although the soil is suited to the crops commonly grown, intensive conservation measures are needed to help control runoff and erosion. All except the more rocky areas are suited to orchards. (Capability unit IIIe–1; woodland suitability group 1)

Frederick cherty silt loam, 8 to 15 percent slopes, severely eroded (FfC3).—This soil occurs on somewhat irregular slopes and has lost most of its original surface layer through erosion. The present surface layer is slightly finer texturedt han the one described as representative, and it does not take in water so well. The soil has medium to rapid runoff and is highly susceptible to further erosion.

About 50 percent of this soil is in crops, 20 percent is in orchards, 25 percent is in pasture, and 5 percent is in woods. The soil is suited to all the common crops and to row crops grown in a long rotation, but intensive conservation practices are needed to help reduce runoff and to control further erosion. It is especially well suited to apple orchards if continuous cover is maintained. (Capability unit IVe–1; woodland suitability group 1)

Frederick cherty silt loam, 15 to 25 percent slopes. (FfD).—This soil occupies small areas on short side slopes. It has few to common outcrops of limestone. Runoff is medium to rapid, and the erosion hazard is severe.

Almost all the acreage is in woods, but the soil is suitable as cropland if it is farmed in a long rotation and if intensive practices are used to help control runoff. (Capability unit IVe–1; woodland suitability group 1)

Frederick cherty silt loam, 15 to 25 percent slopes, severely eroded (FfD3).—This soil occurs on short side slopes where water has concentrated and removed most of the original surface layer. Runoff is rapid, and the erosion hazard is severe.

About half of this soil is in woods, and most of the rest is in pasture. The soil is best suited to these uses and is commonly farmed with adjoining Frederick soils that are less steep. In many places diversions and other measures that control runoff are needed. (Capability unit VIe–1; woodland suitability group 1)

Frederick silt loam, 3 to 8 percent slopes (FdB).—This soil occurs in fairly large tracts. Its profile contains less chert than the one described as representative of the Frederick series. Normally, a few pieces of chert are on the surface and throughout the soil. Limestone outcrops are few and normally do not seriously limit cultivation. Slopes are smooth to irregular and have some sinkholes. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are small areas that are cherty or very stony and small areas of Duffield soils.

More than half of this soil is in crops, and the rest is mainly in orchards and pasture. A small part remains wooded. This soil is well suited to all the commonly grown crops and is suited to orchard trees. Only simple practices are needed in controlling runoff. (Capability unit IIe–1; woodland suitability group 1)

Frederick silt loam, 8 to 15 percent slopes (FdC).—This soil has a few more limestone outcrops and is more irregularly sloping than Frederick silt loam, 3 to 8 percent slopes. It has medium or moderately rapid runoff and is moderately or severely susceptible to erosion.

About half of this soil is in crops, and a little more than a fourth is in pasture. The rest is in orchards and small woodlots. This soil is suited to crops if intensive conservation measures are used to control runoff. All but the rocky areas are suited to orchards. (Capability unit IIIe–1; woodland suitability group 1)

Frederick silt loam, 8 to 15 percent slopes, severely eroded (FdC3).—This soil has a long history of cropping. Most of the original surface layer has been removed through erosion, and the present surface layer is slightly finer textured than typical. The soil has more outcrops of limestone than less eroded Frederick soils, it has more areas that are only moderately deep to limestone, and it does not take up water so readily. Included in areas mapped as this soil are areas that have a silty clay loam surface layer and small areas that are cherty or very stony. Runoff is moderately rapid or rapid, and the erosion hazard is severe.

About three-fourths of this soil is in crops, and orchards and pasture are common. Only a few areas remain wooded. The soil is suited to all the common crops if they are grown in long rotations. It is well suited to apple orchards that are kept in permanent cover. Intensive conservation practices are needed, however, to help reduce runoff and to control further damage from erosion. (Capability unit IVe–1; woodland suitability group 1)

Frederick gravelly loam, thick surface, 3 to 8 percent slopes (FgB).—This soil occurs mostly at the western edge of the large limestone valley and in the smaller limestone valley north of Jones Springs. It is similar to the nonstony Frederick soils, but it has a mantle of gravelly loam that ranges from 10 to 24 inches in thickness and is underlain by limestone residuum. Limestone crops out in places, and there are a few large sandstone fragments. This soil tends to be firm below a depth of 15 or 18 inches and has a weak fragipan in a few places. In small areas the gravel and chert are large enough to interfere slightly with cultivating and harvesting. Runoff is slow or medium, and the erosion hazard is slight to moderate. Included in areas mapped as this soil are small areas of very cherty soils.

Representative profile in woods—

O1—1 to ½ inch, leaf litter from hardwoods.

O2—½ inch to 0, dark, compacted leaf mull.

A1—0 to 2 inches, very dark gray (10YR 3/1) gravelly loam; moderate, fine, granular structure; very friable; many roots; 25 percent angular pebbles of sandstone as much as 6 inches in diameter, and some squarish chert fragments; strongly acid; abrupt, wavy boundary. Layer is 0 to 4 inches thick,

A2—2 to 10 inches, yellowish-brown (10YR 5/4) gravelly loam; weak, thin, platy and weak, fine, subangular blocky structure; friable; common roots; 20 percent angular sandstone gravel and some chert fragments; very strongly acid; clear, wavy boundary. Layer is 6 to 10 inches thick.

A3—10 to 15 inches, strong-brown (7.5YR 5/6) gravelly heavy loam that contains common coarse sand grains; weak, medium, subangular blocky structure; 15 percent sandstone and chert fragments; very strongly acid; clear, wavy boundary. Layer is 0 to 6 inches thick.

IIB21t—15 to 29 inches, yellowish-red (5YR 4/6) silty clay; some spots and faces of red (2.5YR 5/6); strong,

fine and medium, blocky structure; firm when moist, slightly plastic and slightly sticky when wet; common continuous clay films; 15 percent chert fragments and an occasional pebble of sandstone; strongly acid; gradual, wavy boundary. Layer is 10 to 16 inches thick.

IIB22t—29 to 41 inches, red (2.5YR 4/6) silty clay or clay that has prominent clay films of reddish brown (5YR 4/4); strong, medium and coarse, blocky structure; firm (firmer than IIB21 horizon); hard when dry, slightly plastic and slightly sticky when wet; common manganese concretions; few black films on peds; few roots; 25 percent chert fragments; strongly acid; gradual, wavy boundary. Layer is 8 to 11 inches thick.

IIC—41 to 62 inches +, yellowish-red (5YR 5/6) clay that has many coarse spots and faces of red (2.5YR 4/6) and yellowish brown (10YR 5/8); massive, breaking to weak, medium and coarse, subangular blocky; firm when dry, plastic and slightly sticky when wet; few clay films; few manganese concretions; few black films on peds; 15 percent chert fragments as much as 4 inches in diameter and common, soft, silty, strong-brown (7.5YR 5/8) limestone ghosts; strongly acid; estimated depth to limestone ranges from 5 to 10 feet.

About 50 percent of this soil is wooded, 25 percent is in crops, 15 percent is in pasture, and 10 percent is in orchards. The soil is suited to all the common crops and to orchard fruits. Because the surface layer is open and friable, adequate amounts of fertilizer are needed for good yields. (Capability unit IIe–1; woodland suitability group 1)

Frederick gravelly loam, thick surface, 8 to 15 percent slopes (FgC).—This soil is similar to Frederick gravelly loam, thick surface, 3 to 8 percent slopes, but it occurs in smaller areas. In wooded areas it tends to have more and larger pebbles and stones on the surface than in other areas. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are small areas that are very cherty or very stony.

Almost two-thirds of this soil remains in woods, and the rest is about equally in crops, orchards, and pasture. This soil is suited to commonly grown crops and to orchard fruits, but fertilizer is needed in adequate amounts for good yields. (Capability unit IIIe–1; woodland suitability group 1)

Frederick gravelly loam, thick surface, 8 to 15 percent slopes, severely eroded (FgC3).—This soil occurs on shoulders on slope breaks and has lost most of its original surface layer through erosion. Only the plow layer is gravelly loam and, in places, the reddish subsoil is exposed. Runoff is medium to rapid, and the erosion hazard is moderately severe.

Slightly more than 50 percent of this soil is cropped, about 15 percent is in orchards, 10 percent is in pasture, and 20 percent is wooded. The soil is well suited to crops commonly grown, but row crops should be grown only occasionally. If kept in permanent cover, this is a good soil for orchards. Intensive practices are needed to reduce runoff and to control further erosion. (Capability unit IVe–1; woodland suitability group 1)

Frederick gravelly loam, thick surface, 15 to 25 percent slopes (FgD).—This moderately steep soil occupies steep side slopes and breaks. It contains more and larger pebbles than Frederick gravelly loam, thick surface, 3 to 8 percent slopes. Runoff is medium, and the erosion hazard is moderate to severe. Included in areas mapped as this soil are small areas that are very cherty or very stony.

About three-fourths of this soil is wooded, and the rest is in pasture. It is suitable as cropland if farmed in long rotations and if runoff is controlled. (Capability unit IVe–1; woodland suitability group 1)

Frederick gravelly loam, thick surface, 15 to 25 percent slopes, severely eroded (FgD3).—This soil is similar to Frederick gravelly loam, thick surface, 15 to 25 percent slopes. Because erosion has removed most of the original surface layer, the mantle of gravelly loam is shallow, and in places the clayey subsoil is exposed. Runoff is moderately rapid, and the erosion hazard is severe.

About a fourth of this soil is in crops, a fourth is in orchards, and the rest is in pasture and woods. Because slopes are moderately steep and the erosion hazard is severe, the soil is best suited to permanent pasture or woods. Management is needed on pasture to maintain sod and to limit further damage through runoff and erosion. (Capability unit VIe–1; woodland suitability group 1)

Frederick very rocky silt loam, 3 to 15 percent slopes (FkC).—Except for its lower content of chert and larger number of limestone outcrops, this soil is similar to Frederick cherty silt loam, 3 to 8 percent slopes. Limestone crops out in fairly narrow ledges that generally are oriented in a north-south direction. The soil occurs in small areas and, in many places, is within larger areas of nonstony Frederick soils. Medium runoff causes a slight or moderate hazard of erosion.

About half of this soil remains in wooded pasture. Most of the rest is in crops, and some is in orchards. This soil is best suited as permanent pasture or as woodland. (Capability unit VIs–1; woodland suitability group 1)

Frederick very stony loam, thick surface, 8 to 15 percent slopes (FsC).—This soil occurs mostly on Ferrel Ridge. It contains large sandstone fragments, has large chert fragments on the surface, and has a few outcrops of limestone. Otherwise it is similar to Frederick gravelly loam, thick surface, 3 to 8 percent slopes. Runoff is slow to medium, and the erosion hazard is slight or moderate. Included in areas mapped as this soil are small areas that are very cherty or very rocky.

All of this soil is wooded. Pasture or woodland is suitable, but pasture plants on the most stony areas are hard to mow. (Capability unit VIs–1; woodland suitability group 1)

Frederick very stony loam, thick surface, 15 to 25 percent slopes (FsD).—This moderately steep soil is extensive on Ferrel Ridge. It is similar to Frederick gravelly loam, thick surface, 3 to 8 percent slopes, but it contains large fragments of sandstone and chert, and limestone crops out in some places. Included are small areas of Dekalb soils and small areas of nonstony Frederick soils. Runoff is slow to medium, and the erosion hazard is moderate.

Almost all of this soil is in woods, but a few areas are in pasture. Woodland is an excellent use, and all but the most stony areas are suited to pasture plants. (Capability unit VIs–1; woodland suitability group 1)

Frederick very stony loam, thick surface, 25 to 45 percent slopes (FsE).—This soil occurs on narrow breaks and short slopes. It is similar to Frederick gravelly loam, thick surface, 3 to 8 percent slopes, but it is steeper and has many fragments of sandstone on the surface. Limestone crops out in many places. Included are small areas

of Dekalb soils. Runoff is medium, and the erosion hazard is moderate or severe.

About 95 percent of this soil is wooded, and the rest is in pasture. Most of the acreage is too steep and too stony for pasture and should be in trees. (Capability unit VIIs–1; woodland suitability group 1)

Gilpin Series

In the Gilpin series are moderately deep, well-drained soils in the limestone valley. These soils have a surface layer of dark-brown silt loam and a subsoil of yellowish-brown, friable silt loam or silty clay loam. Fragments of soft shale normally occur throughout the profile.

In Berkeley County the Gilpin soils have a substratum of soft acid shale that permits roots to penetrate somewhat more deeply than in normal Gilpin soils, which are underlain by harder shale and thin sandstone. All the Gilpin soils are moderately permeable and have moderate available moisture capacity.

These soils are adjacent to the shallower, more shaly Berks and Montevallo soils, the somewhat poorly drained Blairton soils, and the Hagerstown, Frederick, and other soils derived from limestone. Gilpin soils are deeper, contain fewer rock fragments, and have more distinct horizons than the Berks channery silt loams in the western part of the county.

Representative profile of Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes, in pasture—

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; about 5 percent fine shale chips; strongly acid; abrupt, wavy boundary. Layer is 5 to 8 inches thick.

B1—7 to 11 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; about 5 percent fine shale chips; strongly acid; clear, wavy boundary. Layer is 0 to 6 inches thick.

B2t—11 to 20 inches, yellowish-brown (10YR 5/4) to brown (7.5YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; somewhat firm; common, discontinuous clay films, mostly in root channels; 15 percent soft shale fragments; strongly acid; gradual, wavy boundary. Layer is 7 to 10 inches thick.

B3—20 to 28 inches, strong-brown (7.5YR 5/6) silty clay loam; massive, breaking to weak, medium, subangular blocky structure; firm in place, but friable when broken out; a few clay films; 40 percent shale fragments as much as 3 inches in diameter; very strongly acid; gradual, wavy boundary. Layer is 6 to 10 inches thick.

R—28 inches +, rather soft, tilted and broken Martinsburg shale; some silty clay loam similar to that in B2 horizon occurs in cracks and is deposited on some faces of shale; in some places fine material makes up as much as 5 percent by volume and continues to a depth of several feet.

Range in characteristics: Content of shale fragments throughout the profile ranges from 5 to 40 percent by volume. The depth to Martinsburg shale ranges from 20 to 30 inches.

Location: Shale belts in the central and eastern parts of the county.

Parent material: Residuum from Martinsburg shale.

Drainage: Well drained.

Permeability: Moderate.

Slopes: 0 to 15 percent.

Gilpin silt loam, soft shale substratum, 0 to 3 percent slopes (GpA).—This nearly level soil is on smooth, broad ridges and has a profile similar to the one described as representative of the Gilpin series. It has medium runoff, and receives little water from higher slopes. Included in mapped areas are small areas of Berks shaly silt loam and Blairton silt loam.

Two-thirds of this soil is in crops, a small part is in orchards and pasture, and the rest is wooded. The soil is suited to all the crops commonly grown, but it is a little too shallow for the best yields of orchard crops. Only simple conservation measures are needed. (Capability unit IIe–10; woodland suitability group 4)

Gilpin silt loam, soft shale substratum, 3 to 8 percent slopes (GpB).—This soil has the profile described for the Gilpin series. It occupies ridges and side slopes that are gently sloping and have medium runoff. Included in areas mapped as this soil are small areas of Berks and Blairton soils.

About half the acreage is cropped, a small part is in orchards and pasture, and the rest is wooded. The soil is suited to all the crops common in the county, but it is not among the best soils for orchards. Needed are conservation measures that help to control erosion and the loss of water. (Capability unit IIe–10; woodland suitability group 4)

Gilpin silt loam, soft shale substratum, 8 to 15 percent slopes (GpC).—This soil is similar to the soil described as representative of the series, but it occurs on side slopes, is slightly more shallow, and has a higher content of shale in the surface layer. In addition, areas mapped as this soil include a little larger acreage of Berks shaly silt loam.

About half of this soil is in crops and pasture, a small acreage is in orchards, and the rest is wooded. If stripcropping, diversions, and other conservation practices are used, the soil is suited to crops grown locally and to orchards. (Capability unit IIIe–10; woodland suitability group 4)

Hagerstown Series

The Hagerstown series consists of deep, well-drained, moderately permeable soils that developed in residuum of hard, fairly pure limestone. They are underlain mainly by the Beekmantown limestone.

The Hagerstown soils have a surface layer of dark-brown silt loam or silty clay loam, a subsoil of reddish-brown silty clay or clay that has strong, blocky structure, and a thick clayey substratum that is over hard limestone. In Berkeley County these soils commonly have a few small fragments of rough porous sandstone and a few very coarse grains of quartz throughout their profile. Apparently these grains and fragments were contained in limestone that weathered out. Nearly all the nonrocky Hagerstown soils have a few outcrops, or ribs, of limestone that occur singly or parallel and are rather long and very narrow.

Most Hagerstown soils readily take in water and are fairly easily tilled, but the silty clay loams have fairly rapid runoff and are slightly difficult to till. Although the available moisture capacity generally is high, it is moderate in areas of very rocky soils that are shallow. Unless the Hagerstown soils are limed, their surface layer

is strongly acid or medium acid, and their lower subsoil is slightly acid or neutral.

These soils occupy more than 30,000 acres in the limestone valley, and slightly more than one-fourth the acreage is very rocky. They are mainly along the northeastern edge of the valley and in a band that is 2 to 3 miles wide and extends north and south across the central part of the county, along and just west of U.S. Highway No. 11.

Hagerstown soils occur with the Frankstown and Duffield soils but are redder and finer textured than those soils. They also occur with the Frederick soils, but they have a darker colored surface layer, are less acid in the lower subsoil, and are not so strongly leached. In addition, the Hagerstown soils occur with the Murrill and Pickaway soils, adjoin the Berks and Blairton soils, and are near the Chilhowie and Carbo soils. Hagerstown soils are coarser textured and more permeable than the Chilhowie and Carbo soils. They are deeper than the Corydon soils and are redder and deeper than the Frankstown soils.

The Hagerstown soils are well suited to crops and pasture, and nearly all the acreage has been cleared. The nonrocky soils are used extensively for orchards.

Representative profile of Hagerstown silt loam, 3 to 8 percent slopes, in meadow (see tables 16 and 17, sample No. S60-WVa-2-2(1-7), for chemical and physical properties)—

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; slightly hard when dry, friable when moist; few small quartz fragments; slightly acid; abrupt, smooth boundary. Layer is 7 to 10 inches thick.

A2—8 to 10 inches, brown (7.5YR 5/4) silt loam; weak thin, platy and weak, fine, subangular blocky structure; slightly firm or friable when moist; few small quartz fragments; neutral; clear, wavy boundary. Layer is 0 to 4 inches thick.

B21t—10 to 16 inches, reddish-brown (5YR 4/4) silty clay; moderate, medium and coarse, blocky structure; slightly plastic and slightly sticky when wet; slightly acid; clear, wavy boundary. Layer is 4 to 8 inches thick.

B22t—16 to 33 inches, reddish-brown (2.5YR 4/4) to red (2.5YR 4/6) clay; strong, medium and coarse, blocky structure; prominent reddish-brown (5YR 4/4) clay films on peds; common black coatings; hard when dry, firm when moist, and plastic and sticky when wet; slightly acid; clear, wavy boundary. Layer is 6 to 10 inches thick.

B3—33 to 39 inches, yellowish-red (5YR 4/6) silty clay or clay loam; moderate, fine and medium, blocky structure; common red (2.5YR 4/6) clay films and black coatings on peds; firm when moist, plastic and slightly sticky when wet; slightly acid; clear, wavy boundary. Layer is 0 to 10 inches thick.

C1—39 to 61 inches, variegated yellowish-red (5YR 5/6) and strong-brown (7.5YR 5/6) silty clay; massive, but breaks to weak, coarse, subangular blocky structure; firm or very firm; contains common lenses and streaks of coarse quartz sand and a few quartz pebbles; few clay films and common black coatings on peds; medium acid; gradual, wavy boundary. Layer is 20 to 30 inches thick.

C2—61 to 75 inches +, variegated yellowish-red (5YR 5/6) and strong-brown (7.5YR 5/6) silty clay loam or silty clay; massive, but breaks to weak, coarse, subangular blocky structure; friable; contains common lenses and streaks of coarse quartz sand and a few quartz pebbles; few clay films; medium acid; underlain by hard, gray Beekmantown limestone at estimated depth of 8 to 10 feet.

Range in characteristics: The surface layer is silt loam, gravelly silt loam, very rocky silt loam, silty clay loam, or very rocky silty clay loam. The subsoil is silty clay or clay. Only a few outcrops of limestone occur in the nonrocky soils, but outcrops severely limit or prohibit cultivation in the rocky soils. In most places the depth to hard bedrock is more than 4 feet. It generally ranges from 3 to 10 feet, though it is less than 3 feet in small, very rocky spots. Sinkholes are common in some places.

Location: The limestone valley in the eastern and central parts of the county.

Parent material: Beekmantown limestone.

Drainage: Well drained.

Permeability: Moderate.

Slope: Gently sloping to very steep (3 to 50 percent slopes).

Hagerstown gravelly silt loam, 3 to 8 percent slopes (HaB).—This soil is similar to Hagerstown silt loam, 3 to 8 percent slopes, but its surface layer is 15 to 20 percent small, angular and subangular fragments of rough, coarse-grained sandstone, 1 to 3 inches across. These fragments do not interfere with tillage, and only a few occur below the surface layer. Included in areas mapped as this soil are a few, very stony areas.

This soil is most extensive in the central part of the limestone valley, north and south of Arden. It generally occupies short slopes that are marked by shallow sinkholes and a few limestone outcrops. Runoff is medium, and erosion is a slight to moderate hazard. The rate of water intake and the available moisture capacity are high.

This soil is well suited to all the crops commonly grown, is excellent for orchards, and is suitable for irrigation. Most of the acreage is in crops and orchards. Intensive management is justified. (Capability unit IIe–1; woodland suitability group 1)

Hagerstown gravelly silt loam, 8 to 15 percent slopes, severely eroded (HaC3).—This soil is similar to Hagerstown gravelly silt loam, 3 to 8 percent slopes, but most of its original surface layer has been removed through erosion and the present surface layer is slightly finer textured than normal and, in small areas, is gravelly silty clay loam. In most places there are a few limestone outcrops and a few very stony spots. Gravel makes up 10 to 20 percent of the surface layer. Shallow sinkholes are few to common Runoff is medium to rapid, and the erosion hazard is moderate to severe.

Most of this soil is in crops and orchards, and a few areas are wooded. The soil is suited to the same crops as Hagerstown gravelly silt loam, 3 to 8 percent slopes. Management needs are about the same, but more intensive practices are necessary to control runoff, and only an occasional row crop should be grown. (Capability unit IVe–1; woodland suitability group 1)

Hagerstown silt loam, 0 to 3 percent slopes (HbA).—This nearly level soil has a profile similar to the one described for the Hagerstown series. It occurs in small spots scattered throughout areas of slightly steeper Hagerstown soils and is commonly farmed along with them. A few limestone outcrops occur. Runoff is slow to medium, and the erosion hazard is slight.

Nearly all of this soil has been cleared and is used for crops and orchards. Under ordinary good management

all the common crops can be grown in short rotations. Although frost pockets occur in some spots, this is a good soil for orchards. (Capability unit I–1; woodland suitability group 1)

Hagerstown silt loam, 3 to 8 percent slopes (HbB).—This soil has the profile described for the Hagerstown series. It is extensive in the eastern and central parts of the limestone valley. A few outcrops of limestone occur as narrow ribs that are 1 to 3 feet across and generally point north and south. Most slopes are short and fairly smooth, but shallow sinkholes occur in many places. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are a few very stony areas.

This is one of the most extensive and most important soils in the county. About 60 percent is in crops, 15 percent is in orchards, 15 percent is in pasture, and the rest is in small woodlots. The soil is highly productive and is well suited to all the common crops and to orchards, though tillage is slightly hindered by limestone outcrops. Only simple conservation practices are needed. (Capability unit IIe–1; woodland suitability group 1)

Hagerstown silty clay loam, 3 to 8 percent slopes (HcB).—This soil has a finer textured surface layer and a few more rock outcrops than Hagerstown silt loam, 3 to 8 percent slopes, and it tends to be a little shallower to bedrock. It occurs in rather small areas that are scattered throughout larger areas of other Hagerstown soils. This soil is somewhat more difficult to till than the Hagerstown silt loams, and it does not take in water so readily. In most places slopes are short and irregular. Runoff is medium to rapid, and the erosion hazard is moderate or severe. Included in areas mapped as this soil are small areas that have a silt loam surface layer.

Most of this soil is in crops and pasture, and the rest is in orchards and small woodlots. The soil is suited to crops grown locally but is not used extensively for orchards, apparently because the surface layer is fine textured and because hard limestone is only about 3 feet below the surface. In small areas limestone outcrops make tillage difficult. Conservation practices are needed to control runoff. (Capability unit IIe–1; woodland suitability group 1)

Hagerstown silty clay loam, 8 to 15 percent slopes (HcC).—This soil is more irregularly sloping and has a few more sinkholes than Hagerstown silty clay loam, 3 to 8 percent slopes. In a few places there are outcrops of limestone. Runoff is medium or moderately rapid, and erosion is a moderate or severe hazard. Included in areas mapped as this soil are a few small, very rocky areas, which generally are wooded.

About a third of this soil is in crops, a third is in pasture, and the rest is in orchards and small woodlots. The soil is well suited to all the common crops and to a 4-year crop rotation. Runoff can be reduced and erosion controlled by using suitable practices. (Capability unit IIIe–1; woodland suitability group 1)

Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded (HcC3).—This strongly sloping soil occurs in rather small areas on exposed points and irregular side slopes. It has lost most of its original surface layer through erosion, and its present surface layer is silty clay loam. It is shallower to bedrock than Hagerstown silt loam, 3 to 8 percent slopes, and has more outcrops of limestone. Some spots are only moderately deep to hard bedrock. Runoff is medium to rapid, and the erosion hazard is moderate or severe. Included in areas mapped as this soil are small, very stony areas.

Most of this soil is in crops and pasture, and some is in orchards. The soil is suited to all the crops commonly grown, but it is moderately difficult to till and does not take in water readily. Long rotations are suitable, and intensive practices are needed for reducing runoff and controlling further erosion. The soil is only fairly well suited to orchards. (Capability unit IVe–1; woodland suitability group 1)

Hagerstown silty clay loam, 15 to 25 percent slopes, severely eroded (HcD3).—This steep soil has a profile similar to that of Hagerstown silty clay loam, 8 to 15 percent slopes, severely eroded. It occurs in small areas on side slopes where water has concentrated. It has a few to common outcrops of limestone, a few very stony areas; and small areas that are only moderately deep to bedrock. Runoff is rapid, and the erosion hazard is severe.

About half of this soil is in pasture. Most of the rest is in crops, and there are a few orchards. Because the soil is subject to severe erosion, its best use is pasture. Management should provide practices that maintain sod and control runoff. (Capability unit VIe–1; woodland suitability group 1)

Hagerstown very rocky silt loam, 3 to 8 percent slopes (HgB).—This soil occurs throughout the area of Hagerstown soils, mainly along the eastern edge of the county. It occupies short, irregular, rocky slopes that have few to common sinkholes. The rocks occur singly or in parallel clusters that extend in a north-south direction and appear as narrow ribs, 1 to 3 feet across and a few inches to 2 feet high. Some spots are extremely rocky, especially near Scrabble in the extreme eastern part of the county. Most of these spots are wooded. Included in areas mapped as this soil are small areas of very stony Chilhowie, Frederick, and Carbo soils. Runoff is medium, and the erosion hazard is moderate.

Representative profile of Hagerstown very rocky silt loam, 3 to 8 percent slopes, in undisturbed woods (see tables 16 and 17, sample No. S60–WVa–2–9(1–6), for chemical and physical properties)—

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) very rocky silt loam; moderate, fine and medium, granular structure; very friable; neutral; clear, wavy boundary. Layer is 1 to 5 inches thick.

A2—3 to 5 inches, dark-brown (7.5YR 4/2 to 4/4) very rocky silt loam; weak, medium and weak, fine, subangular blocky structure; friable; neutral; clear, wavy boundary, some mixing of material from A1 horizon. Layer is 0 to 4 inches thick.

B1—5 to 9 inches, reddish-brown (5YR 5/4) silty clay; moderate, fine, subangular blocky structure; common clay films; slightly acid; clear, wavy boundary; a little mixing of darker material from A1 horizon. Layer is 0 to 6 inches thick.

B21t—9 to 23 inches, reddish-brown (5YR 4/4) clay; strong, fine and medium, subangular blocky and blocky structure; hard when dry, firm when moist, and plastic and slightly sticky when wet; prominent continuous clay films; few black concretions; slightly acid; clear, wavy boundary. Layer is 10 to 18 inches thick.

B22t—23 to 36 inches, reddish-brown (5YR 4/4) clay; moderate, medium, blocky structure; few black concretions and coatings; prominent clay films; many weathered chert fragments; hard when dry, firm when moist, and plastic and slightly sticky when wet; slightly acid; gradual, wavy boundary. Layer is 10 to 20 inches thick.

C—36 to 62 inches +, yellowish-red (5YR 4/6) to red (2.5YR 4/6) clay that is more silty than the matrix; spots and streaks of strong brown (7.5YR 5/8); massive, but tends to weak, coarse, subangular blocky structure; numerous small, gray, calcareous particles; hard when dry, firm when moist, and plastic and sticky when wet; neutral.

About two-thirds of this soil is in pasture, and most of the rest is in woods and a few small orchards. Because the soil is very rocky, it is best suited to bluegrass pasture or trees. Machinery can be used in all but the most rocky areas. (Capability unit VIs–1; woodland suitability group 1)

Hagerstown very rocky silt loam, 8 to 15 percent slopes (HgC).—This soil is in smaller areas on slightly more irregular slopes than Hagerstown very rocky silt loam, 3 to 8 percent slopes. Most of these areas are on rolling side slopes. The soil has medium runoff and is subject to moderate or moderately severe erosion.

About half of this soil is in pasture, and most of the rest is in woods and a few orchards. Permanent pasture or woodland is the best use. Bluegrass pasture grows well and responds to additions of lime and fertilizer, but mowing is needed to maintain good sod. Machines can be used in most areas. (Capability unit VIs–1; woodland suitability group 1)

Hagerstown very rocky silt loam, 15 to 25 percent slopes (HgD).—This soil occupies small areas that are generally on steep breaks. Included with it are many extremely stony areas. Runoff is medium, and erosion is a moderate hazard.

Because this soil is so rocky, it probably is best suited to trees, and almost all the acreage is wooded. The less rocky areas are suited to pasture or orchards. (Capability unit VIs–1; woodland suitability group 1)

Hagerstown very rocky silt loam, 25 to 50 percent slopes (HgF).—This soil is in small, generally narrow areas on steep and very steep breaks. It has more extremely rocky areas than Hagerstown very rocky silt loam, 15 to 25 percent slopes. Runoff is medium to rapid, and the erosion hazard is severe unless permanent cover is maintained.

Because this soil is rocky and steep, it is best suited as woodland. Most of it is wooded. (Capability unit VIIs–1; woodland suitability group 1)

Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded (HkC3).—This soil has a profile similar to that of Hagerstown very rocky silt loam, 3 to 8 percent slopes, but it has lost most of its original surface layer through erosion, and the present surface layer does not take in water so readily. Consequently, the soil is slightly droughty. Runoff is rapid, and the erosion hazard is severe. Included in areas mapped as this soil are small areas of very rocky silt loam and small, extremely rocky areas.

About two-thirds of this soil is in pasture, and most of the rest is in woods. Because of rocks and the erosion hazard, the soil is best used as woodland, but it can be used for pasture if the sod is managed well. (Capability unit VIs–1; woodland suitability group 1)

Hagerstown very rocky silty clay loam, 15 to 25 percent slopes, severely eroded (HkD3).—This soil is steeper than Hagerstown very rocky silty clay loam, 8 to 15 percent slopes, severely eroded, and it occurs in small areas on side slopes. Runoff is rapid, and the erosion hazard is severe.

About half of this soil is in pasture, and the rest is wooded. The soil is fairly well suited to pasture, but good management is needed to maintain the sod and to control further erosion. (Capability unit VIIs–1; woodland suitability group 1)

Huntington Series

The Huntington series consists of deep, well-drained soils that developed in recent alluvium washed from soils on uplands derived from limestone. The Huntington soils occur on flood plains along medium-sized and large streams in the limestone valley. They also occur in large sinkholes, at the foot of concave slopes, and along small intermittent drainageways in the limestone valley.

The Huntington soils have a surface layer of dark-brown silt loam to fine sandy loam and subsurface layers of mellow, dark yellowish-brown silt loam and fine sandy loam that are relatively unweathered and contain considerable organic matter. The soils are naturally fertile and slightly acid or neutral. Their available moisture capacity is generally high, but it is moderate in some of the fine sandy loams.

In this county the Huntington soils occur along the streams that drain the limestone valley in the central and eastern parts. They are extensive along Opequon Creek and the narrow flood plain of the Potomac River. The soils occupy about 4,000 acres in the county and are important as cropland. Most of their acreage has been cleared.

Representative profile of Huntington silt loam along Opequon Creek—

Ap—0 to 10 inches, dark-brown (10YR 3/3) silt loam; moderate, fine and medium, granular structure; very friable; many fine roots; neutral; clear, smooth boundary. Layer is 7 to 10 inches thick.

C1—10 to 23 inches, dark-brown (10YR 4/3) silt loam; moderate, medium, granular and weak, fine, subangular blocky structure; friable; common worm casts; some mixing from Ap horizon; common medium pores; neutral; clear, wavy boundary. Layer is 10 to 15 inches thick.

C2—23 to 44 inches, dark yellowish-brown (10YR 4/4) coarse silt loam; weak, medium, granular and weak, fine, subangular blocky structure; common silty films of dark brown (10YR 3/3); few worm casts; contains some organic matter; neutral; gradual, wavy boundary. Layer is 18 to 25 inches thick.

C3—44 to 72 inches +, dark grayish-brown (10YR 4/2) stratified fine sandy loam, silt loam, and loam; common faces and streaks of dark brown (10YR 3/3); massive; few fine mottles of brown (10YR 5/3) and light brownish gray (10YR 6/2) below depth of 60 inches; contains appreciable amount of organic matter; a few small pebbles; neutral; total estimated thickness of the alluvial deposits ranges from 12 to 15 feet.

Range in characteristics: The surface layer ranges from silt loam to find sandy loam, and the subsurface layers range from coarse silty clay loam to fine sandy loam.

Location: In the limestone valley, on flood plains along streams draining the limestone uplands, and in depressions in intermittent drainageways.

Parent material: Recent alluvium derived from limestone.

Permeability: Moderate or moderately rapid.
Slope: Nearly level or gently sloping (0 to 8 percent slopes).
Flood hazard: Slight to moderate.

Huntington silt loam (Hn).—This soil has the profile described for the Huntington series. In most places the hazard of flooding is moderate, but it is slight in the higher areas, and a few narrow areas adjacent to streams are frequently flooded. High water gouges out streambanks in places. The available moisture capacity is high. Included in areas mapped as this soil are small areas of Lindside soils.

About half of this soil is in crops, and the rest is in pasture or woodland. The soil is well suited to crops, but the time of planting may be delayed in fields that are likely to be flooded. The soil produces good pasture and is suitable for irrigation. (Capability unit IIw–6; woodland suitability group 8)

Huntington fine sandy loam (Hm).—This soil generally is fairly close to streams; it is extensive along the Potomac River. It has a surface layer of dark-brown fine sandy loam and subsurface layers of dark yellowish-brown fine sandy loam or loam. Flooding is a slight to moderate hazard, and very narrow areas along streams are flooded annually or more often. These narrow areas are mostly wooded, are coarser textured than typical, and are droughty. The permeability of this soil is moderate to rapid, and the available moisture capacity is moderate to high. Included are small areas of Huntington silt loam and of Lindside soils.

This soil is suited to all the crops commonly grown in the county, and about half the acreage is in crops. The time of planting may need adjusting in fields where the flooding hazard is known. This soil is suitable for irrigation. (Capability unit IIw–6; woodland suitability group 8)

Huntington silt loam, local alluvium (Ho).—This extensive soil occurs in small areas along intermittent streams and in broad, shallow sinkholes in the limestone valley. It receives soil material washed from adjacent limestone soils, and it contains more small fragments of coarse sandstone than other Huntington soils in the county. The soil is 3 to 8 feet deep to residual clay from limestone. Flooding or ponding is a slight hazard. The available moisture capacity is high. Included in areas mapped as this soil are small gravelly spots.

Representative profile in meadow—

Ap—0 to 9 inches, dark-brown (10YR 3/3) gritty silt loam; weak, fine, granular structure; very friable; 5 to 10 percent rough angular sandstone fragments, mostly less than 1 inch in diameter; neutral; abrupt, smooth boundary. Layer is 8 to 10 inches thick.

C1—9 to 16 inches, dark-brown (10YR 4/3) gritty silt loam; weak, fine, subangular blocky and weak, medium, granular structure; some mixing from Ap horizon; friable; 15 percent sandstone fragments as much as 2 inches in diameter; neutral; clear, smooth boundary. Layer is 6 to 12 inches thick.

C2—16 to 44 inches, dark yellowish-brown (10YR 4/4) gravelly silt loam; weak, fine and medium, subangular blocky structure; friable; 20 percent squarish sandstone fragments as much as 2 inches in diameter; common medium pores; slightly acid; gradual, wavy boundary. Layer is 20 to 30 inches thick.

IIC—44 to 52 inches +, yellowish-red (5YR 5/6) and red (2.5YR 5/8) silty clay; massive; hard when dry, firm when moist, plastic and sticky when wet; common black films; few manganese concretions; slightly acid; underlain by Beekmantown limestone. Layer is 7 to 14 inches thick.

About three-fourths of this soil is in crops, a small part is in orchards, and a few areas are in small woodlots. The soil produces high yields of all crops grown in the county, but its use for orchards is severely limited because air drainage is poor. Crop yields normally justify a high level of management, including large additions of fertilizer. (Capability unit I–6; woodland suitability group 8)

Laidig Series

The Laidig series consists of deep, well-drained soils that have a fairly high content of coarse sandstone fragments. These soils developed in old, deep colluvium that came from soils on uplands derived from acid, gray sandstone and that contained some shale and reddish sandstone.

The Laidig soils have a surface layer of mellow, dark grayish-brown very stony loam or gravelly loam and a subsoil of dark-brown sandy clay loam. Underlying the subsoil is a firm, dense fragipan. The soils are subject to surface runoff and subsurface seepage from higher slopes, and runoff generally causes a slight to moderate hazard of erosion. The available moisture capacity is moderate to high.

In Berkeley County the Laidig soils occur on the middle and lower slopes of North Mountain, Third Hill Mountain, and Sleepy Creek Mountain in the western part. They are below the well-drained Dekalb and Berks soils, and they are close to the moderately well drained Buchanan soils. Most of the acreage in Laidig soils remains wooded.

Representative profile of Laidig very stony loam, 15 to 25 percent slopes, in woodland—

O1—4 inches to ¾ inch, leaf litter from hardwoods.

O2—¾ inch to 0, black, partly decayed leaf mull mixed with soil material.

A1—0 to 3½ inches, very dark grayish-brown (10YR 3/2) very stony loam; moderate, medium, granular structure; loose; medium acid; clear, irregular boundary. Layer is 2 to 6 inches thick.

A2—3½ to 12 inches, brown (7.5YR 5/4) very stony fine sandy loam; weak, fine, subangular blocky structure; very friable; some mixing from A1 horizon in root holes and channels; 15 percent partly rounded fragments of sandstone; strongly acid; clear, wavy boundary. Layer is 6 to 10 inches thick.

B1—12 to 20 inches, dark-brown (7.5YR 4/4) heavy sandy loam; weak, fine and medium, subangular blocky structure; friable; 20 percent partly rounded fragments of sandstone; strongly acid; clear, irregular boundary. Layer is 6 to 10 inches thick.

B21t—20 to 34 inches, dark-brown (7.5YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; a few clay films; firm in place but friable when broken out; common fine pores; 25 percent partly rounded fragments of sandstone; very strongly acid; clear, wavy boundary. Layer is 10 to 16 inches thick.

B22t—34 to 50 inches, dark-brown (7.5YR 4/4) sandy clay loam or sandy clay with common clay films of reddish brown (5YR 4/4); finer textured than B21 horizon; moderate, coarse and medium, subangular blocky structure; firm when moist, slightly plastic and slightly sticky when wet; 25 percent partly

rounded sandstone fragments; a few large sandstone fragments; very strongly acid; gradual, wavy boundary. Layer is 12 to 20 inches thick.

Cx—50 to 72 inches +, variegated yellowish-red (5YR 4/6) and dark-brown (7.5YR 4/4) sandy clay loam; fragipan; massive (structureless); firm to very firm when moist, slightly plastic and slightly sticky when wet, and hard when dry; few manganese concretions and black films on cracks; 30 percent partly rounded sandstone fragments; very strongly acid; total estimated thickness of colluvial material is 25 feet.

Range in characteristics: The surface layer ranges from gravelly silt loam to very stony sandy loam. The gravel consists of partly rounded fragments of sandstone and angular channery fragments of sandstone. Depth to the fragipan ranges from 36 to 50 inches.

Location: Colluvial slopes on North, Third Hill, and Sleepy Creek Mountains in the western part of the county.

Parent material: Old colluvium derived from acid sandstone and some shale on uplands.

Permeability: Moderate.

Slope: Gently sloping to steep (3 to 45 percent slopes).

Drainage: Well drained.

Laidig gravelly loam, 3 to 8 percent slopes (LaB).—This soil has a profile similar to the one described as representative of the Laidig series, but it contains fewer large stones. The soil occurs in small areas and, in places, has been cleared of larger stones. Runoff is slow to medium, and the erosion hazard is moderate.

About half of this soil is wooded, and the rest is in pasture and orchards. The soil is suited to the crops commonly grown and, where air drainage is satisfactory, is well suited to orchards. (Capability unit IIe–4; woodland suitability group 2)

Laidig gravelly loam, 8 to 15 percent slopes (LaC).—In wooded areas this soil has more large stones on the surface than Laidig gravelly loam, 3 to 8 percent slopes. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are small, very stony areas and small areas of Buchanan soils.

About three-fourths of this soil is in woods, a small part is in orchards, and the rest is in pasture and crops. This soil is suited to the same uses as Laidig gravelly loam, 3 to 8 percent slopes, but is more susceptible to erosion. (Capability unit IIIe–4; woodland suitability group 2)

Laidig gravelly loam, 8 to 15 percent slopes, severely eroded (LaC3).—This strongly sloping soil is similar to Laidig gravelly loam, 3 to 8 percent slopes, but it receives runoff from higher slopes and has lost about three-fourths of its original surface layer through erosion. Runoff is medium to rapid, and the erosion hazard is moderate or severe.

About one-fourth of this soil is in orchards, half is in woods, and the rest is largely in pasture. The soil can be used for orchards, and it is suited to all the common crops if they are grown in long rotations. Diversion terraces are needed in some places. (Capability unit IVe–3; woodland suitability group 2)

Laidig gravelly loam, 15 to 25 percent slopes (LaD).—This soil contains fewer large stones than Laidig gravelly loam, 3 to 8 percent slopes. Some stones have been removed from cleared areas, but a few large ones occur in most places. Runoff is medium, and the erosion hazard is moderate. Included in wooded areas mapped as this soil are a few small areas of very stony Laidig soils.

About three-fourths of this soil is woodland, and small areas are in orchards. Management needs are similar to those for Laidig gravelly loam, 8 to 15 percent slopes, but the steeper slopes make the use of machines more difficult. (Capability unit IVe–3; woodland suitability group 2)

Laidig very stony loam, 3 to 15 percent slopes (LbC).—The profile of this soil is similar to the one described as representative of the Laidig series. Runoff is slow, and the erosion hazard is slight. Included in areas mapped as this soil are small areas of Buchanan soils.

This soil is most suitable as woodland, and almost all the acreage remains wooded. Pasture can be grown, but this is not practical in most areas. (Capability unit VIs–2; woodland suitability group 2)

Laidig very stony loam, 15 to 25 percent slopes (LbD).—This extensive soil has the profile described for the Laidig series. It has slow to medium runoff and is subject to slight or moderate erosion. Included in mapped areas are a few areas of Buchanan and Dekalb soils

Although this soil is moderately well suited to pasture, most of it is in isolated areas on mountains and remains wooded. Yields of wood products are excellent. (Capability unit VIs–2; woodland suitability group 2)

Laidig very stony loam, 25 to 45 percent slopes (LbE).—This soil has a profile similar to the one described for the Laidig series. Mapped with it are small areas of Dekalb soils. Sandstone ledges crop out in places. Runoff is medium, and the erosion hazard is moderate.

All of this soil is in woodland, its best use. Normally, a high level of management is justified. (Capability unit VIIs–2; woodland suitability group 2)

Leadvale Series

In the Leadvale series are deep, moderately well drained soils that have a fragipan in the lower subsoil. These soils developed in colluvium derived mainly from uplands of acid silty shale and sandstone. They have many fragments of shale and sandstone throughout the profile.

The surface layer is dark-brown silt loam. The subsoil is yellowish-brown heavy silt loam in the upper part and is a dense, firm fragipan of yellowish-brown silty clay loam at a depth of about 2 feet.

In the western part of the county, the Leadvale soils occur on concave toe slopes below the Berks and Montevallo soils. They also occur next to the Tygart and Monongahela soils on terraces. Leadvale soils are less extensive in the eastern part, where they occupy slopes below the Berks soils and above the Pickaway soils. The Leadvale soils are more silty and less sandy than the Buchanan soils, which developed below uplands mainly of sandstone.

Representative profile of Leadvale silt loam, 3 to 8 percent slopes, in meadow—

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many fine roots; 10 percent fragments of shale; slightly acid; abrupt, wavy boundary. Layer is 6 to 10 inches thick.

A2—8 to 11 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular and weak, fine, subangular blocky structure; somewhat firm in place, but fri-

able when broken out; 10 percent fragments of shale; medium acid; clear, irregular boundary. Layer is 1 to 4 inches thick.

B21—11 to 19 inches, yellowish-brown (10YR 5/6) heavy silt loam; weak, fine and medium, subangular blocky structure; friable; common silty films of dark grayish brown (10YR 4/2); 15 percent fragments of shale; medium acid; clear, wavy boundary. Layer is 7 to 12 inches thick.

B22t—19 to 25 inches, yellowish-brown (10YR 5/6) gritty silty clay loam that has common, medium mottles of strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2); weak, medium, subangular blocky structure; a few discontinuous clay films; a few manganese concretions; somewhat firm; 15 percent fragments of shale; strongly acid; clear, wavy boundary. Layer is 5 to 8 inches thick.

Bx1—25 to 36 inches, yellowish-brown (10YR 5/4) coarse silty clay loam; a weak fragipan that has many, medium mottles of light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6); massive, breaking to weak, medium, subangular blocky or weak, thin, platy structure; firm to very firm; many manganese concretions; 15 percent fragments of shale; a few roots in cracks; strongly acid; gradual, wavy boundary. Layer is 8 to 14 inches thick.

Bx2—36 to 53 inches +, about equal parts of light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/8) channery silty clay loam; weak fragipan; massive; firm; 20 percent fragments of shale that increase in amount with depth; few manganese concretions; strongly acid; total estimated depth of colluvium over acid, grayish shale is 6 feet.

Range in characteristics: The subsoil ranges from silt loam to silty clay. Coarse fragments in the subsoil range from fine pieces of shale to large pieces of sandstone. Some areas near the deltas of small streams have a very shaly subsoil. The total depth to firm shale ranges from 3 to 10 feet. Seeps are few to common.

Location: Concave toe slopes in the western part of the county and a few areas in the eastern part.

Parent material: Colluvium weathered from acid silty shale and some sandstone.

Permeability: Moderate in upper subsoil; slow in fragipan.

Slope: Gently sloping to strongly sloping (3 to 15 percent slopes).

Water table: Ground water tends to perch on the fragipan and cause permanent seepy areas and a high water table in winter.

Leadvale silt loam, 3 to 8 percent slopes (LdB).—This soil has the profile described as representative of the Leadvale series. It receives water from higher slopes, has slow to medium runoff, and is slightly or moderately susceptible to erosion. Small seeps are common. Included in areas mapped as this soil are small areas of channery silt loam or shaly silt loam.

About half of this soil is in crops. The commonly grown crops are suited, but alfalfa and other deep-rooted legumes are damaged at times by a high water table. Orchard trees are generally not suited, because air drainage is poor. The soil can be improved by draining the seeps. (Capability unit IIe–13; woodland suitability group 2)

Leadvale silt loam, 8 to 15 percent slopes (LdC).—This soil has fewer seeps and better surface drainage than Leadvale silt loam, 3 to 8 percent slopes. Surface runoff is medium, and the erosion hazard is moderate or severe. Included in areas mapped as this soil are small areas of channery silt loam.

About half of this soil is in woods, a large part is in pasture, and the rest is in crops and orchards. The soil has better air drainage than Leadvale silt loam, 3 to 8 percent slopes, but it is used and managed in about the same way. Because the erosion hazard is more severe on this soil, however, longer rotations and more intensive measures are needed to reduce runoff and control erosion. (Capability unit IIIe–13; woodland suitability group 2)

Leadvale silt loam, 8 to 15 percent slopes, severely eroded (LdC3).—This soil has a profile similar to the one described for the Leadvale series, but it has had about three-fourths of its surface layer removed through erosion and the plow layer now contains more fragments of shale. Water from higher slopes is concentrated on this soil. Runoff is medium to rapid, and the erosion hazard is severe.

About half of this soil is in crops and pasture, and the rest is wooded. All the common crops are suited, but a row crop should not be grown more often than once in 5 years. Diversion ditches can be used to remove excess water. (Capability unit IVe–9; woodland suitability group 2)

Lehew Series

The Lehew series consists of moderately deep, well-drained to excessively drained soils that developed in material weathered from reddish, fine-grained Catskill sandstone on uplands.

These soils have a dark-brown channery loam surface layer and a friable, reddish-brown channery loam subsoil. Profile development is weak. Permeability is moderate to rapid, and the available moisture capacity is low to medium. The soils are strongly or very strongly acid and are low in natural fertility.

The Lehew soils occur mainly on smooth rounded foothills just east of Third Hill Mountain. They occupy a band that is roughly 1 mile wide and extends north and south across the entire country. In this county the Lehew soils are mapped singly and in complexes with the Berks soils. They occur closely with the Berks and Dekalb soils, which were derived from grayish sandstone and shale. In a few places they occur with the colluvial Laidig soils. Much of the smooth acreage in Lehew soils has been cleared and is used for orchards, but many areas are reverting to woodland.

Representative profile of Lehew channery loam, 3 to 10 percent slopes, in meadow—

Ap—0 to 7 inches, dark-brown (7.5YR 4/2) channery loam; weak, medium, granular structure; very friable; 25 percent fragments of reddish sandstone; medium acid; clear, wavy boundary. Layer is 7 to 10 inches thick.

B2—7 to 16 inches, reddish-brown (5YR 4/3) channery loam that is slightly finer textured than Ap horizon; weak, medium, subangular blocky structure; friable; common, dark-brown (7.5YR 4/2), discontinuous, dull, silty films; 30 percent fragments of sandstone; strongly acid; gradual, wavy boundary. Layer is 8 to 12 inches thick.

C—16 to 25 inches, reddish-brown (5YR 5/3 to 4/4) channery loam to channery fine sandy loam; massive, breaking to very weak, medium, subangular blocky structure; somewhat firm in place, friable when bro-

ken out; 60 percent fragments of sandstone; strongly acid; gradual, irregular boundary.

R—25 inches +, weak-red (2.5YR 4/2) and dark reddish-brown (2.5YR 3/4), fine-grained, acid, blocky sandstone that is somewhat broken on top.

Range in characteristics: The surface layer ranges from channery silt loam to channery fine sandy loam, and the subsoil ranges from channery fine sandy loam to channery loam. The surface layer is darker in wooded areas than in cultivated areas. The total depth to hard sandstone ranges from about 16 to 32 inches.

Location: Foothills east of Third Hill Mountain; area extends north and south across the county.

Parent material: Reddish, fine-grained Catskill sandstone that is mixed with gray shale in some places.

Permeability: Moderate to rapid.

Slope: Gently sloping to steep (3 to 45 percent slopes).

Lehew channery loam, 3 to 10 percent slopes (LhB).—This soil has the profile described as representative of the Lehew series. It is mostly on smooth, rather narrow ridges and is susceptible to moderate erosion. Included in areas mapped as this soil are small stony areas and small severely eroded areas.

About 65 percent of this soil is wooded, 15 percent is in orchards, and 20 percent is in pasture and crops. All the crops grown locally are suited, and orchards are moderately productive. In most places air drainage is good. Only simple conservation measures are needed to control runoff and erosion. (Capability unit IIe–10; woodland suitability group 5)

Lehew channery loam, 10 to 20 percent slopes (LhC).—This soil has a profile similar to that described as representative of the Lehew series, but it occurs on side slopes instead of ridges. Included in mapped areas are small stony areas and small areas of Laidig soils.

This soil is moderately productive of trees and almost all of it is wooded. Because most areas are nearly inaccessible, only about 5 percent of the acreage has been cleared and is used for crops and pasture. The soil is suited to commonly grown crops and to orchards. (Capability unit IIIe–10; woodland suitability group 5)

Lehew channery loam, 10 to 20 percent slopes, severely eroded (LhC3).—This soil is steeper, is shallower, and contains more sandstone fragments than the soil described as typical of the Lehew series. Most of the original surface layer has been removed through erosion. Runoff is medium to rapid, and the erosion hazard is severe. In some places water runs in from higher slopes.

About two-thirds of this soil is wooded. The soil is suited to the crops commonly grown but is too droughty for the best orchards. In many places orchards have been removed or abandoned. (Capability unit IVe–3; woodland suitability group 5)

Lehew channery loam, 20 to 30 percent slopes (LhD).—This soil is steeper and has a few more stony areas than Lehew channery loam, 3 to 10 percent slopes. It occupies side slopes and areas near the mountains. Runoff is medium, and the erosion hazard is moderate to severe. Included in areas mapped as this soil are small areas of Laidig soils.

In most places this soil is nearly inaccessible, and almost all the acreage remains wooded. Only small areas are in pasture and crops. The soil is suited to all the crops commonly grown. It should be kept in close-growing cover most of the time but can be used for an occasional row crop. (Capability unit IVe–3; woodland suitability group 5)

Lehew channery loam, 20 to 30 percent slopes, severely eroded (LhD3).—This soil has a profile similar to the one described, but it is shallower and contains more rocks. Most of the original surface layer has been removed through erosion. Rapid runoff causes a severe hazard of erosion.

Although much of this soil was formerly in crops or orchards, most areas have been abandoned and are growing up in woods. Only small areas remain in crops and pasture. Orchard production is low because the soil is shallow and droughty. (Capability unit VIe–2; woodland suitability group 5)

Lehew channery loam, 30 to 45 percent slopes (LhE).—This steep soil occupies side slopes and areas close to the mountains. In places it receives runoff from higher slopes. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are deep areas and small very stony areas.

This soil is best suited to wood crops, and practically all the acreage remains wooded. The soil is not well suited to pasture. (Capability unit VIIe–2; woodland suitability group 5)

Lindside Series

The Lindside series consists of deep, moderately well drained soils that formed in alluvium washed from uplands of limestone. These soils are on botton lands along streams, along poorly defined intermittent drainageways, and in broad, shallow sinkholes in the limestone valley. Flooding or ponding is a slight to moderate hazard.

Lindside soils have a surface layer of dark grayish-brown silt loam and subsurface layers of grayish-brown, mottled silty clay loam. These soils are not strongly weathered. They contain an appreciable amount of organic matter and are slightly acid or neutral. Permeability is moderate to slow, and the available moisture capacity is high.

These soils commonly occur along Opequon Creek and the Potomac River and are in many small areas throughout the limestone valley. They occur with the well-drained Huntington soils and the poorly drained Melvin soils near and below the Hagerstown, Frederick, and other soils derived from limestone. For the most part, the Lindside soils have been cleared and are important agricultural soils for crops and pasture.

Representative profile of Lindside silt loam along Opequon Creek—

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; very friable; many roots; many worm casts; neutral; clear, wavy boundary. Layer is 7 to 10 inches thick.

C1—9 to 22 inches, dark grayish-brown (10YR 4/2) heavy silt loam with common organic films and streaks of very dark grayish brown (10YR 3/2); weak, fine and medium, granular structure; friable or somewhat firm; neutral; gradual, wavy boundary. Layer is 10 to 16 inches thick.

C2g—22 to 30 inches, grayish-brown (10YR 5/2) silty clay loam with common, medium mottles of yellowish brown (10YR 5/8) and light gray (10YR 7/2);

weak, medium, subangular blocky structure; firm; few, fine manganese concretions; common black films; neutral; clear, wavy boundary. Layer is 14 to 20 inches thick.

C3g—30 to 47 inches +, light brownish-gray (10YR 6/2) silty clay loam to silty clay with many, medium mottles of brownish yellow (10YR 6/8) and gray (10YR 5/1); massive; firm when moist, slightly sticky when wet; common manganese concretions; common black faces; neutral; total estimated thickness of alluvium is 12 feet.

Range in characteristics: The texture of the subsurface layers ranges from heavy silt loam to silty clay. The depth to mottling ranges from 18 to 25 inches.

Location: Flood plains along the Potomac River and other streams that drain the limestone uplands, and also along small intermittent drainageways and in sinkholes in the limestone valley.

Parent material: Alluvium from limestone uplands.

Permeability: Moderate to slow.

Slope: Nearly level or gently sloping (0 to 8 percent slopes).

Flooding or ponding hazard: Moderate to slight.

Water table: Seasonally high; near the surface in winter and early in spring.

Lindside silt loam (Ln).—This soil has the profile described for the Lindside series. It occurs extensively along Opequon Creek and the Potomac River. The flooding hazard generally is moderate, but it is slight in some areas. Included in areas mapped as this soil are small areas of Melvin soils.

About 50 percent of this soil is in crops, 35 percent in pasture, and 15 percent in woods. The crops commonly grown are suited to this soil, but water-tolerant grasses and legumes grow best. Alfalfa may be damaged in winter because the water table is high and permeability is slow. Draining the soil will improve yields. (Capability unit IIw–7; woodland suitability group 8)

Lindside silt loam, local alluvium, 0 to 3 percent slopes (LoB).—This soil occupies small areas in poorly defined intermittent drainageways and in shallow sinkholes throughout the limestone valley.

Representative profile in meadow—

Ap—0 to 10 inches, dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; very friable; 5 percent sandstone fragments as much as 1 inch across; neutral; clear, smooth boundary. Layer is 8 to 10 inches thick.

C1—10 to 19 inches, dark grayish-brown (10YR 4/2) heavy silt loam; weak, fine and medium, granular structure; friable; common films of dark brown (10YR 4/3) material from Ap horizon on peds and in cracks; few fine manganese concretions; a few, small sandstone fragments; slightly acid; gradual, wavy boundary. Layer is 6 to 11 inches thick.

C2g—19 to 40 inches, grayish-brown (10YR 5/2) silty clay loam with common, medium mottles of strong brown (7.5YR 5/8) and light gray (2.5YR 7/2); weak, fine and medium, subangular blocky structure; firm when moist, slightly plastic and slightly sticky when wet; common, fine manganese concretions; few black films in cracks; slightly acid; clear, wavy boundary. Layer is 16 to 24 inches thick.

IIC—40 to 52 inches +, reddish-brown (5YR 5/4) silty clay with many coarse mottles and streaks of red (2.5YR 5/8) and light yellowish brown (10YR 6/4); massive; hard; firm when moist, plastic and sticky when wet; slightly acid; underlain by Beekmantown limestone.

Small fragments of sandstone in this soil range from none to common. Overflow is a slight to moderate hazard, and some areas remain ponded for a day or more. The available moisture capacity is high. Productivity is somewhat limited by a high water table, by a slowly permeable subsoil, and in some places, by poor air drainage. Included in areas mapped as this soil are small, gently sloping areas and small, poorly drained spots.

About two-thirds of this soil is in crops. The rest is mainly in pasture, small wooded areas, and a few orchards. Diversion ditches are needed in some places to divert water from higher slopes. (Capability unit IIw–7; woodland suitability group 8)

Lindside silt loam, local alluvium, 3 to 8 percent slopes (LoC).—This gently sloping soil has better surface drainage than Lindside silt loam, local alluvium, 0 to 3 percent slopes. It receives a considerable amount of runoff from higher slopes. The available moisture capacity is high. Included in areas mapped as this soil are some small, poorly drained areas.

More than three-fourths of this soil is in crops, some is in orchards, and the rest is in pasture and woods. The crops commonly grown in the county are suited, but alfalfa may be short lived because the water table is high and the subsoil is slowly permeable. If the soil is drained, yields are improved. (Capability unit IIw–7; woodland suitability group 8)

Melvin Series

The Melvin series consists of deep, nearly level, poorly drained soils on bottom lands that are subject to moderate flooding. These soils developed in recent alluvium that washed mainly from the Hagerstown, Frederick, and similar soils on limestone uplands.

The Melvin soils have a dark grayish-brown silt loam surface layer and grayish-brown, clayey subsurface layers. They have moderate to high available moisture capacity, but their use is limited by a high water table and by a slowly permeable subsoil. The soils are neutral in reaction.

In this county the Melvin soils occur along streams in the limestone valley, and they are common along Opequon Creek. They occur with the well-drained Huntington and the moderately well drained Lindside soils. Most areas of the Melvin soils have been cleared and are used for pasture or general crops.

Representative profile of Melvin silt loam in a pasture along Opequon Creek—

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam with a few, fine mottles of strong brown (7.5YR 5/8); weak, medium, granular structure; friable; many fine roots; neutral; clear, wavy boundary. Layer is 8 to 10 inches thick.

C1g—10 to 28 inches, grayish-brown (10YR 5/2) light silty clay loam with common, medium mottles of yellowish red (5YR 4/6) and light gray (10YR 7/2); weak, fine and medium, blocky structure; friable or firm; few to common roots; neutral; gradual, wavy boundary. Layer is 14 to 20 inches thick.

C2g—28 to 41 inches, dark-gray (10YR 4/1) clay loam with common, medium mottles of yellowish red (5YR 4/6) and light gray; massive, breaking to weak, fine, blocky structure; firm; a few shiny films, common fine manganese concretions, and common black films; neutral; gradual, wavy boundary. Layer is 10 to 16 inches thick.

C3g—41 inches +, light brownish-gray (10YR 6/2) silty clay with many, coarse mottles of yellowish brown

(10YR 5/8); massive; firm when moist, slightly plastic and slightly sticky when wet; a few manganese concretions; neutral. Horizon is finer textured, more dense, and less permeable than C2g horizon.

Range in characteristics: The surface layer ranges from silt loam to silty clay loam, and the subsurface layer ranges from light silty clay loam to silty clay. Some areas are underlain by marl.

Location: Bottom lands along streams that drain limestone uplands in the central and eastern parts of the county.

Parent material: Recent alluvium derived from limestone or washed from uplands influenced by limestone.

Drainage: Poorly drained.

Permeability: Slow; soils are sufficiently permeable, however, to permit artificial drainage.

Slope: Nearly level.

Overflow hazard: Moderate; flooding is occasional to frequent.

Melvin silt loam (Ma).—This soil has the profile described for the Melvin series. Runoff is slow, and the overflow hazard is moderate. Included in areas mapped as this soil are small, very poorly drained areas.

About 50 percent of this soil is in crops, 35 percent is in pasture, and 15 percent is wooded. Unless drainage is improved, the soil is not suited to crops commonly grown in the county. It is easily drained but is best suited to water-tolerant grasses and legumes. If surface drainage is provided, good yields are obtained from bluegrass pasture. (Capability unit IIIw–1; woodland suitability group 10)

Monongahela Series

In the Monongahela series are deep, moderately well drained soils on terraces that have a fragipan in the lower part of the subsoil. These soils developed in alluvial sediments that washed from uplands of acid sandstone and shale.

The Monongahela soils have a surface layer of grayish-brown silt loam, an upper subsoil of yellowish-brown heavy silt loam, and a fragipan of firm silt loam at a depth of about 2 feet. Rounded gravel and some angular gravel may occur throughout the profile. The soils are leached, are strongly acid unless limed, and are low in plant nutrients, particularly potassium. Permeability is slow in the fragipan. The available moisture capacity is moderate to high.

Monogahela soils are extensive in Back Creek valley and also occur along other streams that drain the acid uplands. They occur with the poorly drained Tygart soils on terraces, and they are between the Pope, Philo, and Atkins soils on bottom lands and the Dekalb and Berks soils on the surrounding uplands. Most areas of the Monongahela soils have been cleared and are used for general farming.

Representative profile of Monongahela silt loam, 3 to 8 percent slopes, in meadow—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) smooth silt loam; very weak, fine, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary. Layer is 7 to 10 inches thick.

A2—8 to 13 inches, pale-brown (10YR 6/3) silt loam; weak, medium, platy and weak, fine, subangular blocky structure; common roots; friable, but firmer than Ap; medium acid; clear, wavy boundary. Layer is 4 to 6 inches thick.

B1—13 to 19 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; some pale-brown (10YR 6/3) drift from A2 horizon in cracks and on ped faces; medium acid; clear, wavy boundary. Layer is 6 to 9 inches thick.

B2t—19 to 25 inches, yellowish-brown (10YR 5/6) heavy silt loam that has few, medium mottles of yellowish brown (10YR 5/8) and light gray (10YR 7/2); weak to moderate, medium, subangular blocky structure; somewhat firm; few patchy clay films; few, fine manganese concretions; strongly acid; clear, wavy boundary. Layer is 5 to 7 inches thick.

Bx—25 to 42 inches, yellowish-brown (10YR 5/6) heavy silt loam fragipan that has common, medium mottles of light gray (10YR 7/2) and strong brown (7.5YR 5/8); massive with weak coarse polygons breaking to weak thick platy and weak, coarse, subangular blocky; gray (10YR 6/1) silt and clay coatings on polygons and on some peds; firm or very firm; a few manganese concretions; strongly acid; diffuse boundary. Layer is 15 to 25 inches thick.

C—42 to 55 inches +, similar to the Bx horizon in color and texture; massive; with weak, coarse polygons; firm but less firm than Bx; about 5 percent of horizon fine gravel; a few manganese concretions and black stains; no roots; strongly acid; total estimated depth of terrace deposit over gray Hamilton shale is 8 feet.

Range in characteristics: The surface layer is silt loam or gravelly silt loam. The top of the fragipan is 18 to 30 inches below the surface. The gravel consists of rounded pebbles and angular fragments of sandstone and shale that range from 1 to 3 inches in diameter. The terrace deposits range from 4 to 12 feet in thickness and, in some places, grade abruptly to shale and contain little or no gravel.

Location: Smooth terraces above overflow, mainly in the Back Creek valley.

Slope: Nearly level to strongly sloping.

Drainage: Moderately well drained.

Permeability: Slow in the fragipan.

Parent material: Alluvial sediments derived from acid sandstone and shale.

Monongahela gravelly silt loam, 3 to 8 percent slopes (MgB).—This inextensive soil generally occurs near side streams that cross terraces. About 20 percent of the soil consists of angular and rounded gravel, but otherwise the profile is similar to the one described as representative of the Monongahela series. Most of the pebbles are less than 2 inches in diameter. In most places the soil is underlain by shale at a depth of 4 to 6 feet. A few spots are seepy. Runoff is medium, and the erosion hazard is moderate. Included in the areas mapped are small, severely eroded areas and small areas that have a silt loam surface layer.

About two-thirds of the acreage is in crops and pasture, a small part is in orchards, and the rest is wooded. Liberal additions of lime and fertilizer are needed. The soil is suited to crops commonly grown, but alfalfa may be short lived. (Capability unit IIe–13; woodland suitability group 3)

Monongahela silt loam, 0 to 3 percent slopes (MhA).—This soil has poorer surface drainage than Monongahela silt loam, 3 to 8 percent slopes. It occurs on smooth, nearly level terraces that have some seepy areas and, at times, receive runoff from adjacent hills. Included in areas mapped as this soil are small areas of Tygart soils.

This soil is used mainly as cropland. It is suited to all the common crops, but alfalfa and other crops may be

damaged in winter. Large amounts of fertilizer are needed for maximum yields. The soil can be improved by draining seep spots. (Capability unit IIw–1; woodland suitability group 3)

Monongahela silt loam, 3 to 8 percent slopes (MhB).—A profile of this soil is the one described as representative of the series. Included in areas mapped are small areas of Tygart soils, small seepy spots, and a few spots of well-drained soils.

In most places this soil is not on long slopes. In some areas it receives considerable water from adjacent hillsides. Runoff is medium, and the erosion hazard is moderate.

This soil is about 50 percent in crops, 35 percent in woods, and 15 percent in pasture and a few small orchards. Crops common in the county can be grown, though alfalfa may be short lived. Draining the seepy spots helps to improve this soil, but yields are only average, even if fertilizer is added in large amounts. (Capability unit IIe–13; woodland suitability group 3)

Monongahela silt loam, 8 to 15 percent slopes, severely eroded (MhC3).—This soil is on shoulders and breaks between one terrace level and another or between a terrace and the bottom land. It occupies small areas that normally occur with areas of smoother, less eroded Monongahela soils. Erosion has removed most of the original surface layer, and a few shallow gullies occur. Runoff is medium to rapid, and the erosion hazard is moderate to severe. Included in areas mapped as this soil are small, well-drained areas and small areas of gravelly soils.

About two-thirds of this soil is in crops or pasture, and the rest is wooded. Hay crops are best suited, but a row crop can be grown occasionally. In some places diversions are needed to intercept runoff above this severely eroded soil. (Capability unit IVe–9; woodland suitability group 3)

Montevallo Series

The Montevallo series consists of shallow or very shallow, excessively drained soils that developed on uplands underlain by acid shale, siltstone, and some thin-bedded sandstone. These soils are gently sloping to very steep and occur on somewhat rounded slopes that, in most places, are cut by small drainageways. Many areas remain wooded.

The surface layer is very dark grayish-brown or dark-brown channery silt loam or shaly silt loam. The subsoil is thin, yellowish-brown shaly or channery silt loam that has a fairly high content of rock fragments and is very weakly developed. These soils are strongly or very strongly acid throughout and are low in plant nutrients.

The Montevallo soils occur mostly around Back Creek valley in the western part of the county. Here, they occur with the deeper, more sandy Dekalb soils and the deeper, more strongly developed Berks soils. Also in the western part, they are mapped in complexes with the reddish Lehew soils. On the soft shale belts of the limestone valley, severely eroded Montevallo soils are mapped in complexes with the severely eroded Berks soils. In some places the Montevallo soils are above the colluvial Leadvale and Rushtown soils.

Representative profile of Montevallo shaly silt loam, 10 to 20 percent slopes, in woodland (see tables 16 and 17, sample No. S60–WVa–2–7–(1–3), for physical and chemical properties)—

O1—hardwood leaf litter.

O2—1 inch to 0, very dark gray, compacted leaf mull mixed with soil materials.

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) shaly silt loam; moderate, fine, granular structure; very friable; 20 percent shale chips ¼ to ¾ inch in diameter; many fine roots; very strongly acid; abrupt, wavy boundary. Layer is 0 to 2 inches thick.

A2—1 to 4 inches, light olive-brown (2.5Y 5/4) shaly silt loam; weak, fine, granular and weak, thin, platy structure; friable; 25 percent shale chips as much as 1 inch in diameter; common fine roots; very strongly acid; clear, wavy boundary. Layer is 1 to 5 inches thick.

B2—4 to 10 inches, yellowish-brown (10YR 5/6) shaly silt loam; weak, fine and medium, subangular blocky structure; friable or firm; common roots; 35 percent shale fragments as much as 2 inches in diameter; very strongly acid; gradual, wavy boundary. Layer is 4 to 8 inches thick.

C—10 to 15 inches, light olive-brown (2.5Y 5/6) very shaly silt loam; massive; friable; a few roots; 70 to 80 percent shale fragments as much as 4 inches in diameter; very strongly acid; gradual boundary. Layer is 4 to 7 inches thick.

R—15 inches +, pale-brown (10YR 6/3) and yellowish-brown (10YR 5/6) siltstone and fine-grained sandstone of the Hamilton series; strongly folded.

Range in characteristics: In the subsoil the shale content ranges from 25 to 80 percent by volume and the texture is shaly or channery silt loam. The total depth to bedrock ranges from 10 to 18 inches.

Location: Rounded foothills in the western part of the county and eroded areas on the shale belts in the limestone valley.

Parent material: Material weathered from shale, siltstone, and fine-grained sandstone.

Drainage: Excessively drained.

Permeability: Rapid.

Slope: Moderately steep in most places, but the range is 3 to 50 percent.

Montevallo channery silt loam, 10 to 20 percent slopes severely eroded (MkC3).—This soil contains small blocky fragments of shale. It has lost about three-fourths of the original surface layer through erosion, and it is shallower and has more channery material in the present surface layer than Montevallo shaly silt loam, 10 to 20 percent slopes.

All of this soil is in the western part of the county. About three-fourths of it has been cleared, and almost 20 percent of the acreage was once used for orchards, but many areas have reverted to woodland or are idle. More than half the acreage is now wooded.

This soil is droughty and is highly susceptible to further erosion. It is suited to crops commonly grown if conservation practices are adequate. Yields generally are not high. (Capability unit IVe–3; woodland suitability group 4)

Montevallo channery silt loam, 20 to 30 percent slopes, severely eroded (MkD3).—Erosion has removed most of the original surface layer from this soil, and the present surface layer contains channery material. The soil is thinner and more droughty than Montevallo shaly silt loam, 10 to 20 percent slopes.

This soil occurs in the western part of the county. About three-fourths of the acreage was once cleared and

Figure 22.—**Strawberry plants laid out in rows on the contour on Montevallo shaly silt loam, 3 to 10 percent slopes, near Tomahawk.**

used for crops or orchards, but much of it has reverted to woods. Only small areas remain in crops and orchard trees. Because erosion is a severe hazard on unprotected areas, the soil should be kept in woodland or permanent pasture. (Capability unit VIe–2; woodland suitability group 4)

Montevallo channery silt loam, 30 to 50 percent slopes (MkE).—This soil has a profile similar to the one described for the series, but it is slightly more shallow and contains more and larger rock fragments. It occurs on steep breaks that generally are just above small streams in the foothills and lower mountain slopes in the western part of the county.

Almost all of this soil is in woods. It is best suited to trees and produces moderate yields of wood products if management is adequate. (Capability unit VIIe–2; woodland suitability group 4)

Montevallo shaly silt loam, 3 to 10 percent slopes (MmB).—This soil contains more fine fragments of dark shale than Montevallo shaly silt loam, 10 to 20 percent slopes. It occupies smooth, narrow ridges and is fairly extensive in the Back Creek valley. Runoff is medium to rapid, permeability is rapid, and the erosion hazard is moderate to severe. Included in areas mapped as this soil are some severely eroded areas.

More than two-thirds of this soil is wooded, and the rest is in pasture and crops. All the common crops are grown, but yields are low because the soil is infertile and droughty. Crops that tolerate drought are best suited. Figure 22 shows a field of strawberry plants on this soil. (Capability unit IIIe–32; woodland suitability group 6)

Montevallo shaly silt loam, 3 to 10 percent slopes, severely eroded (MmB3).—This soil has lost most of the original surface layer through erosion, but in other respects it is similar to Montevallo shaly silt loam, 10 to 20 percent slopes. Much of the acreage occurs on gentle slopes in the Back Creek valley. Runoff is rapid, and the hazard of further erosion is severe. The available moisture capacity is very low. Included in areas mapped as this soil are small, very shaly areas.

About two-thirds of this soil is in woods, and the rest is cropped or pastured. The soil is suited to all the common crops if they are grown in long rotations, but practices are needed to control erosion. Yields generally are low, and pasture does not do well. (Capability unit IVe–32; woodland suitability group 11)

Montevallo shaly silt loam, 10 to 20 percent slopes (MmC).—This soil has the profile described for the Montevallo series. Much of the acreage is poorly accessible. Runoff is moderately rapid, and the erosion hazard is severe. Included in areas mapped as this soil are small, severely eroded areas and small areas of Dekalb soils and Berks channery soils.

Most of this soil remains in woods. Although the commonly grown crops are suited, yields are low because the soil is droughty and infertile. Woodland is fairly well suited. (Capability unit IVe–32; woodland suitability group 6)

Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded (MmC3).—Erosion has removed more of this soil than of Montevallo shaly silt loam, 10 to 20 percent slopes. Most of the original surface layer has been lost. The soil is extensive in the Back Creek valley and on surrounding uplands. Runoff is rapid, and the hazard of further erosion is severe or very severe. The available moisture capacity is low. Included in areas mapped as this soil are small areas of Berks channery soils.

More than three-fourths of this severely eroded soil is wooded (fig. 23), and the rest is in pasture and crops. The soil is best used as pasture or woodland, but it is too droughty for high yields of bluegrass. (Capability unit VIe–31; woodland suitability group 11)

Montevallo shaly silt loam, 20 to 30 percent slopes (MmD).—In areas mapped as this soil, small areas of Berks channery soils are included and make up a slightly larger acreage than they do in areas mapped as Montevallo shaly silt loam, 10 to 20 percent slopes. Also included are small areas of Dekalb soils and small, stony areas. Runoff

Figure 23.—**Stand of pine on Montevallo shaly silt loam, 10 to 20 percent slopes, severely eroded, near Tomahawk. Photograph, taken in a quarry, shows the Hamilton shale that typically underlies the Montevallo soils.**

is rapid and causes severe erosion if the plant cover is disturbed.

All of this soil is wooded except a few areas that are in brushy pasture. Because the soil occupies inaccessible mountain slopes, it is best suited as woodland. It is suited to pasture, but yields are low. (Capability unit VIe–31; woodland suitability group 6)

Montevallo shaly silt loam, 20 to 30 percent slopes, severely eroded (MmD3).—Erosion has removed most of the original surface layer of this soil. Runoff is rapid; and the hazard of further erosion is severe or very severe. The available moisture capacity is low. Included in areas mapped as this soil are small areas of moderately deep Berks channery soils and small areas having some large stones.

Although one-fourth of this soil has been cleared and cropped, most areas have been abandoned to trees because the soil is very poor for crops and pasture. (Capability unit VIIe–3; woodland suitability group 11)

Montevallo shaly silt loam, 30 to 50 percent slopes (MmE).—This steep soil occurs mostly on short breaks and side slopes and on lower mountain slopes. Runoff is rapid, and the erosion hazard is severe. Included in mapped areas are small areas of Dekalb soils and Berks channery soils.

All of this soil is in trees. Woodland is its best use, though yields are low to moderate. Protection from fire is essential. (Capability unit VIIe–3; woodland suitability group 6)

Montevallo shaly silt loam, 30 to 50 percent slopes, severely eroded (MmE3).—This soil occurs on steep breaks and, in many places, receives runoff from higher slopes. Included in mapped areas are small stony areas and small areas of Dekalb soils and Berks soils.

About two-thirds of this soil is in woods, and the rest is in poor, brushy pasture. Most areas occur within areas of less severely eroded Montevallo soils. To control further erosion, a cover of seeded or naturally occurring trees and shrubs is needed. In addition, diversion ditches or other water-control measures are needed in many places. (Capability unit VIIe–3; woodland suitability group 11)

Montevallo-Lehew Complexes

These complexes consist of Montevallo channery loam and Lehew channery loam in about equal proportions. The soils are in such an intricate pattern that it is impractical to show them separately on a map. They occupy a band just east of Third Hill Mountain and, in many places, are near the deeper soils in the Berks-Lehew complexes. Most areas are severely eroded.

Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded (MnC3).—Montevallo soil and Lehew soil, in about equal acreages, make up this complex. These soils have lost much of their original surface layer through erosion. In many places they are shallow, and in some spots they are very shallow. Shallow gullies are common in places. Included in areas mapped as this complex are small areas that are stony or shaly. Runoff is medium to rapid, and the hazard of further erosion is severe. The available moisture capacity is low to moderate.

About two-thirds of the acreage in this complex is wooded, and the rest is in crops and orchards. Air drainage is generally good, but the soils are too shallow and droughty for high yields of orchard crops, and a number of the orchards have been abandoned. The soils are suited to crops commonly grown and can be used for an occasional row crop when farmed in a long rotation. (Capability unit IVe–3; woodland suitability group 4)

Montevallo-Lehew channery loams, 20 to 30 percent slopes, severely eroded (MnD3).—This complex is similar to Montevallo-Lehew channery loams, 10 to 20 percent slopes, severely eroded, but the soils have had most of the original surface layer removed by erosion and are shallow or very shallow to bedrock. Included in mapping are small shaly areas. Runoff is rapid and causes a severe hazard of further erosion. The available moisture capacity is low to moderate.

About two-thirds of the acreage in this complex is wooded, and most of the rest is in crops and orchards. Much of the acreage was once cleared, but many areas are being abandoned to brushy woods. The soils are too shallow and droughty for orchards and are better suited as permanent pasture or woodland. (Capability unit VIe–2; woodland suitability group 4)

Montevallo-Lehew channery loams, 30 to 45 percent slopes (MnE).—The major part of this steep complex is the Montevallo soil, and most of the rest is the Lehew soil. These soils occur on short breaks and are considerably more stony than other Montevallo-Lehew soils. They have medium runoff and are moderately susceptible to erosion. Included in mapping are small areas of very stony Dekalb soils.

All the acreage is wooded except a few areas that are in crops and brushy pasture. Woodland is the best use. (Capability unit VIIe–2; woodland suitability group 4)

Murrill Series

Soils of the Murrill series are deep and well drained. They developed in colluvial material that has been influenced by sandstone and is underlain by limestone or by residuum that weathered from limestone.

The surface layer of Murrill soils is brown or dark grayish-brown silt loam, gravelly loam, or gravelly silt loam. The subsoil is yellowish-brown heavy silt loam that increases in firmness with depth. It is underlain by strong-brown to red silty clay or clayey residuum derived from limestone. These soils are moderately permeable, have high available moisture capacity, and are moderately to highly productive.

Most of the sandstone material on which the Murrill soils developed apparently consisted of residual fragments that remained after extensive deposits of limestone were removed through weathering. The beds of limestone that underlie these soils—especially the Conococheague and Beekmantown limestones—have a fairly high content of sandstone. The gravel in the soils consists mostly of sandstone fragments that are angular or subangular, rough, porous, and coarse grained.

In Berkeley County the Murrill soils are most extensive in a broad band that crosses the county in a north-south direction just west of U.S. Highway No. 11. They are mainly on concave slopes where the sandstone material has concentrated through local colluvial action. Murrill soils also occur on the smooth limestone uplands immediately above the Potomac River, and in these places they show considerable influence of material from terraces and contain some rounded gravel. At the foot of

North Mountain, these soils have received colluvial material from uplands of sandstone and shale. On the west side of the mountain is a small acreage of very stony Murrill soils.

The Murrill soils generally occur within larger areas of the Hagerstown, Frederick, Frankstown, and Duffield soils. In places they are near the Pickaway and Sees soils. Murrill soils show much stronger profile development than Huntington silt loam, local alluvium, which developed on somewhat similar material.

Most areas of nonstony Murrill soils have been cleared and are used for orchards and general farming. These soils are excellent for orchards, but air drainage is a problem in many areas.

Representative profile of Murrill silt loam, 0 to 3 percent slopes, in an orchard—

Ap—0 to 8 inches, dark-brown (10YR 4/3) gritty silt loam; moderate, fine, granular structure; very friable; contains a few rounded pebbles of sandstone; neutral; abrupt, wavy boundary. Layer is 6 to 9 inches thick.

A2—8 to 14 inches, brown (10YR 5/3) gritty silt loam or loam; weak, fine, subangular blocky structure; friable; a few rounded pebbles of sandstone; slightly acid; clear, wavy boundary. Layer is 0 to 6 inches thick.

A3 or B1—14 to 19 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine and medium, subangular blocky structure; friable, but breaks into smaller masses than A2 horizon; common alfalfa roots; a few sandstone fragments; slightly acid; clear, wavy boundary. Layer is 0 to 6 inches thick.

B21t—19 to 30 inches, brown (7.5YR 5/4) heavy silt loam; moderate, medium and coarse, subangular blocky structure; somewhat firm; a few yellowish-brown (10YR 5/4) clay films; 10 percent sandstone gravel; a few alfalfa roots; medium acid; clear, wavy boundary. Layer is 10 to 14 inches thick.

B22—30 to 40 inches, strong-brown (7.5YR 5/6) gravelly loam that has a few streaks and splotches of brown (7.5YR 5/4); massive, breaking to weak, fine and medium, subangular blocky structure; this horizon approaches a weak fragipan, but roots are able to penetrate rather freely; firm; 15 percent pebbles as much as 4 inches in diameter; a few alfalfa roots; medium acid; clear, wavy boundary. Layer is 8 to 20 inches thick.

IIB23b—40 inches +, yellowish-red (5YR 4/6) clay; weak, fine, subangular blocky breakage; contains common clay films; hard when dry, firm when moist, plastic and slightly sticky when wet; strongly acid; contains no gravel and appears to have developed in place from underlying limestone.

Range in characteristics: The texture of the surface layer is silt loam, gravelly silt loam, gravelly loam, or very stony loam. The Murrill gravelly silt loams, moderately deep, formed in sandstone colluvium 24 to 36 inches thick over limestone residuum. The silt loam and gravelly loams formed in sandstone colluvium 36 to 60 inches thick over limestone residuum. Subangular fragments of coarse-grained sandstone make up most of the gravel, but there are some rounded pebbles and some angular fragments of chert.

Location: Mainly on concave slopes in the limestone valley in the central and eastern parts of the county; to a lesser extent, on the west side of North Mountain.

Parent material: Sandstone colluvial material, most of which originated as residual fragments from the weathering of limestone that contained some sandstone.

Drainage: Well drained.

Permeability: Moderate above the lower part of B horizon and moderate to moderately slow in it.

Slope: Nonstony soils range from 0 to 25 percent; very stony soils range from 20 to 40 percent.

Depth to limestone residuum: 30 inches to 10 feet.

Murrill silt loam, 0 to 3 percent slopes (MuA).—This nearly level soil has the profile described as representative of the Murrill series. It occurs in small, smooth depressions and flats, mainly in the northern and eastern parts of the county. Some areas have been influenced by material from terraces above the Potomac River. Runoff is slow to medium, and the erosion hazard is slight. Included in areas mapped as this soil are small areas of Lindside silt loam, local alluvium.

Almost all of this soil is in crops and orchards. All the common crops are well suited, and row crops can be grown in a short rotation. In most areas, however, poor air drainage limits the use of the soil for orchard fruits. This soil is suitable for irrigation. (Capability unit I–1; woodland suitability group 1)

Murrill gravelly loam, 3 to 8 percent slopes (MsB).—In position and profile characteristics, this soil is similar to the one described for the series. It occurs on limestone uplands above the Potomac River in the northern and eastern parts of the county. That part of the parent material from sandstone has apparently been influenced by material from terraces along the Potomac River. Deposits of sandstone are underlain at a depth of 36 to 50 inches by limestone residuum or limestone.

The surface layer of this soil generally is gravelly loam, but it ranges from gravelly silt loam to gravelly fine sandy loam. The subsoil is loam or heavy silt loam. Small, shallow sinkholes are few to common, especially in large areas near Whitings Neck. Gravel in the surface layer consists of pebbles as much as 8 inches in diameter. Limestone crops out in places. Runoff is slow to medium, and the erosion hazard is moderate. In many places this soil adjoins the Hagerstown soils.

About a third of this soil is in woods, and most of the rest is in crops and pasture. The soil is suited to crops commonly grown, but air drainage is a serious problem in some orchards. In a few places large pebbles and cobbles make tillage and mowing difficult. (Capability unit IIe–1; woodland suitability group 1)

Murrill gravelly loam, 8 to 15 percent slopes (MsC).—This soil is steeper and has slightly more irregular slopes than Murrill gravelly loam, 3 to 8 percent slopes. A few small sinkholes occur. Surface runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are small areas of Hagerstown soils.

About three-fourths of this soil is wooded, and the rest is mostly in pasture. The soil is suited to crops grown locally and to orchards, but gravel hinders tillage in small areas. Only simple conservation practices are needed. (Capability unit IIIe–1; woodland suitability group 1)

Murrill gravelly loam, 8 to 15 percent slopes, severely eroded (MsC3).—This soil has lost most of its original surface layer through erosion. It is slightly more shallow to limestone residuum than Murrill gravelly loam, 3 to 8 percent slopes, and in places it has more gravel on the surface. Runoff is medium and causes a moderate or severe hazard of further erosion.

About two-thirds of this soil is in crops and pasture, and the rest is in small woodlots. All the common crops are

suited, and row crops can be grown in a 5- or 6-year rotation. In some spots, however, gravel interferes with tillage. (Capability unit IVe–1; woodland suitability group 1)

Murrill gravelly loam, 15 to 25 percent slopes (MsD). This soil occupies short, moderately steep side slopes. It has more and larger pebbles than other gravelly Murrill soils. Limestone crops out in a few places. Runoff is medium, and the erosion hazard is moderate to severe.

About a third of this soil is in pasture, and the rest is wooded. The soil is suited to all the common crops if it is farmed in a long rotation. Much of the acreage has large pebbles on the surface that interfere with tillage. (Capability unit IVe–1; woodland suitability group 1)

Murrill very stony silt loam, 20 to 40 percent slopes (MvE).—This soil lies on a narrow band of deep colluvium from sandstone that is underlain by a narrow ledge of Onondaga limestone. It occurs about halfway down the western slopes of North Mountain. The colluvium is very stony and is 6 to 10 feet deep over residuum from limestone. In a few places limestone crops out. Runoff is slow to medium, and the erosion hazard is slight or moderate. Included in areas mapped as this soil are small areas of Laidig and Dekalb soils.

All of this soil is wooded except a few small areas that are in crops and pasture. Because the soil is stony and steep, it is best used as woodland. (Capability unit VIIs–1; woodland suitability group 1)

Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes (MrB).—This soil is extensive in the limestone valley, especially just west of U.S. Highway No. 11. Most of the acreage is far from mountain slopes. The soil occurs in shallow depressions and in concave areas at the head of streams and at the base of slopes below the limestone uplands. The soil formed in sandstone colluvium that apparently originated as residual sandstone derived from weathered limestone. Through colluvial action this sandstone was concentrated as a mantle 24 to 36 inches deep. The underlying limestone residuum is similar to that under the Frederick, Duffield, and Hagerstown soils.

Included in areas mapped as this soil are small, moderately well drained areas and small areas that have a shallow fragipan underlain immediately by limestone residuum. Also included are areas that are slightly steeper than 8 percent and small, severely eroded areas. Runoff is medium, and the erosion hazard is slight or moderate.

Representative profile of Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes, in an orchard—

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; weak, medium, granular structure; very friable; gravel consists of subangular, porous, rough fragments of coarse-grained sandstone as much as 2 inches in diameter; neutral; abrupt, wavy boundary. Layer is 6 to 10 inches thick.

B21—10 to 20 inches, yellowish-brown (10YR 5/4), gravelly heavy silt loam; weak, fine and medium, subangular blocky structure; a few dull films; friable or firm; 25 percent sandstone fragments and a few chert fragments; common fine roots; slightly acid; clear, wavy boundary. Layer is 8 to 12 inches thick.

B22—20 to 26 inches, yellowish-brown (10YR 5/4), gravelly heavy silt loam that has a few spots of strong brown (7.5YR 5/6); massive, but breaks easily to weak, medium, subangular blocky; firm (firmer than B21 horizon); a few manganese concretions; 15 percent sandstone fragments and a few chert fragments as much as 2 inches in diameter; strongly acid; clear, wavy boundary. Layer is 10 to 18 inches thick.

IIB23b—26 to 38 inches +, strong-brown (7.5YR 5/6) silty clay that has common, coarse streaks and spots of red (2.5YR 5/6); massive (structureless) breaking to weak, medium subangular blocky; firm when moist, plastic and slightly sticky when wet; contains a few sandstone fragments and a few, soft siltstone fragments; a few manganese concretions and a few black films on cracks; strongly acid; total depth to hard Conococheague limestone is about 8 feet.

Almost all of this soil is in crops and orchards, but some is in urban areas. The soil is well suited to all crops grown locally, especially alfalfa. It is excellent for orchards, except in areas that have frost pockets. Only simple practices are needed to control erosion. (Capability unit IIe–1; woodland suitability group 1)

Murrill gravelly silt loam, moderately deep, 0 to 3 percent slopes (MrA).—This soil occupies small flats or slight depressions in the limestone valley. Its profile is similar to that of Murrill gravelly silt loam, moderately deep, 3 to 8 percent slopes. Runoff is slow, and there is little or no erosion hazard. Included in areas mapped are small areas of Lindside silt loam, local alluvium; small areas that have a thin fragipan directly over limestone residuum; and small areas of cherty silt loam.

Most of this soil is in crops and orchards, and the rest is in woods and urban sites. Under good management, the soil is well suited to all the common crops and can be farmed in short rotations. In most areas its use for orchards is limited by frost pockets. This soil is suitable for irrigation. (Capability unit I–1; woodland suitability group 1)

Philo Series

The Philo series consists of deep, moderately well drained or somewhat poorly drained, strongly acid soils on bottom lands in the western part of the county. These soils developed in recent alluvium that washed from uplands of acid sandstone and shale occupied largely by the Dekalb and the Berks soils. Most areas of Philo soils are subject to occasional flooding.

These soils have a dark grayish-brown surface layer and mottled grayish-brown subsurface layers. They have a high capacity for holding water available to plants, but their use for some plants is moderately restricted by a seasonally high water table.

The Philo soils are extensive along Back Creek and its tributaries. They occur with the well-drained Pope soils and the poorly drained Atkins soils. They are more acid than the Lindside soils. The Philo soils produce good yields of crops and pasture, and most areas have been cleared.

Representative profile of Philo silt loam in a meadow along Back Creek—

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; many fine roots; slightly acid; clear, wavy boundary. Layer is 8 to 10 inches thick.

C1—10 to 23 inches, dark-brown (10YR 4/3) silt loam; weak, medium, subangular blocky structure; friable; common worm casts; a few fine, strong-brown (7.5YR 5/6) mottles in lower part; contains considerable organic matter from Ap horizon; strongly

acid; gradual, wavy boundary. Layer is 10 to 16 inches thick.

C2g—23 to 38 inches, dark grayish-brown (10YR 4/2) silty clay loam that has common medium mottles of gray (10YR 5/1) and strong brown (7.5YR 5/6); weak, coarse and medium, subangular blocky structure; common fine pores; firm when moist, slightly plastic and slightly sticky when wet; strongly acid; gradual, wavy boundary. Layer is 12 to 18 inches thick.

C3g—38 to 50 inches +, variegated gray (10YR 5/1) and strong-brown (7.5YR 5/6) silty clay loam that has lenses of silt loam and fine sandy loam; massive; firm; common fine manganese concretions; very strongly acid; total estimated thickness of alluvial sediments is about 15 feet.

Range in characteristics: The surface layer is silt loam or fine sandy loam, and the subsoil ranges from loam to silty clay loam. In some places there are stratified, coarse-textured deposits at a depth of 4 to 6 feet.

Location: Nearly level bottom lands below acid uplands.

Drainage: Moderately well drained or somewhat poorly drained.

Overflow hazard: Mostly moderate; severe in small areas near streams.

Permeability: Moderate to slow.

Water table: Seasonally high; near the surface during winter and early in spring.

Philo silt loam (Ph).—This soil has the profile described. Included in mapped areas are small areas of Atkins silt loam.

About half of this soil is in crops, a fourth is in pasture, and the rest is wooded. Although the crops commonly grown in the county are suited, water-tolerant grasses and legumes grow best. Draining the wet spots improves yields, but alfalfa is short lived in places. (Capability unit IIw–7; woodland suitability group 8)

Philo fine sandy loam (Pf).—This soil is coarser textured and slightly better drained than Philo silt loam. It occurs in areas nearer to streams where flooding, gouging, and deposition are greater hazards. These areas are rather narrow, are parallel to the streams, and have a high water table much of the year. The subsurface layers range from fine sandy loam to coarse silty clay loam. Included in areas mapped as this soil are small areas of Pope fine sandy loam.

About half of this soil is in woods. Most of the rest is in crops, but some is in pasture. The soil can be used in the same way as Philo silt loam, but small narrow areas that are gouged and scoured by floodwaters should be kept in permanent vegetation. (Capability unit IIw–7; woodland suitability group 8)

Pickaway Series

The Pickaway series consists of deep, moderately well drained soils that have a fragipan in the lower subsoil. These soils developed in silty residuum derived from limestone of the Ordovician and Cambrian periods. They occupy gently rolling slopes in the limestone valley, and they also occur on nearly level, slightly concave slopes at the head of drainageways where they have received a moderately deep overwash of silty material from the surrounding limestone soils.

The Pickaway soils have a surface layer of dark grayish-brown or brown silt loam. The upper part of the subsoil is yellowish-brown silt loam, and the lower part is a yellowish-brown silty clay loam fragipan. Underlying the subsoil is silty clay over limestone. The available moisture-capacity in these soils is high. Permeability is moderate above the fragipan but is slow within it. In places water accumulates above the fragipan during wet periods. The overwash phases of the Pickaway soils contain more fine fragments of sandstone, are slightly better drained, and are deeper to the fragipan than the other Pickaway soils in this county.

These soils occur in small areas scattered throughout the broad limestone valley. Generally, they are within areas of the well-drained Hagerstown, Frederick, Frankstown, and Duffield soils. Pickaway soils also occur above the Lindside soils, which developed in deep alluvium and do not have a fragipan.

Representative profile of Pickaway silt loam, 3 to 8 percent slopes, in a meadow—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; very weak, fine, granular structure; friable; many fine roots; slightly acid; abrupt, wavy boundary. Layer is 7 to 10 inches thick.

A2—8 to 13 inches, light yellowish-brown (10YR 6/4) silt loam; weak, thin, platy and weak, fine, subangular blocky structure; somewhat firm in place, but friable when broken out; medium acid; clear, wavy boundary. Layer is 4 to 6 inches thick.

B1—13 to 17 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine and medium, subangular blocky structure; friable; a few faces of reddish brown (5YR 4/4); medium acid; clear, wavy boundary. Layer is 4 to 7 inches thick.

B2t—17 to 23 inches, yellowish-brown (10YR 5/6) silty clay loam that has a few, medium spots of light yellowish brown (10YR 6/4); somewhat firm; common clay films of reddish brown (5YR 4/4); common medium pores; medium acid; clear, wavy boundary. Layer is 6 to 10 inches thick.

Bx—23 to 39 inches, yellowish-brown (10YR 5/6) fragipan of gritty silty clay loam that has many, medium mottles of yellowish red (5YR 4/6) and very pale brown (10YR 7/4); massive, breaking to medium, thick, platy and medium, coarse, subangular blocky structure; very firm; common reddish-brown (5YR 4/3) clay films; common fine manganese concretions and common black films; medium acid; clear, wavy boundary. Layer is 14 to 20 inches thick.

C—39 to 62 inches, coarsely splotched, reddish-brown (5Y 4/4), light yellowish-brown (10YR 6/4) and light olive-brown (2.5Y 5/6) silty clay or clay; medium or fine blocky structure; firm when moist, plastic and slightly sticky when wet; a few manganese concretions and black films; 15 percent soft, yellowish-brown (10YR 5/6) traces of silty limestone; strongly acid; clear, wavy boundary.

R—62 inches +, grayish limestone.

Range in characteristics: The surface layer is silt loam that, in places, contains a few small fragments of sandstone. The subsoil ranges from silt loam to silty clay loam, and the depth to the fragipan ranges from 20 to 32 inches. In the overwash phases, the overwash material is 10 to 24 inches thick over limestone residuum.

Location: Gently rolling slopes and slightly concave, nearly level slopes at the head of drainageways in the limestone valley.

Parent material: Silty residuum from limestone of the Ordovician and Cambrian periods.

Drainage: Moderately well drained; the ponding hazard is none to slight.

Permeability: Slow in the fragipan.
Slope: Nearly level or gently sloping.

Pickaway silt loam, 3 to 8 percent slopes (PmB).—This gently sloping soil has the profile described as representative of the Pickaway series. It occurs in small areas on side slopes that are mostly less than 200 feet long. Limestone crops out in a few places. Runoff is medium, and the erosion hazard is moderate. Included in areas mapped as this soil are small areas of the Hagerstown, Frankstown, and Duffield soils and small, severely eroded areas.

About two-thirds of this soil is in crops and pasture, a small part is in orchards, and the rest is wooded. All the common crops can be grown, but more than average amounts of fertilizer are required. Because the soil has a slowly permeable fragipan, alfalfa tends to be short lived. Orchard fruits are not well suited. (Capability unit IIe–14; woodland suitability group 1)

Pickaway silt loam, overwash, 0 to 3 percent slopes (PkA).—This nearly level soil occurs in slight depressions and around the head of streams. It has been covered by 1 to 2 feet of material that washed from the Hagerstown soils and other soils derived from limestone. In other respects it is similar to Pickaway silt loam, 3 to 8 percent slopes.

Although this soil is moderately well drained or almost well drained, it receives water from higher slopes and is ponded in places for short periods. Runoff is slow to medium, and the erosion hazard is slight. The available moisture capacity is high. Included in areas mapped are small areas of Lindside soils or Hagerstown soils.

Representative profile of Pickaway silt loam, overwash, 0 to 3 percent slopes, in a meadow—

Ap—0 to 10 inches, dark-brown (10YR 4/3) gritty silt loam; moderate, fine, granular structure; very friable; contains common, coarse grains of quartz and a few fine sandstone fragments and soft shale chips; medium acid; clear, smooth boundary. Layer is 7 to 10 inches thick.

B1—10 to 22 inches, dark yellowish-brown (10YR 4/4) gritty silt loam; weak, medium, granular and weak, fine, subangular blocky structure; friable; contains common, fine sandstone fragments and shale chips; common fine roots; a few medium pores; medium acid; clear, wavy boundary. Layer is 0 to 14 inches thick.

IIB2t—22 to 30 inches, yellowish-brown (10YR 5/6) silty clay loam that has a few, medium mottles of yellowish red (5YR 5/6) in lower part; moderate, medium, subangular blocky structure; friable or firm; a few thin clay films; a few, fine manganese concretions; a few, fine fragments of sandstone and shale; medium acid; clear, wavy boundary. Layer is 6 to 10 inches thick.

IIBx—30 to 44 inches, yellowish-red (5YR 5/6) clay loam fragipan that has common, medium mottles of red (2.5YR 5/8) and brown (7.5YR 5/2); massive, breaking to weak, medium, subangular blocky structure; firm or very firm when moist, hard when dry, slightly plastic and slightly sticky when wet; common, fine manganese concretions and black films; common, very coarse sand grains and a few sandstone fragments as much as 1 inch in diameter; medium acid; gradual, wavy boundary. Layer is 12 to 18 inches thick.

IIC—44 to 52 inches, yellowish-red (5YR 5/6) clay that has many, coarse streaks and spots of red (2.5YR 5/8) and a few spots of light yellowish brown (10YR 6/4); massive; firm when moist, hard when dry, plastic and sticky when wet; a few manganese concretions and common, black concretionary films; slightly acid; abrupt, wavy boundary.

R—52 inches +, gray Beekmantown limestone.

About three-fourths of this soil is in crops and pasture, about 10 percent is in orchards, and the rest is wooded. The soil is suited to all the crops commonly grown in the county, and it can be used for alfalfa if the proper fertilizer is added. In most places air drainage is not good enough for orchards. Sodded waterways help to control erosion in small draws. (Capability unit IIw–2; woodland suitability group 1)

Pope Series

The Pope series consists of deep, acid, well-drained soils on bottom lands in the western part of the county. These soils developed in recent alluvium that washed from uplands of acid sandstone and shale occupied largely by the Dekalb and Berks soils.

The Pope soils have a mellow, dark-brown, silty or loamy surface layer and dark yellowish-brown loamy subsurface layers that are coarser textured with increasing depth. Profile development is very weak. The available moisture capacity is moderate to high.

In this county the Pope soils are extensive along Back Creek and its tributaries. They occur as narrow bands that are rather close to the streams, are subject to stream gouging, and in most places have a moderate hazard of flooding. They occur with the moderately well drained or somewhat poorly drained Philo soils and the poorly drained Atkins soils. The Pope soils are highly productive and are agriculturally important.

Representative profile of Pope silt loam along Back Creek—

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; many fine roots; medium acid; abrupt, smooth boundary. Layer is 7 to 10 inches thick.

C1—8 to 32 inches, dark yellowish-brown (10YR 4/4) gritty silt loam; weak, fine and medium, subangular blocky structure; contains a few small pebbles; strongly acid; clear, wavy boundary. Layer is 16 to 30 inches thick.

C2—32 to 40 inches, dark yellowish-brown (10YR 4/4) loam to fine sandy loam; structureless; very friable; 10 percent fine gravel; very strongly acid; clear, wavy boundary. Layer is 6 to 12 inches thick.

IIC3—40 to 56 inches +, dark yellowish-brown (10YR 4/4) and light yellowish-brown (10YR 6/4), stratified silt loam, fine sandy loam, and sandy loam; about 30 percent fine gravel; loose; very strongly acid; total thickness of alluvial sediments is about 15 feet.

Range in characteristics: The surface layer ranges from silt loam to fine sandy loam, and the subsurface layers range from fine sandy loam to coarse silty clay loam. Coarse, sandy or gravelly substrata are at a depth of 3 to 6 feet.
Location: Nearly level bottom lands below acid uplands.
Drainage: Well drained.
Overflow hazard: Mostly moderate, but is severe along the edge of streams.
Permeability: Moderate to rapid.

Pope fine sandy loam (Pn).—Throughout the profile this soil is coarser textured than Pope silt loam, and in places it has coarse-textured material slightly nearer the surface. It has a loam to fine sandy loam subsoil. In some areas near side streams, the soil is as much as 10 percent fragments of shale and sandstone.

This soil occurs as narrow bands along the edge of streams and is subject to streambank erosion in many

places. It is likely to be flooded a little more frequently than Pope silt loam. Permeability in the subsoil ranges from moderate to rapid. Included in areas mapped as this soil are small areas of Pope silt loam.

About two-thirds of this soil is wooded, and almost all the rest is in crops. All the crops commonly grown in the county are suited, but the soil is slightly more droughty and less productive than the silt loam. Also, more frequent applications of fertilizer may be needed. (Capability unit IIw–6; woodland suitability group 8)

Pope silt loam (Po).—This soil has the profile described as representative of the Pope series. In areas near side streams, it contains many shale fragments. Streambank erosion is a problem in a few places. Runoff is slow. Included in mapped areas of this soil are small areas of Philo silt loam or Philo fine sandy loam.

Most of this soil has been cleared and is used for crops, and some is in pasture. Crops commonly grown in the county are suited, but at times they may be damaged by floodwater. Consequently, the time of seeding and the choice of crops are somewhat restricted. Intensive management and a high rate of fertilization are justified, however, because the soil is capable of producing high yields. Streambanks should be protected from erosion. (Capability unit IIw–6; woodland suitability group 8)

Rushtown Series

The Rushtown series consists of deep, excessively drained soils that developed on colluvium consisting of fine fragments of shale that washed or rolled from the Berks, Montevallo, and other soils derived from acid shale on uplands.

The Rushtown soils have a surface layer of dark grayish-brown very shaly silt loam and a subsoil of yellowish-brown extremely shaly silt loam. From 75 to 90 percent of the subsoil is fine shale fragments. Permeability is rapid, and the available moisture capacity is low. The soils are strongly acid and are low to moderate in productivity.

In this county the Rushtown soils are in narrow strips on foot slopes in the Back Creek valley and on strips of shale in the limestone valley. They occur with the Berks and the Montevallo soils and, in places, adjoin the Hagerstown, Corydon, Sees, or other soils derived from limestone. The Rushtown soils are inextensive and are used for general farming, ordinarily in fields with other soils.

Representative profile of Rushtown very shaly silt loam, 3 to 8 percent slopes, in a pasture—

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) very shaly silt loam; weak, medium, granular structure; very friable; 50 percent fine, thin shale chips, mostly less than ½ inch across; slightly acid; clear, smooth boundary. Layer is 6 to 9 inches thick.

C1—8 to 20 inches, yellowish-brown (10YR 5/4) very shaly silt loam; very weak, fine and medium, blocky structure; horizon appears to contain no more clay than Ap horizon; shale fragments are loosely stuck together; very friable; 60 to 70 percent fine shale chips, mostly strongly acid; diffuse boundary. Layer is 10 to 15 inches thick.

C2—20 to 45 inches +, yellowish-brown (10YR 5/4 and 5/6) extremely shaly silt loam; massive; slightly firm in place, but very friable or loose when broken out; 85 to 95 percent shale fragments, mostly less than 1 inch across, but some as much as 2 inches across; strongly acid; layer is 24 to 48 inches thick; total depth to firm gray Marcellus shale is about 6 feet.

Range in characteristics: From 40 to 70 percent of the surface layer consists of shale fragments that range from ⅛ inch to about 1½ inches across but are mostly ¼ to ½ inch across. The B horizon is indistinct or lacking. Shale chips make up 75 percent to almost all of the C horizon. The total depth to firm shale ranges from 30 inches to 8 feet.

Location: Toe slopes below shale uplands in the Back Creek valley and on the shale belts in the eastern part of the county.

Parent material: Colluvium consisting of fine shale chips weathered from the Hamilton, Marcellus, and Martinsburg shales.

Drainage: Somewhat excessively drained.

Permeability: Rapid or very rapid.

Slope: 3 to 8 percent.

Rushtown very shaly silt loam, 3 to 8 percent slopes (RuB).—This soil has the profile described for the Rushtown series. Included in areas mapped as this soil are small areas of Berks and Montevallo soils; a few small spots of the Sees, Hagerstown, and other soils derived from limestone; a few areas that are less than 30 inches deep to bedrock; and a few areas that have slopes of more than 8 percent.

Most of this soil has been cleared and is used for pasture or crops. Although the soil is droughty, it is suited to crops commonly grown, especially deep-rooted grasses and legumes. Because it occurs in narrow areas, it is commonly farmed with the adjoining Berks and Montevallo soils or with the Hagerstown or other soils derived from limestone. (Capability unit IIIe–32; woodland suitability group 4)

Sees Series

The Sees series consists of deep, somewhat poorly drained soils that have a heavy, sticky, slowly permeable subsoil. These soils developed chiefly in residuum of argillaceous limestone, but they have been influenced by sandstone colluvium from nearby uplands or by the vertical weathering of limestone strata containing some sandstone.

The Sees soils have a surface layer of very dark grayish-brown silt loam or silty clay loam, a subsoil of dark grayish-brown, strongly mottled silty clay or clay, and a substratum of clay loam to clay. In many places they are neutral throughout the profile. Their available moisture capacity is moderate to high.

These soils are extensive on slightly concave slopes near the eastern foot of North Mountain. Here, they occur below the colluvial Laidig and Buchanan soils and are next to the Berks and the Blairton soils. Areas near the mountain are underlain by Waynesboro limestone but show considerable colluvial influence.

In addition, a smaller acreage of the Sees soils occurs in slight depressions that are scattered throughout the limestone valley. In these areas the soils occur with the well-drained Frederick, Duffield, Frankstown, and Hagerstown soils and with the moderately well drained Pickaway soils. In the limestone valley the Sees soils contain

fragments of sandstone, which probably were contained in limestone that weathered out, but areas in the valley show less colluvial influence than those at the foot of North Mountain.

Representative profile of Sees silt loam, 0 to 3 percent slopes, in a pasture east of North Mountain (see tables 16 and 17, sample No. S60-WVa-2-3-(1-7), for physical and chemical properties)—

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; friable; a few, fine, black concretions; neutral; abrupt, smooth boundary. Layer is 6 to 9 inches thick.

B1—8 to 12 inches, very dark grayish-brown (10YR 3/2) silty clay loam that has a few, medium mottles of strong brown (7.5YR 5/6); moderate, coarse, blocky structure; somewhat firm; a few, fine, black concretions; neutral; clear, wavy boundary. Layer is 4 to 6 inches thick.

B21tg—12 to 20 inches, dark grayish-brown (10YR 4/2) silty clay that has many, medium mottles of gray (10YR 5/1) and strong brown (7.5YR 5/8); moderate coarse prismatic breaking to strong, coarse blocky structure; hard when dry, firm when moist, and slightly sticky when wet; prominent grayish-brown (10YR 5/2) clay films; neutral; clear, wavy boundary. Layer is 6 to 10 inches thick.

B22tg—20 to 32 inches, dark grayish-brown (10YR 4/2) clay that has many, coarse mottles of gray (10YR 5/1) and dark brown (7.5YR 4/4); weak coarse prismatic, breaking to moderate, coarse, blocky structure; hard when dry, very firm when moist, and plastic and very sticky when wet; common black concretions; neutral; gradual, wavy boundary. Layer is 10 to 14 inches thick.

B3g—32 to 43 inches, dark grayish-brown (10YR 4/2) clay that has many, medium mottles of dark brown (7.5YR 4/4) and gray (10YR 5/1); weak coarse prismatic, breaking to moderate, coarse, blocky structure; hard when dry, firm when moist, plastic and very sticky when wet; few gray (2.5Y 5/0) clay films; common manganese concretions; neutral; clear, wavy boundary. Layer is 8 to 14 inches thick.

C1g—43 to 52 inches, dark grayish-brown (10YR 4/2) clay loam or clay that has common mottles of gray (10YR 5/1) and strong brown (7.5YR 5/8); massive, with some weak, medium, subangular blocky structure; firm when moist, plastic and sticky when wet; a few clay films; common, medium manganese concretions; few charcoal or carbon fragments; neutral; gradual, wavy boundary. Layer is 0 to 10 inches thick.

C2g—52 to 72 inches +, variegated gray (10YR 5/1), dark grayish-brown (10YR 4/2), and strong-brown (7.5YR 5/8) clay loam or clay; massive; firm when moist, plastic and sticky when wet; common manganese concretions; common lime concretions as much as ½ inch across; neutral. Layer is 15 to 25 inches thick.

Range in characteristics: The surface layer ranges from silt loam to silty clay loam, and the subsoil ranges from silty clay loam or clay loam to clay. Coarse sandstone fragments in the profile range from few to common. In some places the C horizon has a fairly high content of black concretionary material and resembles a fragipan. Colluvial influence ranges from slight in the limestone valley to strong in the large areas at the foot of North Mountain.

Location: Concave slopes near the eastern foot of North Mountain and slight depressions throughout the limestone valley.

Parent material: Argillaceous limestone that has been influenced by sandstone colluvium.

Drainage: Somewhat poorly drained.

Permeability: Slow.

Slope: Nearly level or gently sloping.

Sees silt loam, 0 to 3 percent slopes (SaA).—This soil has the profile described for the series. A few spots near North Mountain have loose stones on the surface. A few areas are seepy. Runoff is slow to medium, and the erosion hazard is slight to moderate. Included in mapped areas are small, poorly drained areas.

About half of this soil is in crops, a large acreage is in pasture, a small acreage is in orchards, and the wettest parts remain wooded. The soil is best suited to water-tolerant grasses and legumes, and it produces good yields of bluegrass pasture if surface drainage is provided. The soil must be drained before it can be successfully cropped (Capability unit IIIw-5; woodland suitability group 9)

Sees silt loam, 3 to 8 percent slopes (SaB).—This soil has slighty better surface drainage than Sees silt loam, 0 to 3 percent slopes, but it is used and managed in about the same way. Small areas are moderately well drained. Limestone crops out in a few places. Runoff is medium and causes a slight or moderate hazard of erosion.

About equal parts of this soil are in crops, pasture, and woods. Drainage can be easily improved by using open ditches or tile lines. (Capability unit IIIw-5; woodland suitability group 9)

Sees silty clay loam, 3 to 8 percent slopes, severely eroded (ScB3).—This soil is on shoulders and breaks that often receive water from higher slopes. Most of the original surface layer has been removed through erosion, and the plow layer is silty clay loam. Limestone crops out in a few places. Runoff is rapid, and the hazard of further erosion is moderate or severe.

About half of this soil is in crops, about one-fourth is in pasture, and the rest is wooded. Tillage is more difficult on this soil than on Sees silt loam, 0 to 3 percent slopes. If drainage is adequate, water-tolerant grasses and legumes can be grown. Diversion terraces and other measures are useful in controlling runoff. (Capability unit IIIw-5; woodland suitability group 9)

Sloping Eroded Land, Shale Materials (ShD)

This land type consists of many small areas that are so severely eroded that the original soil profiles have been destroyed. These areas are mostly 1 acre or less in size, but their total acreage is about 1,100 acres. Runoff generally is concentrated on this land from higher slopes. Raw shale is exposed in many places, and there are few to many gullies. The slopes range from 10 to 30 percent. Before erosion destroyed their profiles, the soils were of the Berks and Montevallo series.

Almost all of this land has been cleared and cropped, but much of its acreage has been abandoned to brushy woods. Further erosion should be controlled by keeping the areas in shrubs or trees and by using diversion ditches and other measures that control runoff. (Capability unit VIIe-3; woodland suitability group 11)

Steep Eroded Land, Shale Materials (ShE)

This land is similar to Sloping eroded land, shale materials, but its slopes range from about 30 to 50 percent and some parts are underlain by red sandstone and shale. Gullies are more numerous, and the soil material

is thinner over shale. Raw shale is exposed in most places. Water is concentrated on this land from higher slopes, and runoff is very rapid. The total area of this land type is almost 1,500 acres.

Establishing a plant cover is difficult on this land, but permanent woody plants are needed to control further erosion. Before cover can be planted and established, diversion ditches or other measures that control runoff are needed. Commercial production of timber crops generally is not practical. (Capability unit VIIIe–31; woodland suitability group 11)

Steep Rock Land (SrF)

This land consists of massive outcrops of sandstone and small vertical cliffs. It is very steep in places and occurs on crests and points of Sleepy Creek Mountain, North Mountain, and other mountains. A fairly extensive area occurs on the upper east-facing slope of North Mountain where the dip of the sandstone and the slope of the land parallel each other. Little soil material has accumulated over the bare rock.

Although Steep rock land is all wooded, the trees generally are not desirable and grow slowly or very slowly. This land is not suitable for commercial production of woodland crops and is useful only as scenic spots and as landmarks. (Capability unit VIIIs–1; woodland suitability group 12)

Tygart Series

The Tygart series consists of deep, somewhat poorly drained soils that occupy terraces well above overflow. These soils have a clayey, slowly permeable subsoil. They developed in alluvial sediments that were derived mainly from acid sandstone and shale and that apparently were laid down in slow or slack water.

The Tygart soils have a grayish-brown silt loam surface layer and a yellowish-brown, strongly mottled, clayey subsoil. They have moderate available moisture capacity, are low to moderate in natural fertility, and are strongly acid throughout.

These soils occur on smooth terraces, generally in slight depressions, in the eastern part of the county. The largest acreage is in the Back Creek valley, and smaller areas are along Opequon Creek. About two-thirds of the acreage has been cleared and is used for general crops and pasture.

Representative profile of Tygart silt loam, 0 to 3 percent slopes, in pasture—

Ap—0 to 7 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; friable; many fine roots; medium acid; abrupt, smooth boundary. Layer is 6 to 8 inches thick.

B1—7 to 10 inches, brown (10YR 5/3) heavy silt loam; weak, fine, subangular blocky structure; slightly firm; few, fine rusty spots of strong brown (7.5YR 5/8); common roots; medium acid; clear, smooth boundary. Layer is 0 to 5 inches thick.

B21g—10 to 18 inches, yellowish-brown (10YR 5/6) silty clay loam that has common, medium mottles of gray (10YR 6/1) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; firm when moist, slightly plastic and slightly sticky when wet; a few fine manganese concretions; common roots; strongly acid; clear, smooth boundary. Layer is 6 to 10 inches thick.

B22tg—18 to 33 inches, yellowish-brown (10YR 5/8) silty clay loam to silty clay that has many, prominent, coarse mottles of gray (10YR 6/1) and strong brown (7.5YR 5/8); moderate, medium and coarse, subangular blocky structure; firm when moist, slightly plastic and slightly sticky when wet; a few clay films of gray (10YR 6/1); common fine manganese concretions and black films; few roots; strongly acid; gradual, smooth boundary. Layer is 10 to 16 inches thick.

B3g—33 to 46 inches +, about equal proportions of gray (10YR 6/1) and yellowish-brown (10YR 5/8) silty clay loam ranging to silty clay; massive, breaking to weak, coarse, subangular blocky; firm (firmer than B22g); many manganese concretions and common black films on cracks; a few roots in cracks; strongly acid; total depth of terrace material over acid shale is about 8 feet.

Range in characteristics: The depth to the strongly mottled B horizon ranges from 8 to 15 inches. The subsoil ranges from silty clay loam to clay and, in the lower part, contains a few to many manganese concretions. The lower subsoil is firm or very firm, and though it is fine textured, in some places it resembles a fragipan.

Location: Smooth terraces that are above overflow, mainly along Back Creek and partly along Opequon Creek.

Parent material: Acid alluvial sediments that were laid down in slow or slack water.

Permeability: Generally slow but very slow in some places.

Slope: Nearly level or gently sloping (0 to 8 percent slopes).

Tygart silt loam, 0 to 3 percent slopes (TyA).—This soil has the profile described as representative of the Tygart series. Much of the acreage occurs in slight depressions. Runoff is slow, and the erosion hazard is slight or moderate. Included in mapped areas are small areas of the Monongahela soils and small spots that are poorly drained and very slowly permeable.

About 65 percent of this soil is in crops, 25 percent is in pasture, and the rest is wooded. The soil is suited to water-tolerant grasses and legumes and is fairly well suited to row crops, but it must be drained before crops can be grown. Draining through open ditches is fairly successful. (Capability unit IIIw–5; woodland suitability group 9)

Tygart silt loam, 3 to 8 percent slopes (TyB).—This soil occupies gentle slopes and has slightly better surface drainage than Tygart silt loam, 0 to 3 percent slopes. Runoff is medium, and the erosion hazard is moderate or severe. Considerable runoff is received from the adjoining slopes. Included in areas mapped as this soil are a few small areas of the Monongahela soils and small, severely eroded areas.

About 50 percent of this soil is in crops, 25 percent is in pasture, and the rest is wooded. This soil can be managed in about the same way as the nearly level Tygart soil, but water-control measures are needed for controlling runoff. Terraces can be used to divert water from the hills nearby. (Capability unit IIIw–5; woodland suitability group 9)

Waynesboro Series

The Waynesboro series consists of deep, well-drained, strongly developed soils that occupy old terraces high above the Potomac River. These soils formed in allu-

vial deposits that washed mainly from uplands of acid sandstone and shale.

The Waynesboro soils have a dark grayish-brown gravelly loam surface soil, a yellowish-red clay loam or sandy clay loam subsoil, and a thick, yellowish-red sandy loam substratum that contains varying amounts of rounded gravel. These soils are moderately permeable and are high to moderate in available moisture capacity.

In this county the Waynesboro soils occupy smooth, rolling terraces above the Potomac River along the northeastern boundary. The terraces are high above the river and are at about the same general level as the limestone uplands. The Waynesboro soils adjoin the Berks and Blairton soils and, to lesser extent, occur with the Hagerstown and Frederick soils. Waynesboro soils are redder and more strongly developed than the Murrill soils, which are underlain by limestone. They contain more sand and gravel in the subsoil than the Hagerstown soils. A large part of the Waynesboro soils has been cleared and is used for general cropping and for orchards.

Representative profile of Waynesboro gravelly loam, 3 to 8 percent slopes, in a meadow—

Ap—0 to 8 inches, dark, grayish-brown (10YR 4/2) gravelly loam; very weak, fine, granular structure; very friable; 20 percent rounded gravel; a few stones as large as 8 inches on the surface; many fine roots; medium acid; abrupt, smooth boundary. Layer is 6 to 9 inches thick.

A2—8 to 13 inches, light yellowish-brown (10YR 6/4) loam; very weak, fine, subangular blocky structure; very friable; 15 percent pebbles as much as 3 inches in diameter; medium acid; clear, wavy boundary. Layer is 2 to 6 inches thick.

B1—13 to 16 inches, yellowish-red (5YR 4/6) heavy loam; weak, medium, subangular blocky structure; friable; about 30 percent consists of material that is similar to A2 horizon and is in streaks and pockets; strongly acid; clear, wavy boundary. Layer is 0 to 4 inches thick.

B2t—16 to 30 inches, yellowish-red (5YR 4/6) sandy clay loam or sandy clay; moderate, medium, subangular blocky structure; firm when moist, slightly plastic and slightly sticky when wet; common clay films of strong brown (7.5YR 5/6); a few pebbles; strongly acid; gradual, wavy boundary. Layer is 12 to 16 inches thick.

B3—30 to 40 inches, yellowish-red (5YR 4/6) sandy clay loam that ranges to sandy loam; a few streaks and spots of strong brown (7.5YR 5/6); weak, fine and medium, subangular blocky structure; friable to firm when moist but not so firm as B2; slightly plastic and slightly sticky when wet; a few pebbles; strongly acid; gradual, wavy boundary. Layer is 6 to 12 inches thick.

C—40 to 60 inches +, yellowish-red (5YR 4/6) heavy sandy loam that is coarser textured with depth; common streaks and coarse spots of strong brown (7.5YR 5/6); massive; friable or very friable; a few fine manganese concretions; a few small pebbles; strongly acid; as estimated in nearby road cut, total depth of terrace deposit over acid Martinsburg shale is about 8 feet.

Range in characteristics: In the surface layer the pebbles and cobbles range from 2 or 3 inches to as much as 10 inches in diameter. Texture in the B horizon ranges from silty clay loam to sandy clay, and pebbles are few to common. In total depth the deposits range from 6 to 12 feet. They are underlain mostly by acid shale, but some of the deepest deposits are underlain by limestone.

Location: Old terraces high above the Potomac River in the northern and eastern parts of the county.

Parent material: Alluvial terrace deposits derived largely from uplands of acid sandstone and shale.

Permeability: Moderate.

Drainage: Well drained.

Slope: Gently sloping to strongly sloping (3 to 15 percent slopes).

Waynesboro gravelly loam, 3 to 8 percent slopes (WaB).—This soil has the profile described for the series. On the surface there are few to common pebbles and cobbles, some as large as 10 inches in diameter. Runoff is slow to medium and causes a slight or moderate hazard of erosion. Included in areas mapped as this soil are small areas of Hagerstown soils and small areas that have a gravelly silt loam surface layer.

About one-fourth of this soil remains wooded, about one-fourth is in orchards, and the rest is in crops and pasture. The soil is suited to all the common crops and to orchards. Because it is gravelly, however, some areas are somewhat droughty, and crops are difficult to harvest in some places. For high yields, more than average amounts of fertilizer are needed. (Capability unit IIe–4; woodland suitability group 2)

Waynesboro gravelly loam, 8 to 15 percent slopes (WaC).—This soil is similar to Waynesboro gravelly loam, 3 to 8 percent slopes. It occupies small areas on side slopes and terrace breaks. Runoff is medium, and the erosion hazard is moderate or severe. Included in areas mapped as this soil are small severely eroded areas, small very gravelly areas that are droughty, and small areas that have a gravelly silt loam surface layer.

About half of this soil is wooded, a small part is in orchards, and the rest is in crops or pasture. Although the soil is suited to the crops commonly grown, intensive conservation practices are needed. In some places pebbles and cobbles interfere with tillage. (Capability unit IIIe–4; woodland suitability group 2)

Waynesboro gravelly loam, 8 to 15 percent slopes, severely eroded (WaC3).—This soil is similar to Waynesboro gravelly loam, 8 to 15 percent slopes, but erosion has removed most of its surface layer and more gravel is on the surface in places. Small areas are gravelly enough to be droughty, and small gullies occur in some places. Runoff is medium to rapid, and the erosion hazard is severe.

About a third of this soil is in pasture, a small part is in crops, and the rest is wooded. The commonly grown crops are suited, and row crops can be grown in a 5- or 6-year rotation, but carefully applied measures are needed to control surface runoff. (Capability unit IVe–3; woodland suitability group 2)

Formation and Classification of Soils

In this section the factors that have affected the formation of soils in Berkeley County are discussed. Also discussed is the classification of the soils by higher categories.

Factors of Soil Formation

Soils are intimate mixtures of broken and partly or completely weathered rock, of minerals, of organic matter, of living plants and animals, and of water and air.

They occur as a part of the natural landscape and differ from place to place. Some of the ways in which they differ are in occurrence and degree of development of various horizons; in mineral content; in depth over rock or other substrata; and in texture, color, and slope. The nature of the soil depends on five soil-forming factors: (1) climate; (2) living organisms; (3) parent material; (4) topography, and (5) time. All of these factors have an influence on the genesis of every soil, but their relative importance varies from place to place. One factor may outweigh others in the formation of a soil and may determine most of its properties. For example, a very young alluvial soil may show only faint horizonation because of the short time the soil-forming factors have had to work, but a level soil that formed in residuum from bedrock may show distinct horizons because the soil material has remained largely in place and all of the soil-forming factors have been active for a long time. Thus, combinations of the five major factors have determined the character of the soils in Berkeley County.

Climate

Berkeley County has a humid, temperate climate that is fairly uniform throughout the county. The average annual precipitation is about 38 inches. The frost-free season is about 176 days. The average temperature in summer is about 85° F. maximum and 60° minimum, and the average temperature in winter is about 45° maximum and 25° minimum. Summers are warm, with frequent hot spells; winters are relatively mild, with frequent freezing and thawing. Snow remains on the ground for only short periods. On North Mountain, Third Hill Mountain, Sleepy Creek Mountain, and at other high elevations, the climate is somewhat cooler and the precipitation, particularly snowfall, is greater. In these higher, cooler areas the soils may be a little darker colored and may contain a little more organic matter than those at lower elevations.

Climate does not vary enough within the county to account for all the differences among the soils. The climate of Berkeley County tends to develop strongly weathered, leached, moderately fertile, acid soils. The mature soils in the county have these characteristics. Most of them are in the great soil group of Red-Yellow Podzolic soils.

Living organisms

The natural vegetation of Berkeley County was a forest of mixed hardwoods. Oak was dominant, but there was some hickory, chestnut, yellow-poplar, and other hardwoods. Conifers were scattered, and pure stands were not extensive. Because these forests were reasonably uniform, their influence on the soils was about the same throughout the county.

Soils that develop under hardwoods have a thin, mull-type organic surface layer, or A1 horizon. Hardwoods use much of the calcium and other bases in the soil, but these bases are at least partly returned each year in the fallen leaves. In this humid, temperate climate, this recycling, or return, of soluble bases helps to counteract the tendency of the soils to lose bases through leaching.

Micro-organisms, earthworms, and other small fauna tend to break down, mix, and incorporate organic matter in the soil, particularly in the surface horizon. This helps to form a mull-type horizon.

Since the forests of the county generally are uniform, the forest litter and the organic surface horizon are uniform. Therefore, it is assumed that the soil organisms are somewhat uniform throughout the county, and that they have about the same influence on all soils.

There is a tendency for soils under grass to develop deeper organic horizons than soils under trees, but cropping and erosion may slow or reverse this process. Although much of the smoother parts of Berkeley County has been used for crops or pasture for many years, the soils on the uplands have a plow layer, or Ap horizon, that is mostly low or very low in content of organic matter.

Parent material

Berkeley County is in two major physiographic areas. The Great Valley makes up the central and eastern three-fifths of the county, and the mountains and mountain valleys make up the western two-fifths. The geology, parent materials, and resulting soils are discussed by areas, starting at the eastern edge of the county and progressing westward, generally on a line that would pass through Martinsburg and Jones Springs.

Soils of the Great Valley.—The Beekmantown limestone of Ordovician age occurs at the surface in two broad bands, one in the extreme eastern edge of the county, the other just east of Martinsburg. This limestone consists mainly of hard, dark-blue to bluish-gray rock that contains some magnesium. Some of this limestone has a fairly large content of platy and rounded, yellowish or white chert. Through weathering and solution of the limestone, the chert is left as residual masses on and in the soils. The chert fragments may appear as yellowish, platy blocks or, more commonly, as rounded balls that have a brownish sandy surface. The Beekmantown limestone has thin strata of nearly pure limestone in which the silica content is low. Because of extensive faulting, Beekmantown limestone occurs in sharp folds that generally strike southwest-northeast and crop out as limestone ledges oriented in the same direction. Most of the rock strata in Berkeley County are in folds that extend southwest-northeast. As the limestone is weathered, mainly by solution of the carbonates, a parent material is formed that is rather clayey and has a fairly high content of calcium and exchangeable bases.

The Hagerstown soils are extensive in areas underlain by Beekmantown limestone. Many of these soils are rocky, most contain some sandy and cherty impurities, and some have a gravelly surface horizon. Related soils are the Pickaway and Frederick soils.

The Murrill soils formed in sandstone material over residuum from limestone. The sandy parent material may have been local colluvium that was concentrated from fragments of sandstone contained in the Beekmantown limestone.

A belt of Martinsburg shale, about 3 miles wide, crosses the county east of Martinsburg. A narrow belt of this shale also crosses the county just east of North Mountain. The shale, of Ordovician age, is dark gray to black in place, but it weathers to buff-colored, soft platy fragments. It contains some lime where it joins

the Chambersburg limestone. The shale is strongly folded and tilted. On weathering, it leaves soft, acid, buff or yellowish-brown, shaly parent material that is somewhat low in exchangeable bases. Most of the Martinsburg shale is overlain by the silty Berks and Montevallo soils. These soils are shallow or moderately deep and have a high content of shale fragments. The somewhat finer textured, somewhat poorly drained Blairton soils occur in small bars and depressions.

North and south from Blairton and along U.S. Highway No. 11, narrow belts of Chambersburg and Stones River limestones form the surface rock. They dip sharply and, in many places, are almost vertical. Both are dark-gray pure limestones of Ordovician age. The Stones River limestone is pure in some strata and is very low in silica content. The parent material that weathered from these pure limestones is clayey and high in content of bases, especially calcium. The heavy textured Chilhowie and Carbo soils and some Hagerstown and Corydon soils formed on the Chambersburg and Stones River limestones.

Crossing the county east of Nollville is a band of Conococheague limestone, 1 to 2 miles wide. This limestone is of Cambrian age, is grayish brown and siliceous, and contains magnesium. It also contains a rather large amount of sandstone that remains after the limestone weathers away in solution. The Conococheague limestone dips strongly. Weathered from it is silty to clayey parent material that has a fairly high content of sandstone fragments and chert fragments. The soils underlain by this limestone are the Duffield, Frederick, Pickaway, and some Hagerstown soils on uplands and the Murrill soils in colluvial areas. Presumably the colluvial material in which the Murrill soils formed is a concentration of sandstone impurities from the limestone.

West of Nollville the Elbrook limestone underlies a band of low ridges, 1 to 3 miles wide, that extends across the county. These ridges form the section known as Apple Pie Ridge. The Elbrook limestone is of Cambrian age and consists of layers of shaly limestone and limy shale. Rocks on the surface are mainly buff-colored, shaly limestones that break down to soft platy shale fragments. Hard, blue limestone occurs in deep, unweathered areas. The parent material that weathered from the limestone is quite silty but contains some clay. In the substratum of soils on Elbrook limestone, clayey bands may be surrounded by buff-colored silty shale. The Frankstown soils are extensive on this limestone, and the Frederick and Pickaway soils also occur.

A narrow band of siliceous limestone of the Waynesboro formation occurs just west of Apple Pie Ridge. The somewhat poorly drained Sees soils occur on this limestone and have had some influence from sandstone colluvium that rolled or washed from North Mountain.

The alluvial soils in the limestone valley occur along the Potomac River and along Opequon Creek and other small streams. Most of the alluvial material was derived from uplands of limestone and contains a fairly large amount of calcium. The Huntington, Lindside, and Melvin soils occur along the streams. Mixed alluvial deposits occur on terraces high above the Potomac River. The Waynesboro soils occupy these terraces.

Soils of the mountains and mountain valleys.—The western two-fifths of Berkeley County, from North Mountain westward, is a series of low, roughly parallel mountains or ridges, the intervening foothills, and rather narrow valleys. The main ridges are North Mountain, Wilson Ridge, Third Hill Mountain, and Sleepy Creek Mountain. The best defined, most extensive valley is that of Back Creek.

Hard sandstones occur on the upper and middleslopes of North Mountain, Sleepy Creek Mountain, and Wilson Ridge. Among these rocks are the Tuscarora (White Medina) sandstone of Silurian age, the Juniata (Red Medina) formation of Upper Ordovician age, the Oriskany sandstone of Lower Devonian age, and the Purslane sandstone of Mississippian age. The residuum from these rocks is somewhat mixed but, in most places, is strongly acid, stony, and loamy or sandy. Slopes generally are steep or very steep and are occupied mainly by the stony Dekalb soils. Below the sandy uplands the Laidig and Buchanan soils have developed in deep, loamy colluvium that washed or rolled from higher slopes.

The lower mountain slopes and foothills in the western part of the county are underlain mainly by strongly tipped and folded Chemung, Portage, and Hamilton formations of Devonian age. These formations consist mainly of grayish acid shale, siltstone, and thin-bedded sandstone, but partly of fine, black Marcellus shale that is hard and fissile. Because slopes in this part of the county are mostly strong or moderately steep, parent material is considerably mixed. The residual parent material from these rock formations is rather shallow over shale and is silty, low in exchangeable bases, and fairly high in content of rock fragments. The Berks and Montevallo soils occupy most of the higher slopes, and the Leadvale soils occur on the colluvial foot slopes.

Crossing the county along the foothills of Third Hill Mountain is a band of rocks, about 1 mile wide. These rocks are chiefly red or green acid sandstone and partly red shale of the Catskill formation. The parent material that weathered from this formation is acid and loamy or sandy, and it has given rise mainly to the Lehew soils.

In the Back Creek valley are fairly extensive deposits that washed from uplands of acid sandstone and shale. The deposits on the bottom land are recent, and those on terraces are older. In most places these deposits are silty, acid, and low to moderate in content of plant nutrients. The Pope, Philo, and Atkins soils occur on the bottom land of Back Creek, and the Monongahela and Tygart soils are on the smooth terraces.

A small, narrow, oblong area of limestone extends from north of Jones Springs to State Route 9. This area is underlain mainly by Bossardville limestone and Rondout waterlime, both of which have a fairly high content of siliceous material and silty shale. The parent material that weathered from these formations is medium to fine textured, is fairly high in exchangeable bases, and contains considerable chert and sandy impurities. The Corydon, the Sees, and the Frederick, thick surface, soils occupy much of the area.

Topography

In Berkeley County, position on the landscape exerts an important influence on the soils because of its relationship to other soil-forming factors, particularly time and parent material.

The four general topographic positions in the county are (1) uplands, (2) colluvial slopes, (3) terraces, and (4) flood plains. Table 15 shows the topographic position, parent material, drainage, and depth of all of the soil series in the county. Data are not shown for the miscellaneous land types. Following is a discussion of the topographic positions and their influence on the soils.

Uplands.—Normally, the soils on uplands developed in material that weathered from the underlying rocks. A difference in slope has a marked effect on soil development, even if the parent materials are the same. On gentle slopes the soil material tends to remain in place, and a mature profile develops. The Frederick soils, which are on gentle slopes in the limestone valley, are good examples of mature soils. On steep slopes there is more runoff, less percolation, and more soil creep. Movement of soil material does not allow the soil-forming processes to act on the same material for a long time. The result is weakly developed soils, such as the Dekalb and Montevallo.

Soils on uplands occupy about 80 percent of the county. Most of them are well drained or moderately well drained.

Colluvial slopes.—These slopes consist of soil material that has collected, through creep and wash, at the base of steep slopes or mountains. Extensive areas of colluvial soils occur as narrow bands at the base of North, Third Hill, and Sleepy Creek Mountains. These soils formed in colluvial material that weathered mostly from acid sandstone and partly from shale.

Small areas of other colluvial soils occur at the base of fairly long slopes throughout the county. Many small areas of the Murrill soils are in shallow depressions scattered through the limestone valley, far from any mountains now existing. These soils have sandy or loamy upper horizons and are underlain by limestone residuum. Since many of the limestones in Berkeley County have sandstone inclusions, it may be that the sandstone material was left after the limestone was weathered away in solution and was then concentrated by local colluvial action. The Murrill soils occupy a large total acreage.

Most colluvial slopes are concave and receive runoff from higher slopes. Underground seepage from higher areas is fairly common. Colluvial soils make up about 9 percent of the county.

Old stream terraces.—These terraces are the former flood plains of the county. The soil material was deposited when the streambeds were at a higher level than at present, and it has been subject to soil-forming processes for a relatively long time. This material consists of three general types, (1) material that has been washed mainly from acid uplands, such as the material in which the Monongahela soils developed; (2) material that has been washed from lime-influenced and limestone uplands, such as the material in which the Captina soils developed; and (3) material of mixed origin that has been washed from uplands. The Captina soils still show some effects of lime in the lower part of their profile. The very strongly weathered Waynesboro soils that occupy old terraces high above the Potomac River formed in this material.

Soils on terraces are moderately to strongly leached and have strongly developed profiles. They make up about 3 percent of the county.

Flood plains and bottom lands.—These areas are subject to flooding and periodically receive new deposits of soil materials. Soils that formed in these deposits show only weak profile development. They are nearly level and range from well drained to poorly drained. The poorly drained soils show effects of gleying. There are two general types of alluvial deposits in Berkeley County, (1) material that has been washed from uplands of acid sandstone and shale, such as the material in which the Pope soils developed; and (2) material that has been washed from lime-influenced or limestone uplands, such as the material in which the Huntington soils developed. Soils on flood plains make up about 8 percent of the county.

Time

The length of time that climate, living organisms, and topography have acted on parent material affects the character of the soil. An old, strongly developed soil shows well-defined genetic horizons. A young, less well-developed soil shows only faint or weakly developed horizons. The soils of Berkeley County range from very young soils on bottom lands to old soils on smooth, upland flats.

Periodic flooding keeps alluvial soils in a state of change. Consequently, most soils on flood plains are weakly developed. Some of the alluvial soils in Berkeley County, such as the Huntington and Pope soils, have not been in place long enough for distinct genetic horizons to form.

In steep and very steep areas, soil material is either removed through creeping and washing or is mixed by solifluction before it has had sufficient time to develop a deep soil profile. As a result, shallow and weakly developed soils, such as the Montevallo and Dekalb, are common on steep slopes in the western part of the county.

In smooth upland areas, soil material is relatively stable, and its removal is slow. Therefore, the soil-developing factors have had a long time to act on the same material, and mature soils that have distinct genetic horizons, such as the Frederick soils, have formed. The Waynesboro, Monongahela, and other soils that formed on old alluvial terrace deposits have mature profiles and show distinct horizonation.

Classification of Soils

In this subsection the soil series of Berkeley County are placed in great soil groups (*13*). The soils within each great soil group have several characteristics in common, but they may differ greatly in other characteristics. Generally, the soils have the same kind and number of horizons, though horizons of similar identity are not necessarily of the same thickness and are not expressed with the same degree of clarity.

Some of the soils have characteristics of more than one great soil group. Such soils are classified in one great soil group but are described as intergrades toward another group.

In the following list, the soil series in the county are classified into great soil groups. Following the list,

TABLE 15.—*Soil series arranged to show topographic position, parent material, drainage, and depth*

Parent material	Well drained			Moderately well drained, deep	Somewhat poorly drained, deep	Poorly drained, deep
	Shallow	Moderately deep	Deep			
UPLANDS						
Residuum from—						
Acid gray sandstone		Dekalb				
Acid reddish sandstone	Lehew	Lehew				
Acid siltstone, shale, and thin-bedded sandstone.	Montevallo	Berks				
Soft, acid, silty shale		Gilpin			Blairton [1]	
Limestone—						
Beekmantown limestone that contains siliceous impurities.	Corydon	Corydon	Hagerstown	Pickaway	Sees [2]	
Bossardville limestone and Rondout waterlime.	Corydon	Corydon				
Helderberg limestone that contains some sandy impurities.			Frederick, thick surface.			
Stones River and Chambersburg limestones, high in purity.	Chilhowie	Chilhowie, Carbo.	Carbo			
Conococheague limestone that contains cherty and siliceous impurities.			Duffield, Frederick, Hagerstown.	Pickaway		
Elbrook limestone, silty strata		Frankstown	Frankstown	Pickaway		
Waynesboro limestone that contains some impurities.					Sees [2]	
COLLUVIAL SLOPES						
Colluvium from—						
Acid gray sandstone; colluvium underlain by sandstone and shale.			Laidig	Buchanan		
Acid thin-bedded shale			Rushtown			
Acid gray shale, siltstone, and sandstone.				Leadvale		
Acid gray sandstone; colluvium underlain by limestone.			Murrill			
TERRACES						
Mixed material from acid shale and sandstone and from limestone-influenced uplands; old high deposits.			Waynesboro			
Material from acid shale, siltstone, and sandstone of the uplands.				Monongahela.	Tygart	
Material from limestone and from acid shale and siltstone of the uplands.				Captina		
FLOOD PLAINS						
Alluvium from—						
Acid sandstone, siltstone, and shale of the uplands.			Pope	Philo	Philo	Atkins.
Limestone and some acid shale and siltstone of the uplands.			Huntington	Lindside		Melvin.

[1] The Blairton soils are shallow or moderately deep to shale bedrock and have been influenced by local colluvium.

[2] The Sees soils have been influenced by colluvium from sandstone and shale of the uplands.

there is a discussion of the great soil groups represented in the county.

Gray-Brown Podzolic soils:
  Central concept: none.
  Intergrading toward Red-Yellow Podzolic soils: Carbo, Duffield, Gilpin, Leadvale, Murrill.
  Intergrading toward Lithosols: Chilhowie, Corydon.
  Intergrading toward Brunizems: Sees.

Red-Yellow Podzolic soils:
  Central concept: Buchanan, Captina, Frankstown, Frederick, Laidig, Monongahela, Pickaway.

Intergrading toward Gray-Brown Podzolic soils: Blairton.
Intergrading toward Low-Humic Gley soils: Tygart.
Intergrading toward Reddish-Brown Lateritic soils: Waynesboro.
Reddish-Brown Lateritic soils:
Central concept: none.
Intergrading toward Gray-Brown Podzolic soils: Hagerstown.
Low-Humic Gley soils:
Central concept: Atkins, Melvin.
Lithosols:
Central concept: none.
Intergrading toward Sols Bruns Acides: Montevallo.
Regosols:
Central concept: Rushtown.
Sols Bruns Acides:
Central concept: Dekalb, Lehew.
Intergrading toward Lithosols: Berks.
Alluvial soils:
Central concept: Huntington, Lindside, Philo, Pope.

Gray-Brown Podzolic soils

Undisturbed soils of this great soil group have a thin, dark-colored, highly organic, mineral A1 horizon and a leached, lighter colored A2 horizon that extends to a depth of 8 or 10 inches. Many of these soils have been plowed, however, and have a dark grayish-brown Ap horizon, about 8 inches thick, that generally is a mixture of the A1 and A2 horizons. A few inches of the A2 horizon may be intact, or the B horizon may be immediately below the Ap horizon. The illuvial B horizons are somewhat finer textured than the A horizons, have stronger colors, and have moderately well defined, blocky or subangular blocky structure.

These soils exhibit rather distinct horizonation, but the leaching of bases is considered to be only moderate. The percentage of base saturation generally increases with depth and normally is more than 35 percent. Exchangeable calcium generally makes up a large part of the exchangeable bases.

No soils in Berkeley County are considered to be in the central concept. Those that intergrade toward other great soil groups are discussed in the following paragraphs.

Intergrading toward Red-Yellow Podzolic soils.—The Carbo, Duffield, Gilpin, Leadvale, and Murrill soils show some characteristics of both the Gray-Brown Podzolic and the Red-Yellow Podzolic great soil groups. These soils resemble Gray-Brown Podzolic soils in sequence of horizons, in depth of solum, in color, and generally in degree of textural and structural development. However, they appear to be more strongly weathered than typical Gray-Brown Podzolic soils, and they are acid throughout the solum. The Gilpin, Leadvale, and, in part, the Murrill soils developed in acid parent material. The Carbo and Duffield soils developed in materials weathered from limestone but are moderately leached. Murrill soils are underlain by material derived from limestone.

All of these intergrading soils resemble Red-Yellow Podzolic soils in low degree of base saturation and in low remaining content of readily weathered minerals. The percentage of base saturation generally is less than 35 percent. The Carbo and Duffield soils tend to be higher in percentage of base saturation in the lower part of the solum than the Gilpin, Leadvale, and Murrill soils. Leadvale soils have a compact fragipan in the lower part of the subsoil. Murrill soils are a good example of an intergrade between Gray-Brown Podzolic soils and Red-Yellow Podzolic soils. Representative profiles of two soils in the Murrill series are described in the section "Descriptions of the Soils."

Intergrading toward Lithosols.—The Chilhowie and Corydon soils show some characteristics both of Gray-Brown Podzolic soils and of Lithosols. They resemble Gray-Brown Podzolic soils in sequence of horizons and in general color. The percentage of base saturation in the B horizons normally is more than 35 percent and is higher in the lower part than in the upper. These soils also resemble Lithosols because they are shallow to hard rock, lack evidence of much clay movement, and lack strong structural development. The Corydon soils show somewhat stronger horizonation and profile development than do the Chilhowie soils.

Many areas of the Chilhowie and Corydon soils are rocky, and the profiles contain a fair amount of coarse fragments. A representative profile of a soil in each series is described in the section "Descriptions of the Soils." Additional information about the Chilhowie soils is presented in the subsection "Laboratory Analyses."

Intergrading toward Brunizems.—The Sees soils show many characteristics of Gray-Brown Podzolic soils, but they have some properties common to Brunizems. They resemble Gray-Brown Podzolic soils in sequence of horizons, in depth of solum, and generally in degree of textural and structural development. They are neutral in reaction throughout. The Sees soils resemble Brunizems in that they have a dark grayish-brown solum and are gray mottled with strong brown in the lower C horizon. A representative profile of a soil in the Sees series is described in the section "Descriptions of the Soils." Additional information is presented in the subsection "Laboratory Analyses."

Red-Yellow Podzolic soils

Undisturbed Red-Yellow Podzolic soils have a thin, dark-colored A1 horizon, in which the organic matter is largely mixed with the mineral material, and a prominent, lighter colored A2 horizon that extends to a depth of 8 to 12 inches.

Central concept.—The Red-Yellow Podzolic great soil group is represented in Berkeley County by the Buchanan, Captina, Frankstown, Frederick, Laidig, Monongahela, and Pickaway soils. These soils are extensive and generally occupy the smoother slopes.

Most areas of these soils have been cropped or pastured for many years, and an undisturbed soil is not common. Typically, the Ap horizon, which is from 7 to 8 inches thick, is dark grayish brown, friable, weakly granular, and low in content of organic matter. From 2 to 3 inches of the A2 horizon may be intact below the plow layer, or the plow layer may extend to the B hori-

zon. The B horizons have pronounced clay accumulation and generally are one or more textural classes finer textured than the A2 horizon. They have moderate or strong, blocky structure and are yellowish red, reddish brown, or yellowish brown. Clay coatings are evident to prominent on peds and in root channels. Typically, the B horizons are strongly acid. Base saturation generally is less than 35 percent and decreases with depth. The parent rock ranges from limestone to acid sandstone and siltstone.

The Captina soils are somewhat browner and show less evidence of strong, deep leaching than some of the other soils in this group. The Buchanan, Captina, Monongahela, and Pickaway soils have a weak to moderately well developed fragipan in their subsoil. Laidig soils have an evident fragipan in their substratum.

Frederick cherty silt loam is considered a typical Red-Yellow Podzolic soil. A representative profile of this soil is described in the section "Descriptions of the Soils."

Intergrading toward Gray-Brown Podzolic soils.—The Blairton soils have characteristics of both Red-Yellow Podzolic and Gray-Brown Podzolic great soil groups. These soils generally have the color, texture, and degree of structure common to the Red-Yellow Podzolic soils. However, they lack an evident A2 horizon and show less strong leaching than is typical of Red-Yellow Podzolic soils. In this respect they resemble the Gray-Brown Podzolic soils. Blairton soils are shallow to moderately deep and have a fairly large number of coarse fragments in their lower subsoil. A representative profile of the Blairton series is described in the section "Descriptions of the Soils."

Intergrading toward Low-Humic Gley soils.—The Tygart soils have most characteristics that are common to Red-Yellow Podzolic soils, but they also have some features of Low-Humic Gley soils. They most resemble Red-Yellow Podzolic soils in texture, sequence of horizons, degree of development, general strength of structure, and percentage of base saturation. However, Tygart soils have a fairly high water table much of the time, and as a result, their subsoil becomes waterlogged and lacks air. Gleization is strong, as evidenced by the gray color and strong mottling in the main B horizon of these soils. In this respect Tygart soils resemble Low-Humic Gley soils. A representative profile of the series is described in the section "Descriptions of the Soils."

Intergrading toward Reddish-Brown Lateritic soils.—The Waynesboro soils have characteristics of both Red-Yellow Podzolic and Reddish-Brown Lateritic great soil groups. They resemble Red-Yellow Podzolic soils in texture, sequence of horizons, and general degree of structure and development. They resemble Reddish-Brown Lateritic soils in having a less prominent A2 horizon, a reddish subsoil, and yellowish-red parent material. Their B horizon is more clayey than the surface horizon. The Waynesboro soils developed in mixed, acid alluvial deposits that may have been influenced by limestone. A representative profile of a soil in this series is described in the section "Descriptions of the Soils."

Reddish-Brown Lateritic soils

Soils in this great soil group have a dark-red or brown, thick surface layer; a reddish-brown to red, clayey subsoil; and red, clayey parent material. These soils formed in a temperate, humid climate under hardwood forests. They are similar to Red-Yellow Podzolic soils in degree of weathering and horizonation, but they formed in parent material that is less siliceous and more basic than did those soils. No soils in this county fall within the central concept of the Reddish-Brown Lateritic great soil group.

Intergrading toward Gray-Brown Podzolic soils.—The Hagerstown soils have the texture, general color, and general degree of horizon development that are characteristic of Reddish-Brown Lateritic soils. They resemble Gray-Brown Podzolic soils because they have a moderately thin, dark-brown surface layer and a thin A2 horizon. In addition, their percentage of base saturation is well over 35 percent and increases with depth. In this county the Hagerstown soils developed mainly on Beekmantown limestone, which contains some siliceous material. A representative profile of a soil in this series is described in the section "Descriptions of the Soils." Additional information is presented in the subsection "Laboratory Analyses."

Low-Humic Gley soils

Low-Humic Gley soils have a thin, dark-colored surface layer that has a moderately high content of organic matter. The subsoil shows the effects of waterlogging and of exclusion of air for long periods. Gleization is strong. This process results in grayish colors and in intense mottling. There has been little eluviation, or downward movement of fine materials into the subsoil. However, the surface horizon generally is coarser textured than the subsurface horizons.

The Low-Humic Gley great soil group is represented in Berkeley County by the Atkins and Melvin soils, which are on bottom lands that are subject to overflow. These soils reflect the influence of poor drainage caused by the high water table, by the slowly permeable subsurface layers, and by their position in level or depressed areas. In cultivated areas, the Ap horizon is typically dark grayish brown.

Atkins silt loam is a typical Low-Humic Gley soil. This soil developed in material that washed from acid uplands. A representative profile of this soil is described in the section "Descriptions of the Soils." The Melvin soil, which developed in material washed from lime-influenced uplands, is slightly browner, has somewhat better structure, and has a more permeable subsoil than the Atkins soil.

Lithosols

Lithosols do not have evident genetically related horizons. Typically, they have weak A horizons but do not have B horizons. Lithosols consist of freshly and imperfectly weathered rock fragments, and they are shallow or very shallow to bedrock. Many of the soils classed as Lithosols are stony. Most, but not all, are in hilly, steep, or mountainous regions.

No soils in Berkeley County are typical Lithosols. Some, however, are classified as Lithosols intergrading

thick surface layer; a reddish-brown to red, clayey subsoil;

Bruns Acides intergrading toward Lithosols and are discussed later in this subsection.

Intergrading toward Sols Bruns Acides.—The Montevallo soils in this county have characteristics mainly of Lithosols, but in some ways they resemble Sols Bruns Acides. They are essentially like Lithosols in that they are shallow, are high in content of rock, and have weak horizonation. They resemble Sols Bruns Acides because they have thin B horizons that have weak structure and that are slightly finer textured and stronger colored than the A horizons. A representative profile of a soil in the Montevallo series is described in the section "Descriptions of the Soils."

Regosols

Regosols are young soils that have no evident genetically related horizons. They formed in deposits of deep unconsolidated materials, such as sand.

The Rushtown soils are within the central concept of Regosols. They formed in deep, acid colluvium consisting of fine shale chips. The soils show little evidence of soil formation below the surface layer, which is slightly darker than the underlying layers because it contains more organic matter. Rushtown soils have very rapid permeability. A representative profile of a Rushtown soil is described in the section "Descriptions of the Soils."

Sols Bruns Acides

Soils of this great soil group have a thin, weak A1 horizon and a thin, lighter colored, weak A2 horizon. The B horizons show slight, if any, increase in content of clay, lack evidence of clay movement, and have weak or very weak structure. The B horizons are a little stronger colored, or browner, than the horizons above or below. The percentage of base saturation is low, and generally the soils are strongly or very strongly acid.

Central concept.—The Dekalb and Lehew soils represent Sols Bruns Acides in this county (*2*). Typically, these soils developed in rather coarse-textured parent material that contains a small amount of fine-textured material.

The Dekalb and Lehew soils are shallow or moderately deep, are somewhat excessively drained, and have low available moisture capacity. The Dekalb very stony loams that are on steep slopes are considered typical Sols Bruns Acides. A representative profile of a Dekalb very stony loam is described in the section "Descriptions of the Soils." The reddish Lehew soils developed in material that weathered from red sandstone and, except for color, are similar to the Dekalb soils in profile characteristics.

Intergrading toward Lithosols.—The Berks soils closely resemble Sols Bruns Acides, but they also have some characteristics of Lithosols. They resemble Sols

TABLE 16.—*Particle size distribution*

[Dashed lines indicate

Soil type and sample number	Depth	Horizon	Particle size distribution			
			Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.1 mm.)
	Inches		*Percent*	*Percent*	*Percent*	*Percent*
Berks shaly silt loam, S60-WVa-2-8(1-4).	0-7	Ap	9.3	3.6	1.0	1.2
	7-12	B2	5.0	4.8	1.7	2.2
	12-21	B3	7.0	5.8	1.9	2.4
	21+	[2]R				
Chilhowie silty clay, S60-WVa-2-5(1-4).	0-6	Ap	.4	.7	.6	1.1
	6-12	B2	.8	.8	.6	1.0
	12-18	C1	1.7	1.7	.8	1.2
	18-25	C2	2.6	2.6	1.3	1.8
	25+	[2]R				
Chilhowie silty clay, S60-WVa-2-6(1-3.)	0-7	Ap	.8	.9	.7	1.1
	6-16	B2t	.2	.2	.1	.2
	16-21	C	.1	.3	.2	.3
	21+	[2] R				
Hagerstown silt loam, S60-WVa-2-1(1-8).	0-7	Ap	1.7	1.8	1.2	3.0
	7-13	B21t	.7	1.2	.8	1.6
	13-23	B22t	.2	.3	.2	.6
	23-31	B23t	.1	.1	.1	.5
	31-39	B24t	.2	.3	.2	.7
	39-51	B3	.2	.4	.3	.9
	51-60	C1	.2	.6	.4	1.2
	60-64	C2 beta	.2	.5	.5	1.6
	64+	[2] R				
	24-60	Silt ghost	.1	.6	.7	2.5
Hagerstown silt loam, S60-WVa-2-2(1-7).	0-8	Ap	2.0	4.6	4.4	7.1
	8-10	A2	1.5	3.4	3.5	5.8
	10-16	B21t	.7	1.7	1.9	4.2
	16-33	B22t	.1	.4	.4	2.5
	33-39	B3	.6	.8	1.1	5.0
	39-61	C1	2.9	2.7	1.6	3.8
	61-75	C2	.8	1.2	1.6	6.3

See footnotes at end of table.

Bruns Acides in the sequence and color of their A, B, and C horizons and in being strongly acid. They resemble Lithosols in that they have a thin solum, are weakly developed, and contain considerable coarse fragments. The films in the B horizons may be orientated silt instead of clay. A profile of a Berks soil is described in the section "Descriptions of the Soils." Additional information is presented in the subsection "Laboratory Analyses."

Alluvial soils

Alluvial soils occur on bottom lands near streams that are subject to overflow. Consequently, new sediments are deposited faster than the soil-forming processes can bring about significant changes in the soils already in place.

The Huntington, Lindside, Philo, and Pope soils represent the Alluvial great soil group in this county. These soils are well drained and moderately well drained. The moderately well drained soils show slight gleization in the lower part of the subsoil.

The Huntington and Lindside soils developed in materials washed from lime-influenced uplands and are slightly acid to neutral throughout. Philo and Pope soils developed in materials washed from uplands of acid sandstone and shale and are strongly acid. The soils in this group are productive and have a relatively high content of organic matter. The Huntington soils are typical Alluvial soils. A representative profile of a soil in this series is described in the section "Descriptions of the Soils."

Laboratory Analyses [5]

As part of this soil survey, samples of selected soils in the Berks, Chilhowie, Hagerstown, Montevallo, and Sees series were analyzed at the Soil Survey Laboratory at Beltsville, Md. These soils were derived from four distinct kinds of parent rock—the Berks and Montevallo from acid siltstone and shale, the Chilhowie from nearly pure limestone, the Hagerstown from limestone containing some siliceous material, and the Sees from limestone containing a large amount of siliceous material. The physical and chemical properties of these soils are shown in tables 16 and 17. The data were used as an aid in classifying the soils, in determining texture, and in estimating available moisture capacity and other qualities related to soil management.

[5] By E. J. PEDERSEN, soil scientist, Soil Conservation Service, Beltsville, Md.

and moisture data for selected soils

absence of data]

Particle size distribution—Continued			Particles larger than 2 mm.[1]	Textural class	Moisture held at tension of—		Bulk density	
Very fine sand (0.1 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)			⅓ atmosphere	15 atmospheres	Oven-dry	⅓ atmosphere of tension
Percent	*Percent*	*Percent*	*Percent*		*Percent*	*Percent*	*Gm./cc.*	*Gm./cc.*
2. 5	62. 0	20. 4	36	Silt loam	25. 9	7. 6	1. 46	1. 43
2. 6	56. 7	27. 0	68	Silt loam or silty clay loam	22. 9	9. 4	1. 60	1. 57
2. 4	49. 3	31. 2	78	Silty clay loam or clay loam	27. 0	11. 2	1. 63	1. 58
1. 9	36. 7	58. 6	6	Clay or silty clay	28. 1	19. 2	1. 80	1. 44
1. 2	27. 5	68. 1	13	Clay	31. 8	21. 3	1. 79	1. 36
1. 4	24. 7	68. 5	31	Clay	29. 3	20. 6	1. 66	1. 42
2. 1	26. 8	62. 8	49	Clay	31. 2	20. 1	1. 68	1. 39
2. 1	46. 4	48. 0	4	Silty clay	22. 8	15. 3	1. 69	1. 44
. 4	21. 0	77. 9	7	Clay	35. 1	24. 2	1. 66	1. 30
. 4	26. 5	72. 2	8	Clay	32. 0	22. 7	1. 65	1. 35
8. 4	56. 9	27. 0	8	Silt loam or silty clay loam	20. 3	10. 4	1. 58	1. 48
5. 9	37. 8	52. 0	2	Clay	25. 6	18. 3	1. 72	1. 50
4. 0	42. 9	51. 8	(3)	Silty clay	26. 1	17. 9	1. 68	1. 51
4. 6	42. 7	51. 9	(3)	Silty clay	26. 2	17. 9	1. 66	1. 50
3. 6	39. 8	55. 2	(3)	Clay or silty clay	27. 7	19. 2	1. 58	1. 47
5. 0	44. 9	48. 3	2	Silty clay	25. 1	16. 4	1. 63	1. 53
6. 6	34. 0	57. 0	2	Clay	28. 5	19.	1. 56	1. 44
5. 8	26. 0	65. 4	1	Clay	35. 8	22. 6	1. 50	1. 28
16. 4	50. 0	29. 7	(3)	Clay to silty clay loam				
11. 6	57. 3	13. 0	10	Silt loam	18. 5	5. 9	1. 49	1. 46
9. 1	50. 5	26. 2	10	Silt loam or loam	18. 3	9. 6	1. 66	1. 60
8. 4	31. 0	52. 1	1	Clay	28. 1	18. 3	1. 66	1. 44
8. 7	18. 0	69. 9	(3)	Clay	35. 5	24. 8	1. 54	1. 29
11. 0	25. 7	55. 7	4	Clay	31. 6	21. 4	1. 54	1. 35
6. 2	39. 0	43. 8	2	Clay or silty clay	34. 7	20. 6	1. 28	1. 22
15. 0	40. 0	35. 1	<1	Clay loam	28. 4	15. 0	1. 46	1. 38

TABLE 16.—*Particle size distribution and*

[Dashed lines indicate

Soil type and sample number	Depth	Horizon	Particle size distribution			
			Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.1 mm.)
	Inches		*Percent*	*Percent*	*Percent*	*Percent*
Hagerstown very rocky silt loam, S60–WVa–2–9 (1–6).	0–3	A1	.5	.6	.5	1.5
	3–5	A2	.6	.6	.4	.9
	5–9	B1	.2	.4	.3	.8
	9–23	B21t	.1	.2	.2	.5
	23–36	B22t	2.0	1.8	.8	1.1
	36–62+	C	1.6	1.8	.8	1.0
Montevallo shaly silt loam, S60–WVa–2–7(1–3).	0–7	Ap	14.9	7.9	2.6	2.9
	7–13	B	13.9	9.1	2.5	2.6
	13–22	[2] R				
Sees silty clay loam, S60–WVa–2–3(1–7).	0–8	Ap	2.5	4.5	4.9	4.7
	8–12	B1	1.4	3.6	4.3	4.3
	12–20	B21tg	[3]	.3	1.2	3.9
	20–32	B22tg	.1	.4	1.4	2.9
	32–43	B3g	1.0	2.0	2.7	3.6
	43–52	C1g	2.4	3.4	4.5	5.3
	52–72+	C2g	1.2	3.0	4.1	4.1
Sees silt loam, S60–WVa–2–4(1–8).	0–8	Ap	1.0	3.7	5.2	6.6
	8–20	B21t	.6	2.4	3.6	4.5
	20–26	B22tg	1.0	2.9	3.8	3.9
	26–30	B23tg	.5	1.8	2.9	3.1
	30–35	B24tg	.4	2.4	3.4	3.5
	35–43	B3g	2.8	4.4	4.6	5.6
	43–53	C1g	.8	1.9	2.8	4.7
	53–70+	C2g	3.0	4.7	5.5	8.4

[1] Excluded in calculating percentages of other size classes.
[2] Rock sample.
[3] Trace.

TABLE 17.—*Chemical data*

[Dashed lines indicate absence

Soil type and sample number	Depth	Horizon	Reaction		Organic matter		
			H_2O 1:1	KCl 1:1	Organic carbon	Nitrogen	C/N ratio
	Inches		*pH*	*pH*	*Percent*	*Percent*	
Berks shaly silt loam, S60–WVa–2–8(1–4).	0–7	Ap	6.6	6.3	1.47	0.125	12
	7–12	B2	5.0	3.6	.27	.050	5
	12–21	B3	4.7	3.5	.12		
	21+	R		3.7			
Chilhowie silty clay, S60–WVa–2–5(1–4).[1]	0–6	Ap	6.8	6.0	2.96	.266	11
	6–12	B2t	7.4	6.6	.94	.123	8
	12–18	C1	7.4	6.7	.56	.087	6
	18–25	C2	7.6	6.8	.33		
	25+	R					
Chilhowie silty clay, S60–WVa–2–6(1–3).	0–7	Ap	6.0	5.4	1.58	.144	11
	6–16	B2	5.0	4.0	.38	.068	6
	16–21	C	6.7	5.9	.38	.063	6
	21+	R					

See footnotes at end of table.

moisture data for selected soils—Continued

absence of data]

Particle size distribution—Continued			Particles larger than 2 mm.[1]	Textural class	Moisture held at tension of—		Bulk density	
Very fine sand (0.1 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)			⅓ atmosphere	15 atmospheres	Oven-dry	⅓ atmosphere of tension
Percent	*Percent*	*Percent*	*Percent*		*Percent*	*Percent*	*Gm./cc.*	*Gm./cc.*
9. 9	60. 7	26. 3	4	Silt loam	35. 1	18. 1	1. 16	1. 04
9. 8	60. 0	27. 7	3	Silty clay loam or silt loam	27. 2	9. 6	1. 41	1. 36
8. 9	51. 8	37. 6	4	Silty clay loam	21. 4	12. 2	1. 52	1. 46
6. 6	31. 4	61. 0	4	Clay	29. 4	20. 5	1. 66	1. 42
4..3	30. 4	59. 6	4	Clay	31. 9	20. 8	1. 54	1. 37
5. 7	25. 0	64. 1	2	Clay	32. 6	21. 4	1. 52	1. 32
2. 6	45. 4	23. 7	49	Loam	----------	9. 8	----------	----------
2. 4	48. 6	20. 9	76	Loam	----------	8. 8	----------	----------
3. 9	46. 0	33. 5	1	Clay loam or silty clay loam	21. 2	14. 2	1. 68	1. 56
4. 0	47. 5	34. 5	2	Silty clay loam	21. 2	14. 3	1. 71	1. 22
6. 1	40. 3	48. 2	[3]	Clay	27. 8	19. 1	1. 72	1. 46
4. 6	36. 2	54. 4	[3]	Clay	25. 6	20. 3	1. 74	1. 34
3. 0	38. 5	49. 2	1	Clay	24. 9	19. 1	1. 77	1. 56
3. 5	37. 9	43. 0	2	Clay	28. 8	17. 0	1. 77	1. 46
3. 4	33. 2	51. 0	4	Clay	26. 6	19. 1	1. 74	1. 48
5. 8	50. 2	27. 5	2	Clay loam or silt loam	20. 0	10. 3	1. 62	1. 54
4. 2	34. 3	50. 4	1	Clay	28. 3	19. 2	1. 74	1. 45
4. 9	42. 2	41. 3	5	Silty clay	18. 5	15. 8	1. 90	1. 73
4. 6	49. 7	37. 4	[3]	Silty clay loam	19. 5	15. 4	1. 84	1. 70
3. 8	47. 8	38. 8	2	Silty clay loam	19. 0	15. 1	1. 86	1. 72
6. 2	45. 6	30. 8	9	Clay loam	21. 0	15. 2	1. 74	1. 64
6. 0	50. 4	33. 4	8	Silty clay loam	18. 2	14. 2	1. 87	1. 76
9. 4	40. 7	28. 3	13	Clay loam	19. 1	13. 3	1. 76	1. 68

for selected soils

of data for that horizon]

Free iron oxide (Fe_2O_3)	Extractable cations (meq./100 g. of soil)					Cation exchange capacity (sum)	Base saturation (sum)	$CaCO_3$ equivalent
	Ca	Mg	Na	K	H			
Percent						*Meq./100 g. of soil*	*Percent*	*Percent*
3. 5	13. 9	0. 2	0. 07	0. 14	3. 5	17. 8	80	----------
3. 7	3. 4	. 1	. 08	. 13	6. 5	10. 2	36	----------
4. 6	1. 6	. 6	. 04	. 14	9. 2	11. 6	21	----------
6. 2	. 8	1. 3	. 02	. 35	6. 8	9. 3	27	----------
4. 7	----------	----------	----------	----------	----------	----------	----------	1
6. 3	----------	----------	----------	----------	----------	----------	----------	3
6. 2	----------	----------	----------	----------	----------	----------	----------	7
6. 4	----------	----------	----------	----------	----------	----------	----------	9
4. 3	16. 8	1. 9	. 05	. 36	4. 7	23. 8	80	----------
6. 7	22. 6	2. 4	. 05	. 38	8. 5	33. 9	75	----------
6. 4	26. 5	2. 1	. 07	. 39	3. 4	32. 5	90	[3]

TABLE 17.—*Chemical data*

Soil type and sample number	Depth	Horizon	Reaction		Organic matter		
			H_2O 1:1	KCl 1:1	Organic carbon	Nitrogen	C/N ratio
	Inches		*pH*	*pH*	*Percent*	*Percent*	
Hagerstown silt loam, S60-WVa-2-1(1-8).	0-7	Ap	7.0	6.4	1.28	.120	11
	7-13	B21t	6.6	6.0	.24	.031	8
	13-23	B22t	5.1	4.6	.11		
	23-31	B23t	4.6	4.2	.07		
	31-39	B24t	4.6	4.1	.09		
	39-51	B3	4.7	4.3	.07		
	51-60	C1	5.9	5.4	.11		
	[2] 60-64	C2 beta	7.5	6.6	.33		
	64+	R					
	24-60	Silt ghost	6.5		.11		
Hagerstown silt loam, S60-WVa-2-2(1-7).	0-8	Ap	6.1	5.3	1.07	.078	14
	8-10	A2	6.1	5.2	.26	.029	9
	10-16	B21t	6.6	6.0	.26		
	16-33	B22t	6.6	6.0	.20		
	33-39	B3	5.8	5.0	.17		
	39-61	C1	4.6	3.7	.14		
	61-75	C2	4.4	3.4	.04		
Hagerstown very rocky silt loam, S60-WVa-2-9 (1-6).	0-3	A1	6.7	6.5	4.80	.388	12
	3-5	A2	6.2	5.8	2.02	.178	11
	5-9	B1	6.6	5.7	.89	.083	11
	9-23	B21t	5.8	5.3	.39	.050	8
	23-36	B22t	5.6	5.1	.27		
	36-62+	C	6.1	5.4	.23		
Montevallo shaly silt loam, S60-WVa-2-7(1-3).	0-7	Ap	6.4	5.6	1.52	.153	10
	7-13	B	6.0	5.1	.50	.085	6
	13-22	R		4.5+			
Sees silty clay loam, S60-WVa-2-3(1-7).	0-8	Ap	6.7	5.8	1.86	.156	12
	8-12	B1	6.4	5.4	1.34	.118	11
	12-20	B21tg	5.8	4.5	.60	.077	8
	[2] 20-32	B22tg	6.8	5.8	.44	.068	6
	[2] 32-43	B3g	7.1	6.3	.50	.068	7
	[2] 43-52	C1g	7.2	6.3	.36	.046	8
	[2] 52-72+	C2g	7.2	6.1	.23		
Sees silt loam, S60-WVa-2-4(1-8).	[2] 0-8	Ap	7.2	6.4	1.24	.105	12
	8-20	B21	5.8	4.6	.36	.067	5
	20-26	B22tg	6.6	5.3	.18		
	[2] 26-30	B23tg	6.9	5.8	.13		
	[2] 30-35	B24tg	7.4	6.3	.10		
	[2] 35-43	B3g	7.7	6.8	.10		
	[2] 43-53	C1g	7.8	6.9	.10		
	[2] 53-70+	C2g	7.7	6.8	.10		

[1] All horizons are calcareous.
[2] Horizon is calcareous.
[3] Trace.

for selected soils—Continued

Free iron oxide (Fe_2O_3)	Extractable cations (meq./100 g. of soil)					Cation exchange capacity (sum)	Base saturation (sum)	$CaCO_3$ equivalent
	Ca	Mg	Na	K	H			
Percent						*Meq./100 g. of soil*	*Percent*	*Percent*
2.9	11.0	.4	.04	.28	2.2	13.9	84	(3)
4.9	9.2	.7	.07	.20	3.4	13.6	75	
4.9	7.2	1.3	.05	.15	5.3	14.0	62	
4.4	5.9	1.4	.05	.15	5.6	13.1	57	
4.8	6.0	.6	.05	.23	5.9	12.8	54	
4.4	6.2	1.1	.03	.20	5.0	12.6	60	
5.4	9.7	1.3	.04	.24	3.9	15.2	74	
5.5								3
4.6	6.3	.6	.05	.27	2.5	9.7	74	
2.5	4.2	.7	.03	.34	3.2	8.5	62	
3.4	4.6	.8	.02	.18	2.7	8.3	67	
5.3	8.1	2.2	.06	.23	3.3	13.9	76	
6.9	9.9	3.2	.06	.30	4.3	17.8	76	
6.3	7.2	2.5	.05	.24	4.5	14.5	69	
5.9	3.2	1.6	.06	.23	5.7	10.8	47	
5.8	1.1	.9	.05	.23	6.2	8.5	27	
3.3	25.0	2.3	.03	.82	3.7	31.9	88	
3.7	12.2	1.3	.03	.44	3.3	17.3	81	
4.7	9.7	1.3	.03	.34	3.3	14.7	78	
7.1	12.2	1.5	.04	.39	4.9	19.0	74	
7.8	13.3	1.4	.04	.34	5.5	20.6	73	
7.4	15.4	1.1	.04	.33	4.9	21.8	78	
4.6	9.5	.5	.11	.26	5.5	15.9	65	
4.4	5.6	.3	.07	.14	4.3	10.4	59	
4.6	3.5	.9	.03	.22	4.3	8.9	52	
3.9	14.0	2.4	.08	.24	5.2	21.9	76	(3)
3.9	10.9	2.6	.08	.20	5.5	19.3	72	
3.9	9.7	5.2	.11	.23	5.9	21.1	72	
4.2								1
4.1								1
4.2								1
5.0								1
2.2	14.0	1.0	.08	.11	1.8	17.0	89	1
4.7	6.7	10.0	.10	.19	4.2	21.2	80	(3)
3.0	4.7	11.1	.15	.21	2.1	18.3	89	(3)
3.0								1
1.7								1
7.3								1
3.8								2
5.7								2

Samples were collected from each horizon in a pit that measured about 2½ by 5 feet and was dug through the soil and into the parent material. Particles larger than 2 millimeters in diameter were removed from the samples by use of a 2-millimeter round-hole sieve. The percentage of this material is given in the column "Particles larger than 2 millimeters." The fraction that consisted of particles smaller than 2 millimeters was used for all analyses except those for bulk density and percentage of moisture held at ⅓ atmosphere, which were determined on natural clods. Except for reaction, all laboratory analyses were made on oven-dry material.

Particle size distribution was determined by the pipette method (*6*, *7*). Bulk densities were determined by the plastic-coated clod method. Percentages of moisture held at 15 atmospheres were determined by use of a pressure-membrane apparatus.

The pH was determined by the glass electrode, using a soil-water ratio of 1:1 and a soil-normal potassium chloride ratio of 1:1. Organic carbon was determined by the Walkley-Black wet combustion method, and a 77 percent recovery factor was used (*10*). Total nitrogen was determined by a semimicro Kjeldahl method. Free iron oxides were extracted by use of dithionite and the iron determined by a dichromate titration (*8*). Extractable cations were determined by the ammonium acetate macro method (*10*). Extractable calcium was determined by a cerate titration, and sodium and potassium were determined with a flame photometer. Cation exchange capacity is reported as the sum of the extractable calcium, magnesium, sodium, potassium, and hydrogen. The calcium carbonate equivalent was determined by an acid neutralization procedure.

Table 18 gives data on clay mineralogy for three selected soils in the Berks and Hagerstown series. Montmorillonite, chlorite, vermiculite, mica, interstratified silicates, and quartz were determined by X-ray diffraction. Kaolinite and gibbsite were determined by differential thermal analysis.

Descriptions of selected soil profiles

Profiles of several of the soils selected for testing are described in the following paragraphs. Profiles of the other soils are described in the section "Descriptions of the Soils."

TABLE 18.—*Clay mineralogy*

[The amount of kaolinite is indicated in percentage. The amounts of other minerals present are indicated as Tr=trace, x=small, xx=moderate, xxx=large, and xxxx=dominant. ND=not detected. Dashed lines indicate that tests were not made]

Soil type and sample number	Depth	Horizon	Mineral content of clay fraction (less than 0.002 mm.)								
			Montmorillonite	Chlorite	Vermiculite	Mica	Interstratified silicates	Quartz	Kaolinite	Gibbsite	Amorphous components [1]
	Inches								*Percent*		
Berks shaly silt loam, S60-WVa-2-8(1-4).	0-7	Ap	ND	ND	xx	xx	ND	x	18	ND	
	7-12	B2	ND	ND	xx	xxx	ND	x	12	ND	
	12-21	B3	ND	ND	xx	xxx	ND	x	14	ND	
	21-33+	R	ND	ND	xx	xxxx	ND	x	14	ND	
Hagerstown silt loam, S60-WVa-2-1(1-8).	0-7	Ap	ND	ND	xx	Tr	ND	x	38	ND	
	7-13	B21t	ND	ND	xx	Tr	ND	x	47	ND	
	13-23	B22t	Tr	ND	xx	Tr	ND	x	43	ND	
	23-31	B23t									
	31-39	B24t	xx	ND	x	x	ND	x	43	ND	
	39-51	B3									
	51-60	C1	xxx	Tr	ND	Tr	ND	x	40	ND	
	60-64	C2 beta	x	xx	x	x	ND	x	38	ND	
	64+	R									
Hagerstown very rocky silt loam, S60-WVa-2-9(1-6).	0-3	A1	ND	ND	xxx	x	ND	x	14	ND	
	3-5	A2	ND	ND	xxx	x	ND	x	17	ND	
	5-9	B1	ND	ND	xxx	x	ND	x	19	ND	
	9-23	B21t	x	ND	xx	x	ND	ND	36	ND	
	23-36	B22t	xx	ND	xx	x	ND	ND	33	ND	
	36-62+	C	xx	ND	xx	x	ND	ND	30	ND	

[1] The clay fraction contains amorphous iron oxides and may also contain other amorphous components, but these were not determined.

Berks shaly silt loam, S60-WVa-2-8(1-4). Profile in a bluegrass pasture on a 5 percent slope, 0.5 mile southeast of southern edge of Martinsburg Airport. This profile is described on page 86.

Chilhowie silty clay, S60-WVa-2-6(1-3). Profile in a meadow on a 5 percent slope, 1.2 miles north of Falling Waters.

Ap—0 to 6 inches, dark-brown (10YR 3/3) silty clay; moderate, fine and medium, subangular blocky and blocky structure; somewhat hard when dry, firm when moist, slightly plastic and slightly sticky when wet; 15 percent limestone fragments as much as 4 inches across; pH 6.7; abrupt, wavy boundary.

B2—6 to 16 inches, dark-brown (7.5YR 4/4) clay; moderate, fine and medium, subangular blocky structure; hard when dry, firm when moist, plastic and sticky when wet; common discontinuous clay films; 10 percent limestone fragments as much as 4 inches across; few small, concretionary limestone nodules; pH 6.6; clear, wavy boundary.

C—16 to 21 inches, dark-brown (7.5YR 4/4) clay with common spots and streaks of yellowish brown (10YR 5/6); massive, breaking to weak, medium, subangular blocky structure; hard when dry, firm when moist, plastic and sticky when wet; few clay films; few small, concretionary limestone nodules; pH 7.5; abrupt, irregular boundary.

R—21 inches +, very dark gray (2.5Y 3/0) Stones River limestone; somewhat broken and fractured into angular blocks in upper part.

Chilhowie silty clay, S60-WVa-2-5(1-4). Profile in a pasture on a 4 percent slope, 1.2 miles south of Falling Waters on U.S. Highway No. 11. This profile is described on page 91.

Hagerstown silt loam, S60-WVa-2-1(1-8). Profile in meadow on a 5 percent slope, 0.5 mile east of Files Crossroads on State Route 45.

Ap—0 to 7 inches, dark-brown (10YR 4/3) silt loam; moderate, medium, granular structure; friable; pH 6.7; abrupt, smooth boundary.

B21—7 to 13 inches, reddish-brown (5YR 5/4) to yellowish-red (5YR 5/6) silty clay loam; moderate, fine and medium, blocky structure; friable to firm; common clay films on peds; pH 6.9; clear, wavy boundary.

B22—13 to 23 inches, reddish-brown (5YR 4/4) to yellowish-red (5YR 4/6) clay; strong, medium and coarse, blocky structure; hard when dry, very firm when moist, plastic and sticky when wet; prominent clay films; pH 6.3; gradual, wavy boundary.

B23—23 to 31 inches, reddish-brown (5YR 5/4) to yellowish-red (5YR 5/6) clay; strong, fine and medium, blocky structure; prominent clay films; some black specks on ped faces; hard when dry, firm when moist, plastic and sticky when wet; contains a few small ghost fragments of soft limestone that crush to silty clay loam; pH 5.7; gradual, wavy boundary.

B24—31 to 39 inches, same as B23, divided for sampling.

B3—39 to 51 inches, yellowish-red (5YR 5/6) silty clay; moderate, medium and coarse, blocky structure; firm; common black films on ped faces; common continuous clay films; pH 5.4; gradual, wavy boundary.

C1—51 to 60 inches, yellowish-red (5YR 5/6) silty clay loam or silty clay; massive, tending to weak, coarse, subangular blocky structure; firm when moist, plastic and very sticky when wet; common black concretionary films on ped faces, few fine black concretions; pH 6.5; clear, wavy boundary.

C2 (beta)—60 to 64 inches, reddish-gray (5YR 5/2) to reddish-brown (5YR 5/3) clay; massive; firm when moist; plastic and sticky when wet; pH 6.8; abrupt boundary.

R—60 inches +, gray (2.5Y 5/0) limestone; soft in top 1 inch; upper surface sloping and irregular.

Hagerstown silt loam, S60-WVa-2-2(1-7). Profile in cropland on a 6 percent slope, 1 mile south of Greensburg on State Route 5/3. This profile is described on page 102.

Hagerstown very rocky silt loam, S60-WVa-2-9(1-6). Profile in stand of mixed hardwoods on a 6 percent slope, 0.5 mile east of Van Clevesville on State Route 40, 200 yards north of road. This profile is described on page 103.

Montevallo shaly silt loam, S60-WVa-2-7(1-3). Profile in a bluegrass pasture on an 8 percent slope, 1 mile east of Martinsburg city limits, on Old Shepherdstown Pike, 300 yards south of highway.

Ap—0 to 7 inches, dark-brown (10YR 4/3) shaly silt loam; weak, medium, granular structure; very friable; 30 percent silty shale chips as much as 1 inch across; pH 6.5; clear, wavy boundary.

B—7 to 13 inches, yellowish-brown (10YR 5/4) very shaly silty clay loam; weak, fine, subangular blocky structure; friable; common discontinuous clay films; 65 percent soft silty shale fragments as much as 2 inches across; pH 5.6; clear, irregular boundary.

R—13 to 22 inches +, fractured, blocky siltstone with interior colors of yellowish brown (10YR 5/4) and light olive brown (2.5Y 5/4); rock is soft and easily cut or shaved with a knife; 5 to 10 percent fine material as in B horizon (yellowish-brown 10YR 5/4 silty clay loam); fine material occurs in cracks and as deposits on rock faces and continues to a depth of at least 22 inches.

Sees silt loam, S60-WVa-2-4(1-8). Profile in a meadow on a 2 percent slope, 2.3 miles west of Nollville on State Route 45/8.

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; slightly firm; contains many fine roots; pH 7.2; abrupt, smooth boundary.

B21—8 to 20 inches, brown (10YR 5/3) silty clay; moderate, coarse prisms that break to strong, coarse, blocky structure; few medium mottles of strong brown (7.5YR 5/6) and grayish brown (10YR 5/2); hard when dry, firm when moist, plastic and slightly sticky when wet; common clay films; pH 5.6; clear, wavy boundary.

B22tg—20 to 26 inches, grayish-brown (10YR 5/2) clay; moderate, coarse prisms that break to strong, coarse, blocky structure; hard when dry, firm when moist, plastic and slightly sticky when wet; common clay films; pH 6.6; clear, wavy boundary.

B23tg—26 to 30 inches, variegated grayish-brown (10YR 5/2) and yellowish-red (5YR 5/8) clay; moderate, coarse prisms that break to moderate, coarse, blocky structure; hard when dry, firm when moist, plastic and sticky when wet; continuous gray (10YR 5/1) clay films; few small sandstone fragments; pH 7.2; clear, wavy boundary.

B24tg—30 to 35 inches, grayish-brown (2.5Y 5/2) clay with common medium mottles of yellowish red; weak, coarse prisms that break to moderate, coarse, blocky structure; common gray (10YR 5/1) clay films; few small lime concretions; pH 7.2; clear, wavy boundary.

B3g—35 to 43 inches, yellowish-brown (10YR 5/6) clay loam with many fine mottles of yellowish red (5YR 5/6) and grayish brown (10YR 5/2); massive, breaking to weak, medium, subangular blocky structure; firm to very firm when moist; few small shale fragments; common clay films; common fine manganese concretions; pH 7.2; clear, wavy boundary.

C1g—43 to 53 inches, yellowish-brown (10YR 5/6) clay with many medium mottles of strong brown (7.5YR 5/8) and grayish brown (10YR 5/2); massive, breaking to weak, coarse, platy structure; few clay films; few small sandstone fragments; few lime concretions; pH 7.2; gradual, wavy boundary.

C2g—53 to 70 inches, yellowish-brown (10YR 5/4) clay loam with common medium mottles of strong brown (7.5YR 5/8) and grayish brown (10YR 5/2); massive; firm when moist; few small fragments of sandstone and very coarse grains of quartz sand; few lime concretions and films on stones; pH 7.2+.

Sees silty clay loam, S60–WVa–2–3 (1–7). Profile in a bluegrass pasture on a 2 percent slope, 1.9 miles north of Nollville on State Route 16/1. This profile is described on page 119.

General Nature of the County

This section discusses settlement of the county, physiography, climate, agriculture, and other subjects of general interest.

Settlement, Population, and Transportation

Berkeley County was formed from Frederick County, Va., in 1772, though West Virginia did not become a State until 1863. Martinsburg was chosen as the county seat. The first settlers, who were Scotch and Irish pioneers from Pennsylvania, settled on Apple Pie Ridge in 1732. Apple Pie Ridge is east of Gerrardstown in the western part of the county. Immigrants from Virginia, mainly of English descent, settled in the southern part. In 1960, the population in the county was 33,791 and that of Martinsburg was 15,179.

Berkeley County ranks as one of the best agricultural counties in West Virginia, and it also maintains diversified industries. Orchard fruits, field crops, dairying, and livestock are of major importance on farms, and manufacturing plants make cement, brick, hosiery, chemicals, and plastic cookware. Other plants process fruit and wood products. Limestone of high purity is quarried for use as flux.

This county is served by an excellent network of rural access roads and two main highways, U.S. Highway No. 11 and Interstate Highway No. 81. In addition, the Baltimore and Ohio and the Pennsylvania (Cumberland Valley) Railroads pass through Martinsburg and provide quick access to markets in Washington and Baltimore.

Physiography, Relief, and Drainage

Berkeley County lies within the Ridge and Valley province (*4*). The county has two regions: the eastern three-fifths of the county is a part of the Great Valley region, and the western two-fifths consists of a series of roughly parallel, low mountains and narrow valleys.

The Great Valley is smoothly rolling and generally is 500 to 600 feet above sea level. Slopes are mostly gentle to strong, but relief varies little in most places. Opequon Creek, at an elevation of about 450 feet, drains much of the eastern part of the county, and many small streams form a trellislike drainage pattern. Much of the drainage is through solution channels formed in the underlying limestone, and springs scattered throughout the areas contain a strong concentration of dissolved limestone. The Potomac River, which forms the northern boundary, leaves the county at an elevation of about 350 feet.

Most of the Great Valley is underlain by folded, hard limestone. The soils are mostly deep and well drained, but shallow, droughty soils occur in two belts underlain by acid shale. All the eastern part of the county is in general farms and orchards. Woodlots are small and scattered.

The region of low mountains and narrow valleys begins west of North Mountain, which runs generally southwest to northeast across the county. North Mountain is underlain by folded, acid sandstone and shale. Slopes are mostly steep, and the elevation rises to about 2,000 feet above sea level. On the west side of the mountain, moderately deep foothills over shale are extensive. At an elevation of about 450 feet, Back Creek flows between North Mountain and Third Hill Mountain to the west. Along this creek are strongly sloping to moderately steep valley slopes, level bottom lands, and smooth terraces that are fairly extensive and, in places, are about 1 mile wide.

Between Back Creek and the western boundary of the county, Third Hill Mountain and Sleepy Creek Mountain rise to an elevation of about 1,700 feet. These mountains are underlain by sandstone and shale. Slopes are moderately steep in the foothills and mostly very steep in the mountains. The westernmost part of the county is drained by Meadow Branch, at an elevation of about 900 feet. Its flood plain is small. North of Jones Springs and bounded by Wilson and Ferrel Ridges, there is a small, rolling area that contains limestone soils.

For the most part, the small streams in the mountain and valley region drain into Back Creek, which flows into the Potomac River north of Hedgesville. Most of the steep mountain slopes and foothills are wooded, but the limestone soils and smooth slopes along Back Creek are in general farms and orchards.

Climate [6]

Berkeley County is sheltered on the southwest, west, and north by the Appalachian Mountains and is least sheltered in the eastern part where the Potomac River flows through a gap in the mountains. The prevailing wind is from the west, and the climate is dominantly continental, but the Atlantic Ocean is near enough for easterly winds to bring maritime weather. The county is in the normal path of storms that move across the nation from west to east during the colder part of the year and is near enough to the coast to be affected by coastal storms. During the warmer months, showers and thunderstorms are the main source of moisture. Climatic data from the U.S. Weather Bureau at Martinsburg are summarized in table 19.

Winters in Berkeley County are about the same length but a little less severe than they are at points west of the mountains in the same latitude and at a similar elevation. The normal temperature is not much different than at other points in West Virginia, but all months except July are cooler. Although the difference in average temperature is greater in September and October than at other times, the yearly average temperature is only slightly lower. Areas in the mountains are colder than elsewhere and receive more precipitation.

In an average winter, extending from November through March, the temperature falls about once to near zero or lower. Periods this cold last only a few days, and they do not occur every winter, but some winters

[6] By Horace C. Dwelle, State climatologist, U.S. Weather Bureau, and W. H. Dickerson, agricultural engineer, West Virginia University.

TABLE 19.—*Temperature and precipitation at Martinsburg, W. Va.*

[Elevation, 537 feet]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—		Days with snow cover of 1 inch or more	Average depth of snow on days with snow cover
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—		
	°F.	°F.	°F.	°F.	Inches	Inches	Inches	Number	Inches
January	42	24	60	7	2.6	1.1	4.3	5	2
February	44	24	62	8	2.1	1.2	3.3	4	2
March	52	31	72	17	3.3	1.6	5.5	4	3
April	65	40	83	30	3.2	1.4	5.1	(1)	4
May	76	51	90	37	3.8	1.8	6.8	0	0
June	84	60	95	49	3.2	1.9	4.5	0	0
July	89	64	99	54	3.6	1.5	7.6	0	0
August	87	63	97	51	4.2	1.5	6.4	0	0
September	79	55	92	40	3.1	.9	6.3	0	0
October	68	43	82	30	3.3	.9	6.7	0	0
November	54	33	70	20	2.5	.7	5.4	1	2
December	43	25	60	10	2.7	.8	4.6	5	6
Year	65	43	[2] 100	[3] 2	37.6	30.7	47.0	19	3

[1] Less than one-half day.
[2] Average annual highest temperature.
[3] Average annual lowest temperature.

have two or possibly more. Extremes in temperature in this county range from −19° F. to 112°, which is the highest temperature ever recorded in the State. Temperature changes are frequent in winter because many storms push in warm air and are followed by cold air; the result is frequent freezing and thawing.

Normally, few days in winter have snow cover, but fairly heavy snowstorms have occurred at times in December, March, and April and have caused severe damage. Also, damaging amounts of glaze from freezing rains have formed infrequently. These early and late snowstorms and freezing rains generally follow seaboard storms and easterly winds.

In table 20 it can be seen that in 5 years out of 10 the temperature can be expected to drop to 32° or lower after April 23 in spring and before October 16 in fall (*5*). Thus, the average length of the freeze-free period is 176 days. Table 20 also shows probabilities in spring and fall of a temperature of 24° or lower and of 16° or lower. A temperature of 32° or lower has occurred as late as May 24 in spring and as early as September 11 in fall.

Although high humidity is oppressive at times in summer, the average relative humidity is lower in Berkeley County than in most of the State. The difference is least at midday and greatest early in the morning. At 8 a.m. in July and January, the relative humidity in this county is about 80 percent; at 2 p.m. it is 45 to 50 percent in July and 60 to 65 percent in January.

On the average, precipitation is greatest in spring and summer, and the wettest month is August. Heavy precipitation generally accompanies the easterly winds that occur with coastal storms, especially if the storms move inland. Thunderstorms of short duration average about

TABLE 20.—*Probability of last freezing temperature in spring and first freezing temperature in fall*

[Data from 30-year record at Martinsburg, W. Va. (*5*)]

Probability	Dates for given probability and temperature		
	16° F. or colder	24° F. or colder	32° F. or colder
Spring:			
1 year in 10, later than	Mar. 27	Apr. 14	May 7
1 year in 4, later than	Mar. 15	Apr. 4	Apr. 30
5 years in 10, later than	Mar. 1	Mar. 23	Apr. 23
Fall:			
1 year in 10, earlier than	Nov. 22	Oct. 23	Oct. 3
1 year in 4, earlier than	Nov. 27	Nov. 1	Oct. 9
5 years in 10, earlier than	Dec. 4	Nov. 4	Oct. 16

40 per year at any one location and cause the heaviest rainfall. The heaviest rains recorded at Martinsburg are as follows: 2.05 inches in 1 hour, 2.51 inches in 2 hours, 3.19 inches in 6 hours, and 6.18 inches in 24 hours. In June 1949, about 14 inches of rain fell in 24 hours at Petersburg, on the South Branch of the Potomac River about 70 miles southwest of Martinsburg. Most of the rain fell in only a few hours, and the storm caused flashfloods and large landslides that cost several lives.

Figure 24 shows the probability of receiving at Martinsburg a given amount of precipitation in any 1-week period of the climatological year, March through Feb-

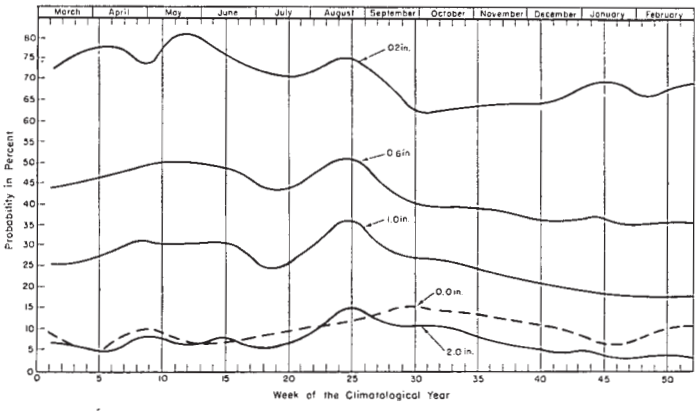

***Figure 24.*—Probability of receiving given amounts of precipitation at Martinsburg, W. Va., in any 1-week period during the year beginning March 1.**

ruary (*3*). The broken line shows the probability of receiving no rain in any 1-week period.

Damaging hailstorms seldom occur and are less frequent than in most comparable areas in the State, which averages less than three hailstorms per year.

Droughts are infrequent, but several have caused poor fruit yields. The severity of a drought is difficult to determine by reviewing records of rainfall because dry periods during the growing season may not reach drought proportions but still may be damaging. Local rains are so variable in summer that damaging dry spells may occur in places, even when a weather station in the general area reports fairly adequate rainfall. No extended dry spell was recorded between 1891 and 1930, but the most serious drought of the past century occurred in 1930, when total precipitation was only 21.43 inches. Dry periods occurred in many years of the 1950's, and listed as drought years were 1952, 1953, 1957, 1962, 1963, and 1964. Rain-bearing winds that cross the mountains from the west drop little rain on the eastern part of the county, and easterly storms and thundershowers must be relied on to make up the difference. If they do not, moisture is scarce.

Winds from the northwest prevail from August through April, and those from the south prevail from May through July. Winds can be strong from any direction, but the strongest generally blow from the northwest after storm centers move eastward. Often persisting for a time are strong easterly winds caused by seaboard storms, including the tropical storms that move from the south. The tropical storms cause destruction about once in 10 years and coincide with the ripening of apple and peach crops. Berkeley County is well sheltered from severe thunderstrom winds, and these winds are rare. The probability of a tornado also is very small. Only two tornadoes have occurred in the county in a 75-year period—on May 30, 1889, and on August 16, 1954. Both tornadoes were near Falling Waters at the eastern edge of the county.

The average number of days with heavy fog is about 15 per year. This number is considerably lower than for most of West Virginia, but the valleys do have radiation fogs on clear, calm nights. These fogs occur mainly in the latter part of summer and in fall when moisture is abundant and nights are lengthening. Especially on the ridges, easterly winds often bring low clouds and fog from the ocean or from rainfall.

In most years about an equal number of days are clear, partly cloudy, or cloudy. Cloud cover is not much heavier in winter than in summer.

Water Supply

Much of the water in the county is supplied from wells. In the limestone strata, however, the depth to and volume of water are variable, and contamination is possible from underground streams. A few springs occur that are strong with limestone in solution. In the limestone area, surface streams are not numerous, and obtaining water for livestock is a problem, though small ponds are used to some extent. In the mountains and mountain valleys, there are many surface streams and springs. Opequon Creek and Back Creek, the major streams, are relatively pure, but their volume is not large. The Potomac River bounds much of the northern part of the county and is a source of water.

Agriculture

In recent years there has been a slight decrease in the number of farms and in the total acreage in farms in Berkeley County. According to the 1959 Census of Agriculture, the 870 farms recorded had an average size of 152 acres and made up 65.4 percent of the total land area. About 11.1 percent of these farms were operated by tenants. The farms were classified by size as follows:

	Number
Less than 10 acres	60
10 to 49 acres	189
50 to 69 acres	67
70 to 99 acres	89
100 to 139 acres	128
140 to 179 acres	82
180 to 219 acres	69
220 to 259 acres	46
260 to 499 acres	109
500 to 999 acres	23
1,000 or more acres	8

In 1959, there were 446 miscellaneous and unclassified farms in the county. According to their main source of income, the rest of the farms were classified as follows:

	Number
Cash-grain farms	5
Fruit-and-nut farms	87
Poultry farms	5
Dairy farms	197
Livestock farms other than poultry or dairy	157
General farms	5

The principal field crops are corn, wheat, oats, barley, red clover, and alfalfa. Vegetables are not grown extensively. Hay consisting of mixed legumes is the most common forage crop. Apples and peaches are grown extensively in the limestone valley. In 1959, the acreage in crops and the number of fruit trees of bearing age in the county were as follows:

	Acres
Corn for all purposes	9, 571
For grain	7, 917
For silage	1, 539
Hogged or grazed, or cut for fodder	115

Small grain threshed or combined:	
Wheat	2,181
Oats	2,185
Barley	2,550
Rye	215
Soybeans for all purposes	120
Hay crops, total	16,540
Alfalfa and alfalfa mixtures	9,124
Clover, timothy, and mixtures of clover and grasses	5,667
Small grain cut for hay	237
Other hay cut	1,512
Red clover seed harvested	511
Irish potatoes harvested for home use or for sale	47
Vegetables:	
Tomatoes	5
Sweet corn	23
Fruit trees and grapevines of bearing age:	*Number*
Apple	228,960
Peach	96,939
Cherry	18,369
Plum	370
Pear	147
Grapevines	111

Livestock and livestock products are a chief source of farm income in Berkeley County. The number of livestock in 1959 was—

	Number
Cattle and calves	19,629
Milk cows	6,382
Sheep and lambs	2,598
Swine	7,626
Chickens 4 months old and over	46,668
Turkeys raised	41,019

Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Alluvial soil. Soil formed from material, such as gravel, sand, silt, or clay, that has been deposited on land by streams and that shows little or no modification of the original materials by soil-forming processes.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available moisture capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Azonal soils. Any group of soils that lack well-developed profile characteristics because of their youth, or because the nature of the parent material or the relief prevents normal development of such characteristics.

Base saturation (soil chemistry). The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

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.

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.

Claypan. A compact, slowly permeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse-textured soils. Sand and loamy sand.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

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; will not hold together in a mass.

Firm. When moist, soil crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Friable. When moist, soil crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Plastic. When wet, soil is 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, soil adheres to other material; tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard. When dry, soil is moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft. When dry, soil breaks into powder or individual grains under very slight pressure.

Cemented. Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivation, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grades.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Diversion terrace. A ridge of earth that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A dense, brittle subsurface horizon very low in organic matter and clay but rich in silt or very fine sand. The layer seems to be cemented when dry, 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 15 to 40 inches below the surface.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the subsoil or substratum, as a result of poor aeration and drainage; expressed in the soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gley soil.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered by grass for protection against erosion; used to conduct surface water away from cropland.

Great soil group. Any one of several broad groups of soils that have fundamental characteristics in common.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rains. The distinction between gully and rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by normal tillage, whereas a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy or clayey, and it may be cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes and that differs in one or more ways from adjacent horizons in the same profile. These are the major soil horizons:

O horizon.—An organic horizon that formed in the upper part of mineral soil; dominated by fresh or partly decomposed organic material.

A horizon.—The mineral horizon at the surface. It has an accumulation of organic matter, has been leached of soluble minerals and clay, or shows the effects of both.

B horizon.—The horizon in which clay minerals or other materials have accumulated, or that has developed a characteristic blocky or prismatic structure, or that shows the effects of both processes.

C horizon.—The unconsolidated material immediately under the true soil.

R horizon.—Rock underlying the C horizon, or underlying the B horizon if no C horizon is present.

Roman numerals are prefixed to the master horizon or layer designations (A, B, C, R) to indicate lithologic discontinuities either within or below the solum. The first, or uppermost, material is not numbered, for the Roman numeral I is understood; the second, or contrasting, material is numbered II, and others, if present, are numbered III, IV, and so on, consecutively downward.

Following are the symbols used in this report with the letters designating the master horizons, and the meaning of these symbols:

g—strong gleying.
p—plow layer.
x—fragipan.

Inclusion. An area of soil that has been included in the mapping unit of a soil of a different kind because the area was too small to be mapped separately on a map of the scale used.

Intrazonal soil. Any of the great groups of soils that have more or less well-developed soil characteristics that reflect the dominating influence of some local factor of relief or parent material over the normal effects of climate and vegetation.

Leached layer. A layer from which the soluble materials have been dissolved and washed away by percolating water.

Mapping unit, soil. Areas of soil of the same kind outlined on the soil map and identified by a symbol.

Medium-textured soils. Very fine sandy loam, loam, silt loam, and silt.

Miscellaneous land type. An area that has little true soil. These areas are not classified by series and types but are identified by a descriptive name, such as Alluvial land, strongly acid.

Moderately coarse textured soils. Sandy loam and fine sandy loam.

Mottled. 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 color 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, value of 6, and a chroma of 4.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil type, series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects management.

Physiographic province. One of the major geographic divisions of the continent.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See Horizon, soil.

Quartz. Crystallized silicon dioxide, commonly colorless, or transparent, although some varieties have color. Ordinary sand is mostly quartz.

Reaction, soil. The degree of acidity or alkalinity of the soil, expressed in pH values, or in words, as follows (*14*):

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Residual soil. Soil formed from material weathered from the underlying consolidated rock.

Runoff. Rainwater that flows over the surface of the soil without sinking in; or the total volume of surface flow during a specified time.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 millimeter 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 of sand and not more than 10 percent of clay.

Second bottom. The first terrace above the normal flood plain of a stream.

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 soil, are similar in differentiating characteristics and in arrangement in the profile.

Shale. A sedimentary rock formed by the hardening of clay deposits.

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.

Soil. A natural, three dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

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 parent material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips, or bands, to serve as vegetative barriers to wind and water erosion.

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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans)

Subsoil. In many soils, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer beneath the solum, or true soil; the C or R horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. See also Clay, Sand, and Silt. The basic textural classes, in order of increasing proportion of fine particles are as follows: *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."

Tilth, soil. The condition of the soil in relation to the growth of plants, expecially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Upland (geology). 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.

Zonal soil. Any one of the great groups of soils having well-developed soil characteristics that reflect the influence of the active factors of soil genesis—climate and living organisms—chiefly vegetation.

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