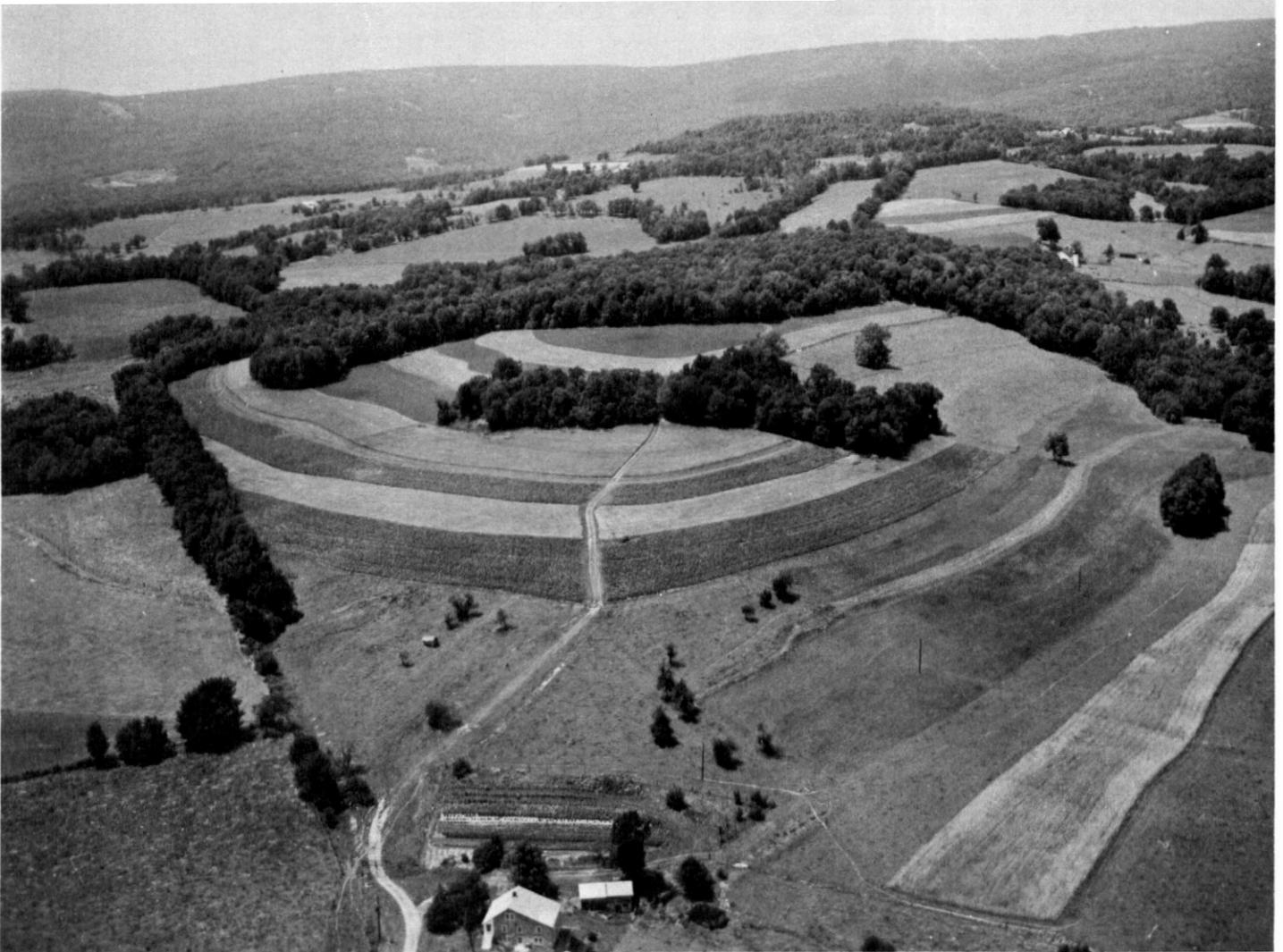


SOIL SURVEY OF

Alleghany County, Maryland



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Maryland Agricultural Experiment Station

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Survey.

Major fieldwork for this soil survey was completed in the period 1941-66. Soil names and descriptions were approved in 1968. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1966. This survey was made cooperatively by the Soil Conservation Service and the Maryland Agricultural Experiment Station. It is part of the technical assistance furnished to the Allegany Soil Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an over-

lay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

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

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

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

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

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

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

Newcomers in Allegany 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 information about the county given at the beginning of the publication.

Cover: Contour stripcropping on a farm near Mount Savage. The soil is mostly Gilpin channery silt loam.

Contents

	Page		Page
How this survey was made	1	Opequon series	46
General soil map	2	Philo series	48
1. Gilpin-Dekalb-Cookport association	3	Pope series	48
2. Stony land-Dekalb association ..	3	Robertsville series	49
3. Weikert-Calvin-Lehew association	3	Rock outcrop	50
4. Elliber-Dekalb-Opequon association	5	Shelocta series	50
5. Weikert-Gilpin association	5	Stony land	51
Descriptions of the soils	6	Strip mines and dumps	52
Albrights series	6	Tyler series	52
Allegheny series	9	Weikert series	54
Alluvial land	11	Westmoreland series	57
Atkins series	11	Use and management of the soils	58
Belmont series	12	Capability grouping	58
Brooke series	13	General management requirements	
Buchanan series	14	Drainage	69
Calvin series	15	Irrigation	69
Cavode series	17	Lime and fertilizer	70
Chavies series	18	Tillage	70
Cookport series	19	Estimated yields	70
Cut and fill land	20	Woodland	70
Dekalb series	21	Wildlife	81
Edom series	22	Engineering uses of the soils	86
Elliber series	23	Engineering soil classification	
Ernest series	25	systems	86
Gilpin series	28	Estimated engineering properties	87
Gravel pits	30	Engineering interpretations	87
Hagerstown series	30	Town and country planning	105
Huntington series	31	Recreation	106
Laidig series	32	Formation and classification of the	
Landisburg series	33	soils	106
Leetonia series	34	Factors of soil formation	106
Lehew series	35	Climate	106
Lickdale series	36	Living organisms	107
Lindside series	37	Parent material	107
Litz series	38	Relief	107
Loysville series	39	Time	107
Meckesville series	40	Morphology of the soils	128
Melvin series	41	Classification of the soils	128
Monongahela series	42	Climate	129
Nolo series	45	Literature cited	130
		Glossary	130
		Guide to mapping units ... Following	134

SOIL SURVEY OF ALLEGANY COUNTY, MARYLAND

BY KENNETH M. STONE AND EARLE D. MATTHEWS, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY C. D. CROCKER, SNYDER VON DAY, AND KENNETH M. STONE, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE,
IN COOPERATION WITH MARYLAND AGRICULTURAL EXPERIMENT STATION

A LLEGANY COUNTY is one of the three mountainous counties of Maryland. It is bounded on the north by the Pennsylvania State line and on the south by the Potomac River and its North Branch (fig. 1). Washington County, Maryland, is on the east side of Allegany County, and Garrett County, Maryland, is on the west side.

The county occupies about 273,920 acres, or 428 square miles. Cumberland, the county seat, is near the center of the southern part of the county. In the Cumberland area, Allegany County is only about 5 miles wide, north to south. Other incorporated towns in the county are Frostburg, Midland, Lonaconing, Westernport, Barton, and Luke.

Winters are generally long and cold, but summers are moderate. The climate is favorable for general farming and such specialties as truck crops and orchards. Forestry remains important, although most wooded areas have been cut over several times. Coal mining was once a major industry but is now limited to a few small operations. Strip-mining techniques have replaced the older deep-mining ones.

Each year many sportsmen are attracted to Allegany County during hunting seasons. One of the favorite hunting areas is Green Ridge State Forest in the eastern part of the county. The most important game is wild turkey, whitetail deer, and ruffed grouse.

Significantly, too, population has increased considerably in recent years in areas suburban to Cumberland

and Frostburg, and this has brought increased demand for information about soils and the way they affect septic tanks, sewage lagoons, homesites, and the like.

The Allegheny Plateau occupies the westernmost part of the county and consists of an area ranging from 3 to 5 miles in width, roughly parallel to the Allegany-Garrett county line. East of this are the Appalachian ridges and valleys. These rather narrow mountain ridges, separated by narrow steep valleys, extend in a general northeast to southwest direction. The valley floors are relatively narrow and make up flood plains and stream terraces. They have many problems relating to flooding and internal soil drainage. The eastern part of the county receives 10 to 15 inches less precipitation per year than the Allegheny Plateau to the west.

About 30 percent of the county is generally suited to cultivated crops. Of this, however, only about 2 percent can be intensively and safely cultivated without appropriate soil and water conservation measures. Approximately 64 percent of the county is soils not generally suited to cultivation that can be safely and economically used for grazing, trees, and wildlife habitat.

Of the remaining 6 percent of the county, about 4.5 percent is so stony, rocky, and nearly barren that it is of little or no economic use; and about 1.5 percent consists of urban, commercial, and industrial areas and suburban residential developments.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Allegany 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 elsewhere, 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 crops and native plants; kinds of rocks and practically all of the facts about soils that could be observed, measured, and recorded. They dug many holes to expose soil profiles, and examined other profiles with a soil auger and on exposed cuts. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the sur-

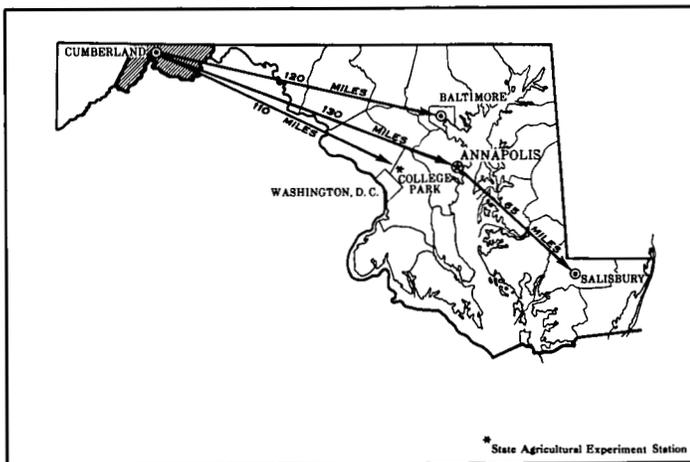


Figure 1.—Location of Allegany County in Maryland.

face down into weathered material under the soil, and in large parts of Allegany County down to solid bedrock.

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

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all 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 that series was first observed and mapped. Gilpin and Opequon, for example, are the names of two soil series in this county. All the soils in the United States having the same series name are essentially alike in those characteristics that govern their potential use and behavior.

Soils of one series can differ somewhat in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates one or more features that affect management. For example, Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded, is one of several phases within the Gilpin series in Allegany County.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew boundaries between the individual soils on aerial photographs. These photographs show woodland, buildings, roads, field borders, trees, and other details that greatly help in drawing soil boundaries accurately. The soil map at the back of this survey was prepared from these 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 phase. It is not exactly equivalent, because it is not practical to show on such a map all of the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

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

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Calvin-Weikert shaly silt loams, 10 to 20 percent slopes, moderately eroded, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. Dekalb and Lehigh very stony soils, 25 to 45 percent slopes, is an undifferentiated group in this county.

In most survey areas there are places where the soil material is so rocky or stony, so wet, so shallow, so severely eroded, or otherwise so mixed or variable that it has not been classified by soil series. These areas are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Alluvial land and Rock outcrop are land types in Allegany County.

While a soil survey is in progress, samples of soils are examined to determine physical and other properties. Laboratory data for the soils, including data for the same kinds of soils in other survey areas, 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 and yield data have been assembled. The mass of detailed information then needs to be organized in a way that is readily useful to different groups of readers, among them farmers, managers of woodland, homeowners, engineers, and planners. This published survey is the result of such organization.

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

General Soil Map

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

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a

wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The five soil associations in Allegany County are discussed in the following pages.

1. Gilpin-Dekalb-Cookport Association

Gently sloping to very steep, well drained and moderately well drained, dominantly very stony soils that are moderately deep over sandstone and shale

This association is in two areas of the western part of Allegany County. The larger area extends from crests of Dan's Mountain, Piney Mountain, and Little Allegheny Mountain westward to the county line. The smaller area extends northeasterly from near Cresap-town to the Pennsylvania line.

This association makes up about 22 percent of the county. About 45 percent of it is Gilpin soils, about 16 percent is Dekalb soils, and about 9 percent is Cookport soils. The remaining 30 percent is minor soils and land types.

The Gilpin soils are well-drained, silty soils that have a sticky subsoil. These soils are very stony in about half of their acreage. The Dekalb soils are also well drained. They are much sandier than Gilpin soils and are mostly very stony. The Cookport soils are moderately well drained and have a very firm, dense fragipan that impedes drainage. The Cookport soils are generally less sloping than the other major soils in this association. They are very stony in about two-thirds of their acreage.

The minor soils and land types of this association are Atkins, Brooke, Buchanan, Cavode, Ernest, Laidig, Philo, Pope, Tyler, and Westmoreland soils and Alluvial land, Stony land, and Strip mines and Dumps. The Brooke, Laidig, and Westmoreland soils are well drained and are deeper than the major soils of this association. The Buchanan, Cavode, Ernest, and Tyler soils all have limitations related to drainage. The Atkins, Philo, and Pope soils are on flood plains. Strip mines and Dumps are common in large sections of the western part of the association where veins of coal are present. These veins are generally at depths of 5 to 50 feet, between strata of sandstone or shale.

General farming (fig. 2) is practiced mostly on acreages of nonstony Gilpin soils and some of the minor soils that are nonstony. These soils produce most crops moderately well. Some soils of the association that are not well drained are used less intensively for hay or pasture. A large acreage of very stony soils is wooded.

The soils of this association that are well drained are suitable for residential development. In most areas, however, the soils have moderate limitations for excavations because of limited depth to bedrock and severe limitations for septic tanks because of limited depth to bedrock and slow permeability. In about

two-thirds of the association, the soils generally have moderate limitations because of stoniness. The soils that are not well drained are moderately to severely limited as sites for buildings having basements, and the soils on flood plains are severely limited as sites for buildings and septic tanks. For development of large residential areas, community systems for water supply and sewage disposal are needed.

2. Stony land-Dekalb Association

Stony land and sloping to very steep, well-drained, very stony soils that are moderately deep over sandstone

This association is in two long narrow areas of the county. The larger area extends northeasterly from near Westernport to the State line. The smaller area is on Wills Mountain and Haystack Mountain. It extends northeasterly from Cumberland to the State line. Between Haystack Mountain and Wills Mountain is a water gap, cut by Wills Creek, known as "The Narrows" and "The Gateway to the West". This cut exposes geologic formations to great depth. It was a vital pass for pioneers going west, and presently is the route of major highways and railways.

This association makes up about 3 percent of the county. About 85 percent of it is Stony land, and about 13 percent is very stony Dekalb soils. The remaining 2 percent is minor soils.

Stony land is mostly steep or very steep, and it is somewhat excessively drained. It is shallow to bedrock and extremely stony and bouldery. The Dekalb soils are sloping to very steep, well drained, moderately deep to bedrock, and very stony.

This association is not used for farming. It is mostly in wooded areas, which provide watershed protection and wildlife habitat. A glass-sand mine is on Wills Mountain.

3. Weikert-Calvin-Lehew Association

Gently sloping to very steep, somewhat excessively drained and well-drained, shaly to very stony soils that are shallow to moderately deep over shale and sandstone

This association is in two large areas of the county. The larger area is all of the county east of Green Ridge. The other area is the eastern slopes of Dan's Mountain, Piney Mountain, and Little Allegheny Mountain. It extends northeasterly from the North Branch of the Potomac River to the State line.

This is the most extensive soil association in the county, making up about 28 percent of it. About 42 percent of the association is Weikert soils, about 23 percent is Calvin soils, and about 8 percent is Lehew soils. The remaining 27 percent is minor soils.

The Weikert soils are less than 20 inches deep to shale bedrock, and they are somewhat excessively drained. They are quite shaly throughout, and some of them are very stony. These soils have the lowest available water capacity of any in the county. Their supply of moisture is quickly exhausted during dry periods. The Calvin and Lehew soils are reddish in color. They

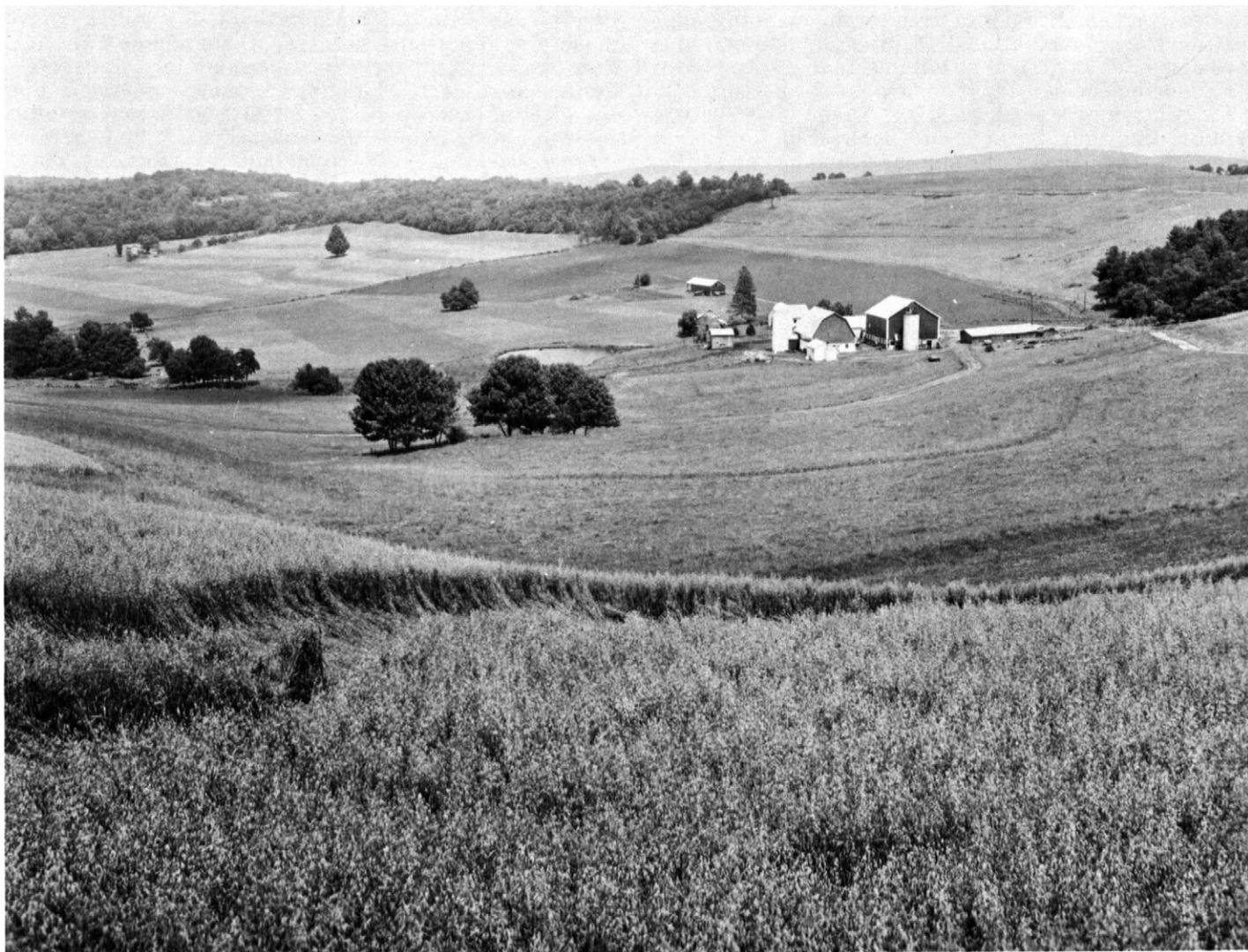


Figure 2.—Area of rolling soils in Gilpin-Dekalb-Cookport association, near Eckhart.
Most of the cultivated areas are on Gilpin soils.

are moderately deep to bedrock and contain many small rock fragments. The Calvin soils contain few stones. The Lehew soils are sandier than the Calvin soils, and they generally are steeper. They are mostly very stony.

The minor soils and land types of this association are Albrights, Allegheny, Atkins, Dekalb, Ernest, Gilpin, Meckesville, Monongahela, Philo, Pope, and Shelocta soils and Alluvial land and Stony land. The Allegheny, Dekalb, Gilpin, Meckesville, and Shelocta soils are well drained. The Allegheny, Meckesville, and Shelocta soils also are deeper than any of the major soils of the association. The Albrights, Ernest, and Monongahela soils have limitations related to drainage. The Atkins, Philo, and Pope soils are on flood plains.

The soils of this association are used for general farming. Calvin soils are used most extensively of the major soils for cultivated crops, and they are moder-

ately productive. The Weikert soils are less productive than the Calvin, and extensive areas of Weikert soils are used for unimproved or partly improved grazing land. The Lehew soils are mostly in trees, but small areas are in crops or pasture.

The major soils of this association are suitable for residential development, although they have moderate limitations for excavations. They also have severe limitations for septic tanks in most places because of limited depth to bedrock. The Weikert soils, although shallow, overlie shale bedrock that is not too difficult to excavate. The Calvin and Lehew soils are somewhat deeper over bedrock, but the bedrock is generally much harder. The soils have moderate limitations for housing developments in many areas because of stoniness. The soils that are not well drained are moderately to severely limited as sites for buildings with basements. All the soils on flood plains are severely limited as sites for buildings and septic tanks. For

development of large residential areas, community systems for water supply and sewage disposal are needed.

4. Elliber-Dekalb-Opequon Association

Gently sloping to very steep, well-drained, cherty or channery to very stony soils that are shallow or deep over limestone or moderately deep over sandstone

This association is in four areas of Allegany County. The largest area, in the central part of the county, extends northeasterly from the Potomac River to the State line. Another area is a narrow ridge that starts near Pinto and extends generally northward through LaVale and Corriganville to the State line. A third area is Shriver Ridge, which begins in Cumberland and extends into Pennsylvania. The fourth is a small area known as Fort Hill in the southwestern part of the county.

This association makes up about 20 percent of the county. About 27 percent of it is Elliber soils, about 20 percent is Dekalb soils, and about 10 percent is Opequon soils. The remaining 43 percent is small areas of minor soils.

The Elliber soils are on the tops and sides of ridges. They are deep over cherty limestone, contain large quantities of chert fragments, and in about half of their acreage are very stony. The Dekalb soils are moderately deep over sandstone and are mostly very stony. The Opequon soils are generally on the sides of limestone ridges. They are less than 20 inches deep over limestone, and they contain either stones or flagstones throughout. Also, limestone crops out in places.

The minor soils and land types of this association are Atkins, Belmont, Buchanan, Edom, Ernest, Hagerstown, Huntington, Laidig, Landisburg, Leetonia, Lickdale, Lindside, Litz, Loysville, Melvin, Philo, and Pope soils and Alluvial land and Stony land. The Belmont, Edom, Hagerstown, Laidig, Leetonia, and Litz soils are well drained. The Edom soils also make up nearly 5 percent of the association. The Hagerstown soils are on uplands and the Huntington soils are on flood plains and adjacent foot slopes. The Buchanan, Ernest, Landisburg, Lickdale, and Loysville soils have limitations related to drainage. The Atkins, Huntington, Lindside, Melvin, Philo, and Pope soils are on flood plains. Areas of Alluvial land and Stony land are small.

The Elliber soils are used intensively for orchards in places. They are also used for truck crops and general farming. The Opequon soils are mainly in orchards and pasture. Quantity and quality of orchard products are high. The Dekalb soils are mostly in trees. Of the minor soils, the Hagerstown and Huntington are most suitable for farming. Some areas of this association near Cumberland are used for residential developments. Limestone is exploited for commercial use locally.

The use of Elliber soils of this association for homesites and septic tanks is limited only by slope. The Dekalb soils are moderately limited for buildings having basements and severely limited for septic tanks because of the limited depth to bedrock. The Opequon

soils are severely limited for buildings having basements and for septic tanks because of shallowness to bedrock. Some of the minor soils that are well drained have fewer limitations for the foregoing uses than the Dekalb and Opequon soils. All the soils that are not well drained are moderately to severely limited for buildings having basements. All the soils on flood plains are severely limited for buildings and septic tanks. In all areas of limestone, ground-water pollution is a hazard. For development of large residential areas, community systems for water supply and sewage disposal are needed.

5. Weikert-Gilpin Association

Gently sloping to very steep, somewhat excessively drained and well-drained, shaly to very stony soils that are dominantly shallow over shale

This association is in two areas of the county. The larger area is in the east-central part of the county. It extends westward from the top of Green Ridge to the lower east slopes of Warrior Mountain and Warrior Ridge, and from the Potomac River to the Pennsylvania State line. The smaller area is between the lower east slopes of Haystack Mountain and Shriver Ridge and the lower west slopes of Irons Mountain and Evitts Mountain. It extends northeasterly from Cresaptown to the Pennsylvania line.

This association makes up about 27 percent of the county. About 60 percent of it is Weikert soils and about 13 percent is Gilpin soils. The remaining 27 percent is minor soils.

The Weikert soils are less than 20 inches deep to shale bedrock. They are somewhat excessively drained. These soils are very shaly throughout, and some of them are very stony. They have the lowest available water capacity of any of the soils in the county. The supply of moisture in Weikert soils is quickly exhausted during dry periods. The Gilpin soils are a little less shallow and a little less shaly than the Weikert soils. They are very stony in about half of their acreage. The Gilpin soils are generally shallower and more shaly in this association, however, than the Gilpin soils of association 1 in the western part of the county.

The minor soils and land type of this association are Allegheny, Atkins, Buchanan, Chavies, Cookport, Dekalb, Ernest, Laidig, Monongahela, Philo, Pope, and Shelocta soils and Alluvial land. The Allegheny, Chavies, Dekalb, Laidig, and Shelocta soils are well drained, and all but Dekalb are deeper to bedrock than any of the major soils. The Buchanan, Cookport, Ernest, and Monongahela soils have limitations related to drainage. The Atkins, Philo, and Pope soils are on flood plains. The areas of Alluvial land are small.

The gently sloping to rolling areas of this association are used for general farming and for pasture. The soils in these areas are generally less productive than those in other parts of the county because this association consists mostly of the shallow, droughty Weikert soils. Some areas are used for unimproved or partly improved grazing land. Stony soils and steep areas are mostly wooded; but since tree growth tends

to be slow on most of this association, wood crops are not produced in large amounts. In the Cumberland area this association includes not only the city of Cumberland and its suburbs but also some important commercial and industrial installations.

The soils of this association have moderate to severe limitations for building sites because of shallowness to relatively soft bedrock that is, however, not too difficult to excavate. The soils are severely limited for septic tanks, also because of this limited depth to bedrock. For development of large residential areas, community systems for water supply and sewage disposal are needed.

Descriptions of the Soils

This section describes the soil series and mapping units in Allegany County. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit. Color terms are for moist soil unless otherwise stated.

As mentioned in the section "How This Survey Was Made", not all mapping units are members of a soil series. Strip mines and Dumps, for example, 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 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 is the capability unit and woodland suitability group in which the mapping unit has been placed. The page for the description of each capability unit and woodland suitability group can be learned by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology

and methods of soil mapping can be obtained from the Soil Survey Manual (5).

Albrights Series

The Albright series consists of deep, somewhat poorly drained to moderately well drained, nearly level to strongly sloping soils that have a fragipan. These soils formed in local colluvial accumulations of reddish shale and siltstone and some gray to reddish sandstone. They are on footslopes. The native vegetation is mixed hardwoods, dominantly oaks and mostly black oak.

In a representative profile in a wooded area, the surface layer is silt loam about 7 inches thick. It is dark brown in the upper part and brown to dark brown in the lower part. The subsoil is about 33 inches thick. The upper part is yellowish-red silty clay loam that is sticky when wet. The lower part is a fragipan of mottled, reddish-brown light silty clay loam that is dense, firm, and brittle. The substratum, at a depth of 40 to 50 inches, is dark reddish-brown loam or silt loam that is strongly variegated in red.

At the optimum moisture content the Albright soils are fairly easy to work, except where the surface layer is too stony. These soils tend to be wet and late to warm in spring. Planting dates are generally delayed especially for early crops. Artificial drainage is needed for some uses. Available water capacity is high, but water moves slowly through the fragipan, and the soils tend to dry out more quickly in dry weather than soils that are more permeable and porous. Generally, these moderately productive soils are limited for some uses by impeded drainage, a seasonally perched water table, slow movement of water through the subsoil, slope and the hazard of erosion, and local stoniness.

Representative profile of Albright very stony silt loam, 3 to 25 percent slopes, in Green Ridge State Forest, about ¼ mile north of Oldtown Road:

- O1—2 inches to ½ inch, leaf litter and twigs consisting mostly of black oak.
- O2—½ inch to 0, thin, felty layer of black organic material.
- A1—0 to 4 inches, dark-brown (7.5YR 3/2) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; about 35 percent channers and flags of shale and sandstone; medium acid; abrupt, smooth boundary.
- A2—4 to 7 inches, brown to dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; about 30 percent channers, flags, and stones; medium to strongly acid; abrupt, smooth boundary.
- B2t—7 to 15 inches, yellowish-red (5YR 4/5) silty clay loam; moderate, fine, subangular blocky structure; friable to firm, sticky and plastic; many roots; about 15 percent coarse fragments; thin, patchy clay films; strongly acid; clear, smooth boundary.
- Bx1—15 to 26 inches, reddish-brown (5YR 4/4) light silty clay loam; common, medium, distinct, brown (7.5YR 5/2) and pinkish-gray (5YR 6/2) mottles; weak, coarse, prismatic structure and weak, fine, subangular blocky; firm, brittle, sticky; common roots in upper part; about 20 percent coarse fragments; thin clay films on prisms; strongly to very strongly acid; gradual, wavy boundary.

¹ Italic numbers in parentheses refer to Literature Cited, p. 130.

TABLE 1.—Approximate acreage and proportionate extent of soils

Soil	Acre	Percent	Soil	Acre	Percent
Albrights silt loam, 0 to 8 percent slopes	280	0.1	Dekalb channery sandy loam, 25 to 45 percent slopes	940	.3
Albrights silt loam, 8 to 15 percent slopes, moderately eroded	220	.1	Dekalb very stony sandy loam, 0 to 12 percent slopes	2,670	1.0
Albrights very stony silt loam, 3 to 25 percent slopes	800	.3	Dekalb very stony sandy loam, 12 to 25 percent slopes	4,710	1.7
Allegheny fine sandy loam, 0 to 3 percent slopes	150	(¹)	Dekalb and Lehew very stony soils, 25 to 45 percent slopes	8,380	3.1
Allegheny fine sandy loam, 3 to 8 percent slopes, moderately eroded	220	.1	Dekalb and Lehew very stony soils, 45 to 75 percent slopes	9,740	3.6
Allegheny fine sandy loam, 8 to 15 percent slopes, moderately eroded	110	(¹)	Edom silt loam, 3 to 8 percent slopes, moderately eroded	170	.1
Allegheny silt loam, 0 to 3 percent slopes	110	(¹)	Edom silt loam, 8 to 15 percent slopes, moderately eroded	640	.2
Allegheny silt loam, 3 to 8 percent slopes, moderately eroded	1,310	.5	Edom silt loam, 15 to 25 percent slopes, moderately eroded	580	.2
Allegheny silt loam, 8 to 15 percent slopes, moderately eroded	980	.4	Edom silt loam, 25 to 45 percent slopes, moderately eroded	790	.3
Allegheny silt loam, 15 to 30 percent slopes	230	.1	Edom silty clay loam, 25 to 45 percent slopes, severely eroded	350	.1
Allegheny-Urban land complex, 0 to 8 percent slopes	290	.1	Elliber cherty silt loam, 0 to 5 percent slopes	270	.1
Allegheny-Urban land complex, 8 to 20 percent slopes	170	.1	Elliber cherty silt loam, 5 to 12 percent slopes, moderately eroded	2,020	.7
Alluvial land	3,760	1.4	Elliber cherty silt loam, 12 to 25 percent slopes, moderately eroded	3,310	1.2
Alluvial land-Urban land complex	640	.2	Elliber cherty silt loam, 25 to 45 percent slopes	2,960	1.1
Atkins silt loam	1,630	.6	Elliber very stony silt loam, 0 to 25 percent slopes	1,370	.5
Belmont very stony silty clay loam, 20 to 50 percent slopes	170	.1	Elliber very stony silt loam, 25 to 45 percent slopes	2,130	.8
Brooke silty clay loam, 8 to 15 percent slopes severely eroded	60	(¹)	Elliber very stony silt loam, 45 to 75 percent slopes	2,760	1.0
Buchanan gravelly loam, 0 to 8 percent slopes, moderately eroded	240	.1	Ernest silt loam, 0 to 3 percent slopes	180	.1
Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded	240	.1	Ernest silt loam, 3 to 8 percent slopes, moderately eroded	2,280	.8
Buchanan very stony loam, 0 to 15 percent slopes	6,050	2.2	Ernest silt loam, 8 to 15 percent slopes, moderately eroded	2,020	.7
Buchanan very stony loam, 15 to 25 percent slopes	2,040	.7	Ernest silt loam, 15 to 25 percent slopes, moderately eroded	150	(¹)
Calvin channery silt loam, 0 to 10 percent slopes	980	.4	Ernest-Landisburg-Urban land complex, 0 to 8 percent slopes	690	.3
Calvin channery silt loam, 10 to 20 percent slopes	1,320	.5	Ernest-Landisburg-Urban land complex, 8 to 25 percent slopes	390	.1
Calvin shaly silt loam, 0 to 10 percent slopes, moderately eroded	1,680	.6	Gilpin silt loam, 0 to 10 percent slopes, moderately eroded	1,310	.5
Calvin shaly silt loam, 10 to 20 percent slopes, moderately eroded	2,780	1.0	Gilpin silt loam, 10 to 20 percent slopes, moderately eroded	1,940	.7
Calvin shaly silt loam, 20 to 30 percent slopes, moderately eroded	4,310	1.6	Gilpin silt loam, 20 to 30 percent slopes, moderately eroded	530	.2
Calvin shaly silt loam, 30 to 45 percent slopes	3,460	1.3	Gilpin channery silt loam, 0 to 10 percent slopes, moderately eroded	3,380	1.2
Calvin-Weikert shaly silt loams, 0 to 10 percent slopes, moderately eroded	430	.2	Gilpin channery silt loam, 10 to 20 percent slopes, moderately eroded	4,690	1.7
Calvin-Weikert shaly silt loams, 10 to 20 percent slopes, moderately eroded	1,500	.5	Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded	3,150	1.1
Calvin-Weikert shaly silt loams, 20 to 30 percent slopes, moderately eroded	1,890	.7	Gilpin channery silt loam, 30 to 45 percent slopes	2,490	.9
Calvin-Weikert shaly silt loams, 30 to 50 percent slopes	1,660	.6	Gilpin very stony silt loam, 0 to 10 percent slopes	1,960	.7
Cavode silt loam, 0 to 10 percent slopes, moderately eroded	930	.3	Gilpin very stony silt loam, 10 to 30 percent slopes	11,100	4.0
Cavode silt loam, 10 to 20 percent slopes, moderately eroded	860	.3	Gilpin-Urban land complex, 0 to 10 percent slopes	190	.1
Cavode very stony silt loam, 0 to 30 percent slopes	1,600	.6	Gilpin-Urban land complex, 10 to 30 percent slopes	660	.2
Chavies loam, 0 to 3 percent slopes	100	(¹)	Gilpin and Weikert very stony silt loams, 30 to 65 percent slopes	7,230	2.6
Chavies loam, 3 to 8 percent slopes	190	.1	Gravel pits	30	(¹)
Cookport silt loam, 0 to 10 percent slopes, moderately eroded	1,180	.4	Hagerstown silt loam, 8 to 20 percent slopes, moderately eroded	120	(¹)
Cookport silt loam, 10 to 20 percent slopes, moderately eroded	730	.3	Hagerstown silt loam, 20 to 40 percent slopes, moderately eroded	220	.1
Cookport very stony silt loam, 0 to 10 percent slopes	1,370	.5	Huntington silt loam	290	.1
Cookport very stony silt loam, 10 to 30 percent slopes	2,630	1.0	Huntington silt loam, local alluvium, 0 to 3 percent slopes	150	(¹)
Cut and fill land	790	.3			
Dekalb channery sandy loam, 0 to 12 percent slopes, moderately eroded	920	.3			
Dekalb channery sandy loam, 12 to 25 percent slopes, moderately eroded	1,320	.5			

TABLE 1.—Approximate acreage and proportionate extent of soils—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Huntington silt loam, local alluvium, 3 to 8 percent slopes	340	.1	Nolo silt loam, 10 to 20 percent slopes, moderately eroded	210	.1
Huntington silt loam, local alluvium, 8 to 15 percent slopes	230	.1	Nolo very stony silt loam, 0 to 20 percent slopes	330	.1
Laidig gravelly loam, 0 to 8 percent slopes, moderately eroded	190	.1	Opequon flaggy clay loam, 3 to 8 percent slopes, moderately eroded	220	.1
Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded	550	.2	Opequon flaggy clay loam, 8 to 15 percent slopes, moderately eroded	900	.3
Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded	170	.1	Opequon flaggy clay loam, 15 to 25 percent slopes, moderately eroded	1,330	.5
Laidig very stony loam, 3 to 15 percent slopes	2,170	.8	Opequon flaggy clay loam, 25 to 50 percent slopes, moderately eroded	1,750	.6
Laidig very stony loam, 15 to 25 percent slopes	1,610	.6	Opequon very stony clay loam, 3 to 25 percent slopes	530	.2
Landisburg cherty silt loam, 0 to 3 percent slopes	180	.1	Opequon very stony clay loam, 25 to 50 percent slopes	1,190	.4
Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded	550	.2	Philo silt loam	2,400	.9
Landisburg cherty silt loam, 8 to 15 percent slopes, moderately eroded	760	.3	Pope fine sandy loam	2,320	.8
Landisburg cherty silt loam, 15 to 25 percent slopes, moderately eroded	140	(¹)	Pope silt loam	920	.3
Leetonia very stony sandy loam, 0 to 25 percent slopes	370	.1	Robertsville silt loam, 0 to 8 percent slopes	240	.1
Lehew channery loam, 3 to 10 percent slopes, moderately eroded	150	(¹)	Rock outcrop	3,710	1.4
Lehew channery loam, 10 to 20 percent slopes, moderately eroded	260	.1	Shelocta shaly silt loam, 0 to 8 percent slopes, moderately eroded	460	.2
Lehew channery loam, 20 to 45 percent slopes	470	.2	Shelocta shaly silt loam, 8 to 15 percent slopes, moderately eroded	600	.2
Lehew very stony loam, 0 to 10 percent slopes	710	.3	Shelocta shaly silt loam, 15 to 25 percent slopes, moderately eroded	210	.1
Lehew very stony loam, 10 to 30 percent slopes	4,570	1.7	Stony land, rolling	6,360	2.3
Lickdale silt loam	150	(¹)	Stony land, steep	2,140	.8
Lindside silt loam	430	.2	Strip mines and Dumps	2,600	.9
Litz shaly silt loam, 3 to 10 percent slopes, moderately eroded	190	.1	Tyler silt loam, 0 to 3 percent slopes	130	(¹)
Litz shaly silt loam, 10 to 20 percent slopes, moderately eroded	570	.2	Tyler silt loam, 3 to 8 percent slopes	170	.1
Litz shaly silt loam, 20 to 30 percent slopes, moderately eroded	750	.3	Weikert shaly silt loam, 0 to 10 percent slopes, moderately eroded	5,640	2.1
Litz shaly silt loam, 30 to 45 percent slopes	630	.2	Weikert shaly silt loam, 10 to 20 percent slopes, moderately eroded	19,040	6.9
Loysville cherty silt loam, 0 to 8 percent slopes	300	.1	Weikert shaly silt loam, 20 to 45 percent slopes	46,280	17.0
Meckesville silt loam, 0 to 8 percent slopes, moderately eroded	210	.1	Weikert very stony silt loam, 0 to 30 percent slopes	4,560	1.7
Meckesville silt loam, 8 to 15 percent slopes, moderately eroded	250	.1	Weikert-Urban land complex, 0 to 10 percent slopes	170	.1
Meckesville silt loam, 15 to 25 percent slopes, moderately eroded	180	.1	Weikert-Urban land complex, 10 to 20 percent slopes	460	.2
Meckesville very stony silt loam, 0 to 15 percent slopes	630	.2	Weikert-Urban land complex, 20 to 45 percent slopes	300	.1
Meckesville very stony silt loam, 15 to 25 percent slopes	500	.2	Weikert and Gilpin channery silt loams, 45 to 65 percent slopes	4,670	1.7
Melvin silt loam	150	(¹)	Westmoreland silt loam, 3 to 10 percent slopes, moderately eroded	180	.1
Monongahela silt loam, 0 to 3 percent slopes	370	.1	Westmoreland silt loam, 10 to 20 percent slopes, moderately eroded	310	.1
Monongahela silt loam, 3 to 8 percent slopes, moderately eroded	1,060	.4	Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded	250	.1
Monongahela silt loam, 8 to 15 percent slopes, moderately eroded	260	.1	Westmoreland silt loam, 30 to 45 percent slopes	210	.1
Nolo silt loam, 0 to 3 percent slopes	200	.1	Water	1,280	.5
Nolo silt loam, 3 to 10 percent slopes	330	.1	Total	273,920	100.0

¹ Less than 0.05 percent.

Bx2—26 to 40 inches, reddish-brown (5YR 4/4) light silty clay loam; common, medium, distinct, red (2.5YR 5/6) and reddish-gray (5YR 5/2) mottles; weak to moderate, coarse, prismatic structure and moderate, medium, blocky and subangular blocky; firm, brittle, sticky and slightly plastic; very few roots; about 40 percent coarse fragments; thin clay films on prisms; strongly to very strongly acid; gradual, irregular boundary.

C—40 to 50 inches, dark reddish-brown (5YR 3/3) loam or silt loam, strongly variegated with red (2.5YR 5/6); massive; friable, slightly sticky and slightly plastic; about 65 percent coarse fragments; strongly to very strongly acid.

The solum generally ranges from 40 to 50 inches or more in thickness. Unconforming bedrock is at a depth of more than 6 feet in most places. In unlimed areas reaction ranges from medium acid to very strongly acid, and acidity generally increases with depth.

The A horizon is silt loam. The B horizon ranges from heavy loam or heavy silt loam to silty clay loam, but is as fine as silty clay in some places and is, on the average, between 18 and 35 percent clay. The fragipan has weak to moderate structure. The pan is faintly to distinctly, but not prominently, expressed. The A horizon is less than 10 percent coarse fragments smaller than stones, but such fragments make up more than 50 percent of the C horizon.

Some areas are very stony, especially where colluvial stones are on and near the surface.

The A horizon is mostly 7.5YR in hue but ranges to 5YR and even 10YR in places. This horizon is generally 3 to 5 in value and 1 to 4 in chroma. The A1 horizon is generally lowest in value and chroma. The B2t and Bx horizons are generally 5YR or 2.5YR in hue, 3 to 5 in value, and 3 to 6 in chroma. The Bx1 horizon has mottling of chroma 2 or less, and in places the B2t horizon also has mottling in the lower part.

Albrights soils are similar to Buchanan, Cookport, Ernest, Laidig, Landisburg, Loysville, Meckesville, Monongahela, Nolo, Robertsville, and Tyler soils in that they have a fragipan in the lower part of the B horizon. They are not so well drained as Laidig and Meckesville soils and not so poorly drained as Nolo and Robertsville soils. They are redder than Buchanan, Cookport, Ernest, Laidig, Landisburg, Loysville, Monongahela, and Tyler soils.

Albrights silt loam, 0 to 8 percent slopes (AbB).—This nearly level to gently sloping soil has a profile similar to that described as representative for the series, but few if any stones are on and near the surface. In cultivated areas the plow layer is generally brown or dark brown.

Included with this soil in mapping are small areas where there has been moderate loss of the surface layer. Also included are some local areas that are wetter than usual, and these are shown on the maps by wet-spot symbols.

Drainage is needed where this soil is used for certain crops and some other purposes. The most important factor in management for most uses, however, is the hazard of erosion. Capability unit IIe-13; woodland suitability group 3w1.

Albrights silt loam, 8 to 15 percent slopes, moderately eroded (AbC2).—In most areas this moderately sloping soil has lost part of the original surface layer. The present surface layer is somewhat redder in color and more sticky and cloddy, because it contains material from the upper part of the subsoil.

Included with this soil in mapping are some wooded areas that are only slightly eroded or not at all. Also included are a few wet spots where there is more than normal seepage, and a few acres where slopes are slightly greater than 15 percent.

If this soil is cultivated, the risk of erosion is greater than on other soils of the series, because of slope. Capability unit IIIe-13; woodland suitability group 3w1.

Albrights very stony silt loam, 3 to 25 percent slopes (AgD).—This nearly level to strongly sloping soil has the profile described as representative for the series. Growing row crops is not practical on this soil because of angular to subangular stones, generally of reddish sandstone, on and near the surface in most places. These stones are mostly larger than 10 inches in diameter and are commonly 5 to 30 feet apart. Included in mapping are a few small areas where slopes are less than 3 percent.

This soil has few limitations for production of wood crops. Almost all areas are under a cover of trees. The soil is also suitable for improved pasture and can be used locally for hay crops. Capability unit VI-3; woodland suitability group 3w1.

Allegheny Series

The Allegheny series consists of deep, well-drained, nearly level to steep soils that formed in old water-laid sediment derived chiefly from acid shale and sandstone. These soils are on high terraces above major streams. The native vegetation is mixed hardwoods. All but a few areas, however, have been cleared.

In a representative profile in a cultivated area, the surface layer is brown to dark-brown fine sandy loam about 12 inches thick. The subsoil is about 28 inches thick. It is brown heavy fine sandy loam in the upper part and strong-brown and yellowish-brown clay loam in the lower part. The subsoil is slightly sticky when wet. The substratum, to a depth of about 52 inches, is light yellowish-brown fine sandy loam. Below this, to a depth of 84 inches, it is gray to light-gray shaly silty clay loam.

The Allegheny soils are easy to work. Available water capacity is moderate to high. It is higher in Allegheny silt loam than it is in Allegheny fine sandy loam. Water moves through these soils readily. These moderately productive soils are limited for farming and most other uses only by slope and the consequent hazard of erosion.

Representative profile of Allegheny fine sandy loam, 0 to 3 percent slopes, in a cultivated area on Mexico Farm Road:

- Ap—0 to 9 inches, brown to dark-brown (7.5YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary.
- A2—9 to 12 inches, brown to dark-brown (7.5YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, smooth boundary.
- B21t—12 to 25 inches, brown (7.5YR 5/4) heavy fine sandy loam; weak, fine, subangular blocky structure; friable, slightly sticky; many roots; few faint clay films; about 2 percent fine waterworn pebbles; strongly acid; clear, smooth boundary.
- B22t—25 to 35 inches, strong-brown (7.5YR 5/6) clay loam; moderate, fine, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; few roots; almost continuous clay films; about 5 percent fine waterworn pebbles; strongly acid; clear, smooth boundary.
- B3—35 to 40 inches, yellowish-brown (10YR 5/4) light clay loam; weak, fine, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; very few roots; about 10 percent waterworn pebbles; strongly acid; gradual, wavy boundary.
- C1—40 to 52 inches, light yellowish-brown (10YR 6/4) light fine sandy loam, variegated with yellowish-red (5YR 5/8) and dark reddish-gray (5YR 4/2); single grained; very friable; very few roots; about 10 percent waterworn pebbles; strongly acid; abrupt, smooth boundary.
- IIC2g—52 to 84 inches, gray or light-gray (N 6/0) shaly silty clay loam; common, medium, prominent, reddish-brown (5YR 5/4) and strong-brown (7.5YR 5/6) mottles; massive; very firm, sticky and plastic; about 15 percent gray shale fragments; very strongly acid.

The solum generally ranges from 40 to 50 inches in thickness. Unconforming bedrock that can be any of various kinds is at a depth of 6 to 10 feet or more. In unlimed areas reaction ranges from medium acid to strongly acid, and acidity increases with depth.

The A horizon is fine sandy loam or silt loam. The B2t horizon is heavy fine sandy loam, clay loam, heavy sandy

clay loam, or light silty clay loam. The conforming C horizon is coarser in texture than the B2t horizon, but the unconforming IIC horizon can be of almost any texture and has evident stratification. Although all horizons contain waterworn pebbles in places, only the A horizon contains significant amounts locally, and only the C horizon contains abundant amounts in some places.

In places the solum is 10YR or 7.5YR in hue throughout. The A horizon is 3 to 5 in value and 2 to 4 in chroma. Only the thin A1 horizon, or the Ap horizon that is 5 in dry value, is 3 in moist value. The Bt horizon is 4 or 5 in value and 4 to 6 or 8 in chroma. The B3 horizon has faint mottling in places. The C horizon is more variable in color. It is mottled and in the lower part, gleyed in places.

Allegheny soils are similar to Chavies, Gilpin, and Shelocta soils. They have stronger horizonation and a finer textured B horizon, and are on higher terraces than Chavies soils. They are slightly sandier and less loamy throughout the solum than Gilpin and Shelocta soils. They formed in the same kind of sediment, or sediment similar to that in which the moderately well drained Monongahela, the somewhat poorly drained Tyler, and the poorly drained Robertsville soils formed.

Allegheny fine sandy loam, 0 to 3 percent slopes (AhA).—This nearly level soil has the profile described as representative for the series. It is easily worked and has few or no limitations for farming or most other uses. Active erosion has occurred in only a few local spots, but not extensively enough to be of concern even there. Capability unit I-5; woodland suitability group 2o3.

Allegheny fine sandy loam, 3 to 8 percent slopes, moderately eroded (AhB2).—In most areas this gently sloping soil has lost a significant amount of the original surface layer—not enough, however, to seriously affect use if the soil is properly managed and protected. Plowing to normal depth turns up some of the subsoil in places. A few shallow gullies are present. Included in mapping are a few areas in trees or pasture that have had practically no measureable soil loss from erosion.

The moderate hazard of erosion is the only important factor in use and management of this soil, which otherwise has no significant limitations. Capability unit IIe-5; woodland suitability group 2o3.

Allegheny fine sandy loam, 8 to 15 percent slopes, moderately eroded (AhC2).—This moderately sloping soil has a combined thickness of the surface layer and subsoil that is less than that in the profile described as representative for the series. This is the result of erosion losses. Only a few spots do not have erosion damage. Shallow gullies are present in places, and in local spots only a very thin layer is above the subsoil. Included in mapping are a few acres where slopes are slightly more than 15 percent.

Where this soil is used for cultivated crops, the hazard of erosion is severe. The soil has no important limitations other than slope and the consequent hazard of erosion. Capability unit IIIe-5; woodland suitability group 2o3.

Allegheny silt loam, 0 to 3 percent slopes (A1A).—This nearly level soil has a profile similar to that described as representative for the series, but the surface layer is silt loam. The subsoil also is somewhat more silty, and its finest texture is light silty clay loam.

Included with this soil in mapping are a few acres

that have been slightly, but not seriously, affected by erosion. Also included are some areas where the surface or plow layer is 10 to 15 percent smooth waterworn gravel. These areas are shown on the maps by a gravel symbol. Also included are a few local spots where the subsoil is redder than it is in other areas.

This soil is not so easily worked over a wide range of moisture content as the representative soil for the series is, but it has a higher capacity for retention of moisture and plant nutrients. Under good management it has practically no limitations for most uses. Capability unit I-4; woodland suitability group 2o3.

Allegheny silt loam, 3 to 8 percent slopes, moderately eroded (A1B2).—This gently sloping soil is one of the more extensive of the soils good for farming that are along some of the major streams in the county.

Included with this soil in mapping are a few local spots where erosion has been severe and some shallow gullies are present. Also included are some gravelly areas and a few acres where the subsoil is redder than it is in other areas.

This soil is moderately limited for cultivated crops because of the hazard of erosion. Under proper management, however, it can be safely cultivated or used for other purposes. In places plowing turns up a little of the fine-textured, brighter-colored subsoil. Capability unit IIe-4; woodland suitability group 2o3.

Allegheny silt loam, 8 to 15 percent slopes, moderately eroded (A1C2).—This soil has some minor local areas of washes or gullies. Included in mapping are small areas of severely eroded soils, which must be especially well protected if they are used for cultivated crops. Also included are a few spots that are under a protective cover of trees and a few gravelly areas.

This moderately sloping soil is subject to a severe hazard of erosion if it is regularly cultivated. If it is regularly cultivated, it needs to be well managed and fully protected. Plowing turns up a little of the subsoil in places. Capability unit IIIe-4; woodland suitability group 2o3.

Allegheny silt loam, 15 to 30 percent slopes (A1D).—In most places this soil is under a cover of trees or grass and has not been severely damaged by erosion. Included in mapping are some cleared areas that have been severely washed and gullied and some gravelly areas.

This strongly sloping to steep soil is not suitable for regular and safe cultivation unless it is exceptionally well managed and protected. It is generally safer for other uses than it is for cultivated crops. Capability unit IVe-3; woodland suitability group 2r4.

Allegheny-Urban land complex, 0 to 8 percent slopes (A₀B).—This complex consists of soils of the Allegheny series, either the fine sandy loam or the silt loam phases, that have been graded, cut, filled, or otherwise disturbed and altered for urban development. These nearly level to gently sloping soils are on terraces of the Potomac River and Wills Creek, largely in the city of Cumberland. Included in mapping are areas of some soils on lower terraces that are less acid and generally more fertile than most Allegheny soils.

Relatively undisturbed Allegheny soils make up about 20 percent of this complex. The more disturbed Allegheny soils make up about 60 percent. These soils have been covered by fill material up to 18 inches thick, or have had about two-thirds of their original material removed by cutting or grading. The rest of the complex is areas where the soils have been covered by fill more than 18 inches thick, or have had all or most of their original material graded away. The fill consists of variable material, most of which is from local areas of Allegheny soils.

Internal drainage is medium to rapid in the soils of this complex, except where they have been modified. The soils generally provide good support for footings, foundations, and basements. In exposed areas they are well suited to ornamentals and other types of vegetation.

Much of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Allegheny-Urban land complex, 8 to 20 percent slopes (A_nC).—This complex consists of soils of the Allegheny series that have been graded, cut, filled, or otherwise disturbed and altered for urban development. These moderately sloping to strongly sloping soils are almost entirely in the city of Cumberland.

Relatively undisturbed Allegheny soils make up about 10 percent of this complex. The more disturbed Allegheny soils make up about 50 percent. These soils have been covered by fill material up to 18 inches thick or have had about two-thirds of their original material graded away. The other 40 percent of the complex is areas where the soils have been covered by fill more than 18 inches thick or have had all or most of their original material graded away. The fill consists mostly of material of local origin graded from one spot.

Internal drainage is medium to rapid in the soils of this complex. The soils generally provide good support for footings, foundations, and basements. The soils and the fill are mostly well suited to vegetation. A hazard of erosion does exist, however, even under the prevalent urban conditions, because of slope. Runoff is generally excessive. Limitations are greater for many residential and community uses than they are in areas of the less sloping Allegheny-Urban land complex.

Much of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Alluvial Land

Alluvial land consists of mixed and variable soil material on flood plains. The soil material is washed from various kinds of soils on uplands, and consequently varies widely in origin and texture. It generally ranges from sand to clay and contains many angular, subangular, and round pebbles. In some areas the surface is stony.

Alluvial land (A_u).—This material is on narrow, somewhat V-shaped or U-shaped flood plains along

minor streams in valleys that also are V-shaped. Slopes generally range from about 3 to 10 percent, but are more strongly sloping in some places and more nearly level in a few other places where plains areas are wider.

Most areas are poorly drained, but some are well drained. These areas are mostly very wet in wet periods and variably wet in dry periods. Nearly all are flooded fairly frequently. The floodwaters generally have considerable velocity, but the floods themselves are of very short duration.

This material is not suitable for cultivation. Areas are mostly in wetland trees and provide wildlife habitat and some forms of recreation. Some areas can be reasonably well developed for pasture. Capability unit VIw-1; woodland suitability group 1w9.

Alluvial land-Urban land complex (A_v).—This complex consists of Alluvial land and Urban land that have mostly been graded, cut, filled, or otherwise disturbed and altered for urban development. Some areas are in the part of Cumberland near the Potomac River. Urban land is made up mostly of soils of the Atkins, Huntington, Lindside, Philo, and Pope series that commonly are on flood plains. In places areas of this complex are relatively undisturbed.

Relatively undisturbed areas make up about 10 to 15 percent of this complex. The more disturbed areas make up about 70 percent. Generally these areas have been covered by fill material up to 18 inches thick. The other 15 to 20 percent of the complex is areas that have been covered by fill more than 18 inches thick, mostly in what were once swales or channels of small streams. Relatively few cutting or grading operations were performed on the original soils in these areas. Where fill has been used it consists of variable material, most of which was cut or graded from Allegheny and Weikert soils.

Originally, most of the material in this complex was somewhat poorly drained or moderately well drained. Internal drainage now ranges from slow to medium. This material generally provides fairly stable support for footings, foundations, and basements, but wetness is a common problem, except where drainage has been artificially improved. Suitability for vegetation is variable.

Much of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Atkins Series

The Atkins series consists of deep, poorly drained, nearly level soils that formed mostly in recent sediment derived from areas of acid shale, siltstone, and sandstone. These soils are chiefly on flood plains of streams throughout the county. In places, however, the soils formed mostly in limestone material and are on uplands. The native vegetation is almost entirely wetland hardwoods.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsoil, about 36 inches thick, is

gray heavy silt loam and light silty clay loam that is mottled in brown and yellowish brown. The underlying material, to a depth of 54 inches, is stratified gray gravelly sand that has streaks of yellowish brown.

At the optimum moisture content the Atkins soils are fairly easy to work, but generally they are too wet to work until late in spring. Plowing and planting dates are generally delayed. These soils are subject to flooding, and they commonly are flooded after heavy rains or sudden thaws. Artificial drainage, necessary for any intensive use of these soils, increases the grazing period for pasture. The soils are not too difficult to drain if adequate outlets are available. Available water capacity is high. Water moves through these soils readily but not rapidly. Generally these soils are severely limited both for farm and nonfarm uses by wetness, poor natural drainage, and the hazard of flooding.

Representative profile of Atkins silt loam, in a pasture on the flood plain of Town Creek, near Oldtown:

- Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; medium acid (limed); clear, smooth boundary.
- Blg—7 to 18 inches, gray (10YR 5/1) heavy silt loam; common, medium, distinct, brown (10YR 4/3) and yellowish-brown (10YR 5/4) mottles; weak, medium, blocky structure; friable to firm, sticky and plastic; many roots; dark grayish-brown (10YR 4/2) silt in old root channels; strongly acid; gradual, wavy boundary.
- B2g—18 to 43 inches, gray (10YR 5/1) light silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; moderate, medium, blocky structure; firm, plastic and very sticky; few roots; very dark gray (10YR 3/1) silt coats; strongly to very strongly acid; abrupt smooth boundary.
- IICg—43 to 54 inches, gray (N 5/0) gravelly sand streaked with yellowish brown (10YR 5/4); stratified; loose to firm; very strongly acid.

In places unconforming bedrock is at a depth of 6 to 20 feet or more. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity increases with depth.

The A horizon is silt loam and is somewhat sticky. The B horizon ranges from silt loam to silty clay loam. In this horizon differences in texture are the result of differential sedimentation and not of movement of fine material within the soil profile. In some places a C horizon that is similar in texture to that of the B horizon is present. In most places, however, a IIC horizon is present that differs abruptly from the horizons above it in texture and parent material. This horizon is generally at a depth of 40 to 50 inches. The solum contains a few waterworn pebbles, and the IIC horizon generally contains large amounts.

Some horizons are 2.5Y, 5Y, or neutral in hue, but none are redder than 10YR. The A horizon ranges from 3 to 7 in value, and the thin A1 horizon, where present, is lowest in value. The A horizon is generally 1 to 4 in chroma. The B horizon is 4 to 7 in value and neutral to 2 or more in chroma. This horizon has mottles that are generally 10YR or 7.5YR, but range to 2.5Y and 5YR, in hue. The mottles are 4 or 5 in value and 2 to 8 in chroma. The C horizon, where present, is as variable in color as it is in texture but generally is gleyed.

Atkins soils have drainage conditions similar to those of Melvin soils and, like Melvin soils, they are subject to flooding. They are much more acid than Melvin soils, however, and they contain lesser amounts of natural plant nutrients. Atkins soils generally are much less productive than Melvin soils when used for farming. They formed in the same

kind of recent sediment as the well-drained Pope soils and the moderately well drained Philo soils.

Atkins silt loam (Aw).—This mostly level soil is generally in low areas and depressions on flood plains. Included in mapping are a few acres where the soils are gently sloping and some spots where slopes are steeper and very short.

The hazard of flooding varies in intensity from one area to another on this soil. Where the soil is artificially drained and sufficiently protected against flooding, it is used for corn, hay crops, and pasture. Where the hazard of flooding is severe, the soil is strongly limited for farming; and where the hazard is very severe, it is used mainly for grazing or wooded areas. Capability unit IIIw-7; woodland suitability group 1w9.

Belmont Series

The Belmont series consists of deep, well-drained, strongly sloping to very steep soils that formed in material weathered from acid, red shale, and sandstone containing strata or beds of limestone at fairly close and regular intervals. These soils are on uplands. The native vegetation is mixed hardwoods, dominantly oaks.

In a representative profile in a wooded area, the surface layer is dark reddish-brown and reddish-brown silty clay loam about 8 inches thick. The subsoil is about 26 inches thick. It is reddish-brown heavy silty clay loam in the upper part and dark reddish-brown shaly silty clay loam in the lower part. The underlying material, to a depth of 80 inches, is reddish-brown shaly clay loam.

All areas of Belmont soils are very stony and are unsuitable for cultivation. Even if enough stones are removed to permit cultivation, the soils still are somewhat sticky and difficult to work except over a narrow range of moisture content. Available water capacity is high. The hazard of erosion is severe if the soils are not kept under a permanent cover of vegetation. These soils are high in fertility and are well suited to hay, pasture, or orchards.

Representative profile of Belmont very stony silty clay loam, 20 to 50 percent slopes, in a wooded area on the east side of Stony Run, about 2 miles east of Westernport:

- O1—½ inch to 0, mat of decomposed organic material.
- A1—0 to 3 inches, dark reddish-brown (5YR 2/2) silty clay loam; weak, fine, granular structure; friable, slightly sticky; many roots; medium acid; abrupt, wavy boundary.
- A2—3 to 8 inches, reddish-brown (5YR 4/3) silty clay loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; strongly acid; clear, wavy boundary.
- B21t—8 to 23 inches, reddish-brown (5YR 5/3 to 5/4) heavy silty clay loam; weak to moderate, fine, blocky and subangular blocky structure; friable to firm, sticky and plastic; many roots; distinct but discontinuous clay films; 0 to 20 percent shale; strongly acid; clear, wavy boundary.
- B22t—23 to 34 inches, dark reddish-brown (2.5YR 3/4) shaly silty clay loam; moderate, medium, blocky structure; firm to very firm, sticky and plastic; few roots; prominent clay films; about 20 percent red shale; strongly acid; clear, wavy boundary.

C—34 to 80 inches, reddish-brown (2.5YR 4/4) shaly clay loam; massive, but with stratification lines indicating solifluction; firm, sticky and very plastic; very few roots in upper part; about 30 percent shale; strongly acid.

The solum ranges from 30 to 40 inches in thickness. Depth to bedrock ranges from about 4 to 10 feet. In the lower part of the profile reaction ranges from slightly acid to strongly acid, but it is neutral in the C horizon in places close to limestone strata.

The solum is silty clay loam. The B horizon is about 30 percent clay and is more clayey than the A horizon. In places the C horizons is slit loam, silty clay loam, or clay loam. The horizons vary in content of shale. The A horizon is about 10 percent shale, and the C horizon about 40 percent. The upper part of the solum contains closely spaced angular to subangular fragments of red sandstone that are 10 to 15 inches in diameter. The lower part of the solum and the C horizon contain lesser amounts of stones. Bedrock is mostly red shale interbedded with strata of limestone.

Horizons are 5YR or 2.5YR in hue throughout the profile. The A horizon is 2 to 4 in both value and chroma. Only in the thin A1 horizon is value 2 or 3. The B and C horizons are 3 to 5 in value and mostly 3 or 4, but sometimes 6, in chroma.

The Belmont soils in Allegany County contain more clay than is within the range defined for the series. This difference does not alter the usefulness or behavior of these soils.

Belmont soils are similar to Brooke, Edom, Elliber, Hagerstown, Opequon, and Westmoreland soils. They have a coarser textured B horizon and are redder than Brooke soils. Belmont soils are generally redder and have a much thicker solum than Edom and Opequon soils. They are not so cherty or so strongly acid as Elliber soils. Belmont soils have a coarser textured B horizon that is lower in chroma than Hagerstown soils, and they have characteristic coarse fragments of red shale or sandstone that Hagerstown soils do not have. They are more clayey than Westmoreland soils.

Belmont very stony silty clay loam, 20 to 50 percent slopes (BeE).—This strongly sloping to very steep soil is excellent for upland pasture, and perhaps locally for orchards, but mechanized cultivation of it is not practical. Most areas are wooded and should remain so unless specifically needed for another more intensive, safer use than for cultivated crops. The soil is capable of producing high quality hardwood timber. Capability unit VII_s-2; woodland suitability group 2r₅ (north aspects) and 3r₅ (south aspects).

Brooke Series

The Brooke series consists of deep, well-drained, moderately sloping soils that have a clayey, tough, intractable subsoil. These soils formed in material weathered in place from clayey and shaly impure limestone. They are on one prominent hill in the western part of the county. The native vegetation is mostly oaks. Most areas, however, have been cleared.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown silty clay loam about 6 inches thick. The subsoil is about 29 inches thick. It is dark yellowish-brown clay or silty clay in the upper part and dark-olive shaly clay in the lower part. The substratum, to a depth of about 48 inches, is very dark gray very shaly clay. Below this, to a depth of 56 inches, it is dark reddish-brown silty clay loam. Limestone bedrock is at a depth of about 56 inches.

The Brooke soils have a firm to very firm, tough subsoil and are very difficult to work beyond a depth of more than a very few inches. The subsoil is extremely hard when dry and highly plastic and intractable when wet. It has probably the highest shrink-swell potential of any soil material in the county. Available water capacity is high. In good years these soils are highly productive. The chief limitations for farming are slope and the hazard of erosion, and the difficulty of normal cultivation because of the unusual nature of the subsoil. Limitations are severe for some nonfarm uses, also because of the nature of the subsoil. Unconsolidated or weakly consolidated clay marl is mined in a few areas of these soils.

Representative profile of Brooke silty clay loam, 8 to 15 percent slopes, severely eroded, in a cultivated area just east of Borden Shaft:

- Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, fine, granular and subangular blocky structure; friable to firm, slightly sticky and slightly plastic; many roots; few, small, flaggy fragments of limestone; neutral; clear, wavy boundary.
- B21t—6 to 15 inches, dark yellowish-brown (10YR 4/4) clay or silty clay; strong, medium, prismatic structure and moderate, medium, subangular blocky; firm to very firm, very sticky and very plastic; common roots; strong-brown (7.5YR 5/6) clay films on prisms, becoming more prominent with depth; some dark-gray (N 4/0) accumulations of silt on irregularities of prism faces; few fragments of limestone in upper part; slightly acid; abrupt, wavy boundary.
- B22t—15 to 35 inches, dark-olive (5Y 3/3) shaly clay; moderate to strong, medium, prismatic structure and moderate, medium, angular and subangular blocky; firm, sticky and plastic; common roots on faces of prisms in upper part; distinct yellowish-brown (10YR 5/6) to yellowish-red (5YR 5/6) clay films; some gray or light-gray (10YR 6/1) accumulations of silt on some prism faces; medium to slightly acid; abrupt, wavy boundary.
- C1—35 to 48 inches, very dark gray (N 3/0) very shaly clay; massive; firm, slightly sticky and slightly plastic; variable to 90 percent oriented fine shale fragments; neutral; abrupt, broken boundary.
- C2—48 to 56 inches, dark reddish-brown (5YR 3/2) silty clay loam; massive; friable to firm, sticky and plastic; neutral; abrupt, irregular boundary.
- R—56 inches, argillaceous limestone that has horizontal seams of calcareous clay shale.

The solum ranges generally from 30 to 40 inches in thickness. Bedrock is at a depth of 4 to 8 feet. In most areas reaction ranges from slightly acid to mildly alkaline, but in places it is medium acid.

The A horizon is hardly ever more than 7 inches in thickness, and in most places is much less. This horizon is silty clay loam. The B horizon is mostly clay but is silty clay in places. The C horizon ranges from clay loam and silty clay loam to clay. The very shaly C1 horizon is not present in places. Presence of this horizon apparently is related to presence of shale seams in the parent rock. In addition to shale in some places, horizons contain scattered flat fragments of limestone that are most commonly on and near the surface. These horizons generally are not more than 5 percent such fragments, by volume.

The Ap horizon is generally 10YR in hue, 3 or 4 in value, and 2 or 4 in chroma. In sodded areas it is 3 in value only to a depth of 2 to 4 inches. In the B horizon the interiors of aggregates range from 10YR to 5Y in hue and from 3 to 5 in value. They are 3 or 4, or sometimes 6, in chroma. The surfaces of these aggregates, particularly the

prism exteriors, are highly mottled or variegated in color. This is a result of the high-chroma colors of the distinct to prominent clay coatings that are present and of the silt that has infiltrated around the prisms in dry seasons when the prisms have shrunk and separated.

Brooke soils are not so red in the B horizon as Belmont soils, and they are more sticky and plastic than those soils. Brooke soils are closely associated with Westmoreland soils, but they have finer textured B horizons than those soils.

The Brooke soils in Allegany County have been severely eroded and for this reason have a thinner and lighter colored A horizon than is within the range defined for the series. These differences do not alter the usefulness or behavior of these soils.

Brooke silty clay loam, 8 to 15 percent slopes, severely eroded (BkC3).—This soil has a number of shallow gullies and a few deep ones. Included in mapping are a very few acres where slope is either slightly less than 8 percent or slightly more than 15 percent.

This moderately sloping soil generally is poorly suited to cultivated crops because of slope and the hazard of erosion, and the difficulty of tillage. It is used mostly for hay, small grains, and pasture. Capability unit IVE-1; woodland suitability group 4c2.

Buchanan Series

The Buchanan series consists of deep, somewhat poorly drained to moderately well drained, nearly level to strongly sloping soils that have a fragipan. These soils formed in local accumulations of gray to brown, acid sandstone colluvium that generally contains shale. They are on foot slopes. The native vegetation is mixed hardwoods, dominantly black, white, and red oaks.

In a representative profile in a wooded area, the surface layer is gravelly loam about 7 inches thick. It is very dark grayish brown in the upper part and brown to dark brown in the lower part. The subsoil is about 28 inches thick. It is brownish-yellow or yellowish-brown gravelly light clay loam in the upper part. The lower part is a fragipan of variegated yellowish-brown and strong-brown shaly loam that is dense, firm, and brittle. The underlying material, to a depth of 60 inches, is a continuation of the fragipan. It is variegated yellowish-brown and very pale brown shaly loam.

When they are not too wet, the Buchanan soils are easy to work, except in areas where they are too stony. In places hard sandstone gravel abrades machinery and implements. These soils commonly are wet and are slow to warm in spring. Planting dates are generally delayed. Available water capacity is moderate. The soils are generally limited for most uses by seasonal wetness, a perched water table, slow movement of water through the fragipan, a somewhat restricted rooting zone, slope and the hazard of erosion, and local stoniness.

Representative profile of Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded, in a wooded area at the intersection of Elbinsville Road and Old Hancock Road:

- O1—2 inches to $\frac{1}{4}$ inch, leaf litter consisting mostly of red and white oak.
O2— $\frac{1}{4}$ inch to 0, thin mat of dark-brown organic material.

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) gravelly loam; weak, fine, granular structure; very friable, many roots; strongly acid; clear, smooth boundary.

A2—3 to 7 inches, brown to dark-brown (10YR 4/3) gravelly loam; weak, fine, granular structure; very friable; many roots; about 30 percent sandstone gravel; strongly acid; abrupt, smooth boundary.

B21t—7 to 14 inches, brownish-yellow (10YR 6/6) gravelly light clay loam; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; distinct patchy clay films; about 30 percent sandstone and shale; very strongly acid; clear, wavy boundary.

B22t—14 to 25 inches, yellowish-brown (10YR 5/4) gravelly light clay loam; common, medium, faint, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; friable, sticky and slightly plastic; many roots; few prominent reddish-brown (5YR 5/4) clay films; about 30 percent sandstone and shale; very strongly acid; clear, wavy boundary.

Bx—25 to 35 inches, variegated yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/6) shaly heavy loam; moderate, thick, platy structure and medium, blocky; firm, brittle, sticky and slightly plastic; few roots; prominent light brownish-gray clay films; about 30 percent fine shale; very strongly acid; clear, wavy boundary.

Cx—35 to 60 inches, variegated yellowish-brown (10YR 5/6) and very pale brown (10YR 7/4) shaly loam; moderate, thick, platy structure; firm, brittle, slightly sticky and slightly plastic; about 30 percent fine shale; very strongly acid.

The solum ranges from 24 to 40 inches in thickness. The fragipan ranges from 10 to 30 inches or more in total thickness. Bedrock is generally at a depth of more than 6 feet. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity generally increases with depth.

The A horizon is gravelly loam, and the B horizon is loam, clay loam, or sandy clay loam. The C horizon is generally loam or sandy clay loam. All horizons generally are distinctly gritty. In places the A horizon has numerous colluvial stones, generally sandstone, on and near the surface. The solum is about 15 to 40 percent sandstone gravel or shale fragments.

All horizons generally are 10YR in hue throughout, but the B horizon in places grades to 7.5YR. The A horizon is 2 to 5 in value and 1 to 6 in chroma. Only the thin A1 horizon is 2 or 3 in value and 1 in chroma, and only the A2 horizon in places is 6 in chroma. The B horizon ranges from 4 to 6 in value and from 4 to 8 in chroma. The B2t horizon has mottles of chroma 2 or less in the upper 10 inches. The B and C horizons in places have some high-chroma mottling.

Buchanan soils are similar to Albrights, Cookport, Ernest, Landisburg, Monongahela, and Tyler soils in that they have the same kind of natural drainage and have a fragipan. Their subsoil is not so red as the subsoil in Albrights soils, and they are deeper to bedrock than Cookport soils. They are coarser textured and contain more sandstone fragments than Ernest and Monongahela soils. They are more acid and contain fewer chert fragments than Landisburg soils. They are coarser textured than Tyler soils and are less sticky and more permeable in the upper part of the subsoil than those soils. They formed in the same kind of material as Laidig soils but are not so well drained, and, unlike Laidig soils, Buchanan soils have gray mottles in the subsoil.

Buchanan gravelly loam, 0 to 8 percent slopes, moderately eroded (BuB2).—This nearly level to gently sloping soil has a profile similar to that described as representative for the series, but in most areas part of the surface layer has been lost. Included in mapping are some wet spots where a wetter, darker surface

layer is present and a few acres where few or no coarse fragments are in the surface layer.

This soil needs drainage improvement if it is to be used for some cultivated crops. When it is seasonally wet, however, the hazard of erosion is generally a more important concern of management than drainage. Capability unit IIe-13; woodland suitability group 3o3.

Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded (BuC2).—This moderately sloping soil has the profile described as representative for the series. In most areas some of the surface layer has been lost, and in some spots erosion has exposed the subsoil and some shallow gullies are present.

Included with this soil in mapping are a few acres in trees that have not been noticeably eroded. Also included are some wet spots and a few acres where few or no coarse fragments are in the soil material.

If this soil is regularly cultivated, it needs more intensive erosion-control measures than are needed on less sloping soils. Capability unit IIIe-13; woodland suitability group 3o3.

Buchanan very stony loam, 0 to 15 percent slopes (BvC).—This nearly level to moderately sloping soil has a profile similar to that described as representative for the series, but many loose stones more than 10 inches in diameter are on and near the surface. These stones are mostly sandstone. They are as much as 30 feet apart but generally are much closer. Included in mapping are a few spots that are wetter than other areas.

This soil is not suitable for cultivation because of stoniness, seasonal wetness, and the hazard of erosion. It can produce some hay or pasture crops. Capability unit VI-3; woodland suitability group 3o3.

Buchanan very stony loam, 15 to 25 percent slopes (BvD).—This strongly sloping soil has a profile similar to that described as representative for the series, but many loose stones more than 10 inches in diameter are on and near the surface. The soil has many seep spots, or wet-weather springs, and generally is relatively unstable. It is susceptible to slips and slides, especially where excavations are made for footings, foundations, basements, and the like. Included in mapping are some small areas where slope is more than 25 percent, and some of these areas are more gravelly than stony. Capability unit VI-3; woodland suitability group 3r4.

Calvin Series

The Calvin series consists of moderately deep, well-drained, nearly level to very steep soils that formed in material weathered from red or reddish shale, siltstone, and fine-grained sandstone. These soils are on ridges, mostly in the eastern part of the county. The native vegetation is mixed upland hardwoods and some Virginia pine and white pine.

In a representative profile in a wooded area, the surface layer is shaly silt loam about 9 inches thick. It is dark brown in the upper part and reddish brown in the lower part. The subsoil, about 15 inches thick, is reddish-brown and dark reddish-brown, friable shaly silt loam. The underlying material, to a depth of 38

inches, is reddish-brown shaly silt loam that is higher in content of shale fragments than the subsoil. Shale bedrock is at a depth of 38 inches.

The Calvin soils are easy to work, but coarse fragments in the surface layer in places abrade cultivating implements. Available water capacity is moderate. The soils tend to desiccate deeply in prolonged dry periods. They are limited for farming chiefly by low moisture content, slope, and the hazard of erosion. They are also limited for some nonfarm uses by the moderate depth to bedrock.

Representative profile of Calvin shaly silt loam, 0 to 10 percent slopes, moderately eroded, in a wooded area about $\frac{1}{8}$ mile east of Orleans Church Road and 1 mile north of U.S. Highway No. 40:

- O1—2 inches to $\frac{1}{2}$ inch, litter of hardwood leaves and twigs.
- O2— $\frac{1}{2}$ inch to 0, felty layer of black organic material.
- A1—0 to 4 inches, dark-brown (7.5YR 3/2) shaly silt loam; weak, fine, granular structure; very friable; many roots; very strongly acid; abrupt, wavy boundary.
- A2—4 to 9 inches, reddish-brown (5YR 4/3) shaly silt loam; weak, fine, granular structure; friable, slightly sticky; many roots; about 20 percent red shale fragments up to 2 inches in length; very strongly acid; gradual, wavy boundary.
- B1—9 to 16 inches, reddish-brown (5YR 4/4) shaly silt loam; weak, fine, subangular blocky structure; friable, slightly sticky; many roots; about 30 percent shale fragments finer than those in A horizon; very strongly acid; gradual, wavy boundary.
- B2—16 to 24 inches, dark reddish-brown (2.5YR 3/4) shaly silt loam; moderate, fine, subangular blocky structure; friable, slightly sticky; many roots; appears to contain more fine silt than other horizons; about 30 percent fine shale fragments; very strongly acid; gradual, wavy boundary.
- C—24 to 38 inches, reddish-brown (2.5YR 4/4) shaly silt loam; massive; friable, slightly sticky; very few roots; 40 to 50 percent shale fragments coarser than those in B horizon; shale strongly coated with silt; very strongly acid; clear, irregular boundary.
- R—38 inches, reddish-brown (2.5YR 4/4) fractured and partly weathered shale, mostly unseparated.

The solum ranges from about 18 to 36 inches in thickness. Bedrock is generally at a depth of 24 to 40 inches. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity generally increases with depth.

Horizons are generally silt loam throughout. The lower part of the solum is as much as 50 percent coarse fragments, and the C horizon as much as 75 percent. In addition to shale, some horizons contain channers of hard siltstone or fine-grained sandstone that are mostly red but are brown in places.

The A horizon is 7.5YR or 5YR in hue and 3 or 4 in value. Generally only the thin A1 horizon is 3 in value. The A horizon ranges from 2 to 4 in chroma. The B and C horizons range from 5YR to 10R in hue but are mostly 2.5YR. They range from 3 to 5 in value. Their lower values are inherent and are not caused by the presence of organic matter. These horizons range from 3 to 6 in chroma.

Calvin soils formed in the same reddish shale material as Albrights and Meckesville soils. They do not have the fragipan in the lower part of the B horizon that Albrights soils have, and they are better drained than those soils. They are similar in color to Lehigh soils but are much lower in content of sand and higher in content of silt and clay in all horizons than those soils. They are closely associated with Weikert soils, but unlike those soils they are dominantly reddish brown instead of brown. Calvin soils, unlike Weikert soils, are more than 20 inches deep to shale bedrock, and the shale is reddish brown instead of pale brown.

Calvin channery silt loam, 0 to 10 percent slopes (CaB).—This nearly level to moderately sloping soil has a profile similar to that described as representative for the series, but the soil material is about 15 to 30 percent or more hard flat fragments of reddish fine-grained sandstone. Also, fewer areas of this soil have been affected by erosion, because the channers deter surface wash to some extent in those areas that are used more intensively than for growing trees. In most areas slopes range from 3 to 10 percent. Included in mapping are areas where the subsoil is finer textured and stickier than in this soil. Also included are a few areas where the soil is moderately eroded.

This soil is somewhat difficult to work because of the channers, which abrade some kinds of implements and machinery. For this reason fewer of the areas of this soil have been cleared for farming than areas of the soil described as representative for the series. Once the crops are planted, however, the channers do not deter growth. Capability unit IIe-10; woodland suitability group 4f3.

Calvin channery silt loam, 10 to 20 percent slopes (CaC).—This moderately sloping to strongly sloping soil is mostly under a cover of trees. Included in map-

ping are a few cleared areas where the soil is eroded and has minor gullies.

This soil is mostly in trees, in which state it provides wood crops, watershed protection, and wildlife habitat. It is well suited to farming, however, if consideration is given to the limitations of slope and content of sandstone channers (fig. 3). Capability unit IIIe-10; woodland suitability group 4f3.

Calvin shaly silt loam, 0 to 10 percent slopes, moderately eroded (C1B2).—This soil has the profile described as representative for the series. Included in mapping are a few areas where the subsoil is finer and stickier than it is in this soil.

Most areas of this nearly level to moderately sloping soil have been cleared for farming. In these areas up to 6 inches of the surface layer have been lost, and in a few spots the subsoil has been exposed. The soil is limited for farming chiefly by the moderate hazard of erosion, but also important is the somewhat limited available water capacity. A few areas are in trees and have not been seriously affected by erosion. Capability unit IIe-10; woodland suitability group 4f3.

Calvin shaly silt loam, 10 to 20 percent slopes, moderately eroded (C1C2).—This moderately sloping to



Figure 3.—Area of Calvin channery silt loam, 10 to 20 percent slopes, in pasture. The flat fragments of hard sandstone scattered over the surface are characteristic of channery soils.

strongly sloping soil has had as much as 6 or 7 inches of its surface layer eroded away in places. Included in mapping are a number of scattered spots where the surface layer has been entirely eroded away, where shallow gullies extend into the subsoil, or both.

If this soil is regularly cultivated, more intensive conservation measures are needed than on less sloping soils because of the greater hazard of erosion. Capability unit IIIe-10; woodland suitability group 4f3.

Calvin shaly silt loam, 20 to 30 percent slopes, moderately eroded (CID2).—This strongly sloping to steep soil has had a large part of the surface layer eroded away in most places. Included in mapping are many small scattered areas where the subsoil has been exposed, where shallow gullies are present, or both.

This soil is severely limited for regular cultivation because of the hazard of erosion, even where intense and complex conservation measures are applied. It is better suited to low-intensity uses such as hay or pasture crops or orchards than it is to cultivated crops. Wooded areas have been little affected by erosion. Capability unit IVe-10; woodland suitability group 4f4 (north aspects) and 5f3 (south aspects).

Calvin shaly silt loam, 30 to 45 percent slopes (CIE).—This steep soil has not been noticeably affected by erosion, except in some local spots. Included in mapping are a few cleared spots where the soil is eroded and gullied in places.

This soil is mostly in wooded areas, and this accounts for the few losses to erosion. These areas are better suited to trees than to other uses. In this state they provide wood crops and watershed protection. This soil is not suitable for cultivation because of the severe hazard of erosion. Cleared areas should be restored to permanent vegetative cover of some kind, such as pasture plants or trees. Capability unit VIe-3; woodland suitability group 4f4 (north aspects) and 5f3 (south aspects).

Calvin-Weikert shaly silt loams, 0 to 10 percent slopes, moderately eroded (CnB2).—This complex is about 70 percent Calvin shaly silt loam and 30 percent Weikert shaly silt loam. Both of these soils have a profile similar to that described as representative for their respective series, but a large part of the surface layer has been eroded away and a few shallow gullies are present locally. In most areas of the complex the soils are gently sloping. Included in mapping are a few spots where only a little shaly material is in the surface layer.

This complex is mostly in cultivated crops. Capability unit IIIe-10; woodland suitability group 4f3.

Calvin-Weikert shaly silt loams, 10 to 20 percent slopes, moderately eroded (CnC2).—This complex is about 70 percent Calvin shaly silt loam and 30 percent Weikert shaly silt loam. These soils are moderately sloping to strongly sloping. Included in mapping are some small areas where almost no shale is in the plow layer.

This complex has a severe hazard of erosion, but it has not become significantly eroded or gullied except in the few minor spots included in mapping. Under very good management areas can be regularly culti-

vated. Capability unit IVe-10; woodland suitability group 4f3.

Calvin-Weikert shaly silt loams, 20 to 30 percent slopes, moderately eroded (CnD2).—This complex is about 70 percent Calvin shaly silt loam and 30 percent Weikert shaly silt loam. These strongly sloping to steep soils are subject to active erosion but in most areas they have not been seriously damaged. Included in mapping, however, are some small scattered areas where the soil has been seriously damaged by erosion. Also included are areas that have many shallow gullies and some gullies that are as deep as the bedrock.

This complex is generally not suitable for regular cultivation, even where damage has not yet been severe, because of the hazard of erosion. It is better suited generally to hay and pasture crops or orchards and permanent ground cover than it is to cultivated crops. Areas in trees are better suited to this use than to others, and the wooded areas should be retained unless they are needed for some important use other than cultivated crops. Capability unit VIe-3; woodland suitability group 4f4 (north aspects), and 5f3 (south aspects).

Calvin-Weikert shaly silt loams, 30 to 50 percent slopes (CnE).—This complex is about 70 percent Calvin shaly silt loam and 30 percent Weikert shaly silt loam. These steep to very steep soils are mostly uncleared. Included in mapping are a few small cleared areas where the soil is severely eroded and gullied. Also included are a few areas where relatively little shaly material is in the soil.

This complex is mostly in wooded areas. These areas are valuable for wood crops, watershed protection, and wildlife habitat. Capability unit VIIe-3; woodland suitability group 4f4 (north aspects) and 5f3 (south aspects).

Cavode Series

The Cavode series consists of deep, somewhat poorly drained, nearly level to steep soils that formed in material weathered from soft, fine-grained clay shale. These soils are on uplands in the western part of the county. The native vegetation is mostly mixed water-tolerant hardwoods.

In a representative profile the surface layer is dark grayish-brown, slightly sticky silt loam about 7 inches thick. The subsoil, about 33 inches thick, is yellowish-brown to brown, sticky silty clay loam that is mottled in gray and other colors. The underlying material, to a depth of about 50 inches, is gray very shaly silt loam. Soft shale bedrock is at a depth of about 50 inches.

The Cavode soils are difficult to work to depths over 6 inches in places, even in areas where the soil is not eroded, because of the thinness of the granular surface layer. Also, some areas are too stony for most cultivation. These soils are seasonally wet and are generally slow to warm in spring. Most planting is generally late. The soils need artificial drainage for intensive uses, such as for most cultivated crops. In places drainage is difficult, expensive, and not very efficient during wet periods. Available water capacity is high.

Water moves slowly through the subsoil. The soils are severely limited for farming and many other uses by their strongly impeded drainage. Also, where all but the most nearly level soils are used for crops or modified for other uses, the hazard of erosion is severe. Even under a high level of management these soils are not highly productive.

Representative profile of Cavode silt loam, 0 to 10 percent slopes, moderately eroded, in a pasture on the west side of State Route 36, just south of Borden Shaft:

- Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint, yellowish-brown (10YR 5/6) mottles; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; slightly acid (limed); abrupt, smooth boundary.
- B1—7 to 11 inches, yellowish-brown (10YR 5/6) silty clay loam variegated with dark yellowish brown (10YR 4/4); common, medium, distinct, gray or light-gray (10YR 6/1) mottles; moderate, medium, subangular blocky structure; friable to firm, sticky and slightly plastic; many roots; medium to slightly acid; clear, smooth boundary.
- B21t-11 to 21 inches, yellowish-brown (10YR 5/6) heavy silty clay loam; common, medium, distinct, strong-brown (7.5 YR 5/8) and gray or light-gray (10YR 6/1) mottles; moderate to strong, medium, subangular blocky structure; firm, sticky and plastic; very few roots; thin, distinct, gray or light-gray (10YR 6/1) clay films and silt coatings on aggregates; some soft shale fragments; strongly acid; clear, smooth boundary.
- B22t-21 to 40 inches, brown or dark-brown (10YR 4/3) heavy silty clay loam; common, coarse, prominent, yellowish-brown (10YR 5/8) and gray or light-gray (N 6/0) mottles; strong, medium, subangular blocky structure; firm, sticky and plastic; prominent gray or light-gray (N 6/0) clay films; about 20 percent soft shale fragments; strongly acid to very strongly acid; clear, smooth boundary.
- Cg—40 to 50 inches, gray or light-gray (N 6/0) very shaly silt loam; few, medium, distinct, brown (10YR 5/3) to yellowish-brown (10YR 5/6) mottles; medium, platy structure; firm, slightly sticky and slightly plastic; about 80 percent very soft shale fragments; some seams of silty clay or silty clay loam; very strongly acid; clear, smooth boundary.
- R—50 inches, soft, very fine grained gray shale.

The solum ranges generally from 40 to 50 inches in thickness. Soft shale bedrock that has seams of siltstone or sandstone in places is generally at a depth of 3½ to 5 feet. In unlimed areas reaction ranges mostly from strongly acid to very strongly acid, and acidity increases with depth.

The A horizon is somewhat sticky when wet and is generally thin. The B2t horizon ranges in texture from heavy silty clay loam to silty clay and clay. It averages between 30 and 35 percent clay. The C horizon is as fine textured as the B horizon in places, but it generally contains more silt and less clay. Many stones are on and near the surface in some areas of these soils, and all horizons contain fragments of siltstone or sandstone in place. The solum, especially the lower part of the B horizon, contains shale fragments in places. The C horizon generally contains many such fragments. This shale is generally soft enough to crumble under moderate pressure.

Horizons are mostly 10YR or yellowish in hue throughout, but in places some are neutral in hue. The A horizon is 2 to 5 in value, and generally only the thin undisturbed A1 horizon is 2 and 3 in value. The A horizon is 1 to 4 in chroma. The B2t horizon is 4 to 6 in value. The B horizon is 4 to 6 in chroma in the upper part but is 3 or less in the lower part. The C horizon also is 3 or less in chroma. Where mottles are present they vary from neutral to 5YR in hue. The solum has some high-chroma mottles in the lower part, but all horizons below the A horizon generally

have mottles of chroma 2 or less. Coatings on aggregates are dominantly gray.

Cavode soils are similar in natural internal drainage to Ernest and Tyler soils. They are higher in content of clay than those soils, however, and generally are more difficult to drain.

Cavode silt loam, 0 to 10 percent slopes, moderately eroded (CoB2).—This soil has the profile described as representative for the series. In most areas slopes are between 3 and 10 percent. The soil is nearly level only in a few areas. Locally sandstone fragments are in the surface layer. Included in mapping are some wet spots and some small areas where the soil is slightly better drained than this soil.

Runoff is high on this soil and moderate soil losses occur in practically all areas except some that are wooded. Drainage improvement, however, is the most important and difficult problem in management. Capability unit IIIw-5; woodland suitability group 2w6.

Cavode silt loam, 10 to 20 percent slopes, moderately eroded (CoC2).—A large part of the surface layer of this moderately sloping to strongly sloping soil has eroded away. Plowing generally turns up material from the subsoil. Generally the soil is not severely eroded, however—possibly because of the cohesiveness of the subsoil and its consequent resistance to erosion and gullyng.

Included with this soil in mapping are areas of severely eroded soil, wet spots, areas where the soils are a little better drained than usual, and places where the surface layer contains channers of sandstone. Also, included are a number of scattered areas where slopes are somewhat steeper than 20 percent. Control of erosion is at least as important as drainage improvement, if not more so, in areas used for farming and other purposes. Capability unit IIIe-34; woodland suitability group 2w6.

Cavode very stony silt loam, 0 to 30 percent slopes (CrD).—This nearly level to steep soil has a profile similar to that described as representative for the series, but stones, chiefly of sandstone origin and mostly 10 inches in diameter, are on and near the surface. These stones are as much as 30 feet apart but are generally much closer. Included in mapping are a few areas where slopes are a little steeper than 30 percent.

Most areas of this soil are under a cover of trees. These wooded areas are probably better suited to trees than to other uses. The soil is severely limited for cultivated crops by wetness, the hazard of erosion, and stoniness, but it can produce some hay and pasture crops. Capability unit VI-3; woodland suitability group 2w6.

Chavies Series

The Chavies series consists of deep, well-drained, nearly level to gently sloping soils that formed in moderately old water-laid sediment influenced somewhat by limestone material. These soils are on low terraces or second bottoms of some of the major streams in the county. The native vegetation is chiefly mixed hardwoods and some conifers.

In a representative profile in a cultivated area, the surface layer is brown or dark-brown loam about 9 inches thick. The subsoil, about 28 inches thick, is brown or dark-brown silt loam and heavy loam that is slightly to moderately sticky when wet. The substratum, to a depth of about 56 inches, is brown stratified sand and waterworn gravel.

The Chavies soils are easy to work and manage. They have no inherent limitations for farming other than a moderate hazard of erosion in sloping areas. Available water capacity is moderate. The soils generally have a good supply of natural plant nutrients, and if they are well managed they can be highly productive. Unless protected by dikes or levees, they are inundated in places at infrequent intervals during periods of severe regional floods.

Representative profile of Chavies loam, 0 to 3 percent slopes, on a low terrace above Town Creek, about 1,100 feet southeast of the point where U.S. Highway No. 40 crosses Town Creek:

- Ap—0 to 9 inches, brown or dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable, slightly sticky; many roots; slightly acid; abrupt, smooth boundary.
- B21t—9 to 20 inches, brown or dark-brown (7.5YR 4/4) light silt loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; faint clay films; contains enough sand to be gritty; about 2 percent fine shale; medium acid; gradual, smooth boundary.
- B22t—20 to 37 inches, brown or dark-brown (7.5YR 4/4) heavy loam or light silt loam; moderate, medium, subangular blocky structure; friable, sticky and slightly plastic; few roots; faint to distinct patchy clay films; contains enough sand to be gritty; about 2 percent fine shale; medium acid; abrupt, smooth boundary.
- IIC—37 to 56 inches, dominantly brown (10YR 5/3) stratified sand and waterworn gravel; loose; some pockets and thin varves of silt and clay; medium acid.

The solum ranges from about 30 to 40 inches in thickness. Bedrock is at a depth of 6 to 20 feet or more. In unlimed areas reaction ranges from slightly acid to strongly acid. The C horizon is generally less strongly acid than the solum.

The A horizon is loam that is moderately high in content of silt but low in content of clay. The B horizon is only slightly finer in texture than the A horizon, but it has faint coats or films of clay on aggregates and shows some structure development. Otherwise, horizons in the solum have only faint individual differences. The solum is less than 18 percent clay. It ranges from about 30 percent to a little more than 50 percent silt, and the B horizon is generally higher in content of silt than the A horizon. In places a C horizon is between the B22t and the IIC horizons. It is similar to the B horizon in texture and color but does not have the structure and clay films of that horizon. The solum contains shale fragments or waterworn pebbles in places. The B horizon is as much as about 20 percent such fragments and pebbles in places in the lower part. The IIC horizon generally contains more waterworn pebbles than other horizons.

The solum is dominantly 7.5YR in hue, but the A horizon is 10YR in places, and the B horizon grades to 10YR and 5YR in places. The A horizon is 3 to 5 in value, and the thin, undisturbed A1 horizon is lowest in value. The A horizon is 2 to 4 in chroma. The B horizon is generally 4 in both value and chroma but is 5 in value and 6 in chroma in places.

Chavies soils are unique in Allegany County, both in profile characteristics and in position on the landscape.

They are somewhat similar to Allegheny soils but are coarser textured, especially in the B horizon, show weaker horizonation, and generally are at lower elevations above streams than those soils.

Chavies loam, 0 to 3 percent slopes (CsA).—This soil has the profile described as representative for the series. Included in mapping are minor areas that show some evidence of erosion.

Under good management this nearly level soil has practically no limitations for most uses, other than the hazard of flooding during unpredictable periods of general floods. Capability unit I-6; woodland suitability group 2o3.

Chavies loam, 3 to 8 percent slopes (CsB).—Erosion is a hazard on this gently sloping soil, but appreciable evidence of accelerated erosion is apparent only in a few areas. Included in mapping are a few areas where slopes are greater than 8 percent.

This soil is moderately limited for cultivated crops because of the hazard of erosion. Capability unit IIe-6; woodland suitability group 2o3.

Cookport Series

The Cookport series consists of moderately deep, moderately well drained, nearly level to steep soils that have a very firm, dense fragipan. These soils formed in material weathered from hard acid sandstone that in places has seams of shale or siltstone. Cookport soils are on uplands. The native vegetation is mixed hardwoods, dominantly oaks.

In a representative profile in a cultivated area, the surface layer is silt loam about 11 inches thick. It is dark grayish brown in the upper part and dark yellowish brown in the lower part. The subsoil, about 24 inches thick, is yellowish-brown light silty clay loam that has gray and yellowish-red mottles in the lower part. The substratum is at a depth of about 35 to 40 inches. It is a variegated yellowish-brown and brown, gravelly fine sandy loam fragipan that is very firm, dense, and brittle. Bedrock is at a depth of 40 inches.

The Cookport soils are fairly easy to work except where the surface layer is too stony. In places the soils are 10 to 15 percent very hard angular channers of sandstone. The channers do not seriously interfere with cultivation, but they abrade and sometimes damage equipment. These soils are seasonally wet and are somewhat late to warm in spring. They are only moderately deep to bedrock, however, and water moves slowly through the fragipan. As a result, these soils tend to dry out more quickly and thoroughly than many deeper soils that are more porous and permeable. Available water capacity is moderate. These moderately productive soils are limited for some uses by impeded drainage, a seasonally perched water table, slow movement of water through the subsoil, slope, the hazard of erosion, and local stoniness.

Representative profile of Cookport silt loam, 0 to 10 percent slopes, moderately eroded, in a cultivated area about 1 mile east of Mount Savage:

- Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; about 5 percent angular sandstone pebbles; slightly acid (limed); abrupt, smooth boundary.

- A2—8 to 11 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; about 5 percent sandstone gravel that contains some shale; slightly acid; clear, smooth boundary.
- B21t—11 to 20 inches, yellowish-brown (10YR 5/6) light silty clay loam; weak, fine, subangular blocky structure; firm, sticky and plastic; common roots; distinct clay films; about 10 percent sandstone gravel; medium acid; clear, smooth boundary.
- B22t—20 to 35 inches, yellowish-brown (10YR 5/6) light silty clay loam; common, medium, distinct, grayish-brown (10YR 5/2) and few, fine, distinct, yellowish-red (5YR 4/6) mottles; moderate, medium, subangular blocky structure that has a tendency toward platy; firm, sticky and plastic; few roots; distinct, almost continuous clay films; some fine brown concretions; about 15 percent sandstone gravel; strongly to very strongly acid; abrupt, wavy boundary.
- Cx—35 to 40 inches, variegated yellowish-brown (10YR 5/6) and brown (10YR 5/3) gravelly fine sandy loam; strong, coarse, platy structure and moderate, fine, subangular blocky; very firm, dense, brittle, slightly sticky and slightly plastic; few faint clay films; about 20 percent angular sandstone pebbles and some fine shale chips; very strongly acid; abrupt, irregular boundary.
- R—40 inches, hard, gray to yellowish-brown sandstone that contains some thin seams of shale.

The solum ranges from about 24 to 36 inches in thickness. Bedrock is generally at a depth of 30 to 40 inches. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity generally increases with depth.

The A horizon is silt loam. The B2t horizon is heavy silt loam or light silty clay loam. A Bx horizon is present instead of a B22t horizon in places. This Bx horizon is similar to the B22t horizon except for the platy structure. It is firm, dense, and brittle soil material. The Cx horizon in places is loam, silt loam, or fine sandy loam. In places a thin, friable C2 horizon is between the Cx horizon and bedrock. In places the A horizon is very stony on and near the surface. The A and B horizons are as much as 15 percent gravel or more and the Cx horizon is as much as 30 percent.

Horizons generally are 10YR in hue throughout, but the B horizon grades to 7.5YR in places. The A horizon is 3 to 5 in value, and the thin A1 horizon is lowest in value. The A horizon is 2 to 6 in chroma, and the A2 horizon is highest in chroma. The B and C horizons are 5 or 6 in value and 4 to 8 in chroma. In the Bt horizon mottles have chroma of 2 or less within 10 inches of the upper boundary. The B and C horizons have high-chroma mottles in places.

Cookport soils are similar to Albrights, Buchanan, Ernest, Landisburg, Monongahela, and Tyler soils in that they have the same kind of natural drainage and fragipan. They differ from those soils in being shallower to bedrock. They formed in the same or similar material as the well-drained Dekalb and Leetonia soils, the poorly drained Nolo soils, and the very poorly drained Lickdale soils.

Cookport silt loam, 0 to 10 percent slopes, moderately eroded (C+B2).—This soil has the profile described as representative for the series. In most areas slopes are between 3 and 10 percent. The soil is nearly level only in a few areas. In practically all areas, except some that are wooded, the soil has lost up to 6 or 8 inches of the surface layer. A few gullies are present locally. Some areas of this soil have a surface layer that is 10 to 15 percent hard sandstone channers.

This soil is limited for farming and some other uses by impeded drainage, poor aeration of the fragipan, and the hazard of erosion. Generally control of erosion is considered to be the most important concern of

management. Capability unit IIe-13; woodland suitability group 2w3.

Cookport silt loam, 10 to 20 percent slopes, moderately eroded (C+C2).—This moderately sloping to strongly sloping soil has a profile similar to that described as representative for the series, but the combined thickness of the surface layer and subsoil is less in many places, and bedrock is at a depth of 30 inches or less. In all cleared areas 6 to 8 inches of the surface layer has been lost as a result of erosion.

Included with this soil in mapping are some gravelly areas where 6 to 8 inches of the surface layer has eroded away and an accumulation of hard gravel or channers is on the surface. Also included are wooded areas that have been less seriously affected by erosion, channery areas, seep or wet spots in sloping areas, and scattered areas where slopes are a little steeper than 20 percent.

This soil is rather severely limited for cultivated crops because of the hazard of erosion. In places drainage improvement is not needed to grow certain crops. Capability unit IIIe-13; woodland suitability group 2w3.

Cookport very stony silt loam, 0 to 10 percent slopes (CuB).—This nearly level to moderately sloping soil has a profile similar to that described as representative for the series, but many loose stones of sandstone origin and more than 10 inches in diameter are on and near the surface. The stones are as much as 30 feet apart, but generally are much closer. Generally this soil is a little shallower to bedrock than most Cookport soils.

This soil is mostly under a cover of trees. Existing wooded areas are better suited to growing trees than to other uses. The soil is severely limited for cultivated crops by stoniness, seasonal wetness, and the hazard of erosion in areas of steeper slopes. It can produce hay and pasture crops in places. Capability unit VI-3; woodland suitability group 2w3.

Cookport very stony silt loam, 10 to 30 percent slopes (CuD).—This moderately sloping to steep soil has a profile similar to that described as representative for the series, but many loose stones more than 10 inches in diameter are on and near the surface. Included in mapping are a few areas where slopes are slightly steeper than 30 percent.

This soil is rather strongly limited, because of the erosion hazard, for some nonfarm uses, especially those having to do with community development and recreation. This hazard, however, does not significantly affect production of hay or pasture crops. Capability unit VI-3; woodland suitability group 2w3.

Cut and Fill Land

Cut and fill land (Cv) consists, in part, of land areas where the soil has been cut away by grading and similar operations. Other areas generally have been filled with several feet of soil and other material. In places the fill is only a foot or two in thickness. Various kinds of material make up the fill. A minor part of the material is hydraulic fill from the Potomac River. A good many areas, particularly in railroad

yards, have been cut or filled and then ballasted with cinders, slag, mine wastes and various kinds of gravel. Other areas have been filled with soil material from leveling operations, mostly from areas of Allegheny, Gilpin, and Weikert soils. In places the fill is shaly to stony mine wastes.

This material generally is not suitable for farming. Most of it is used for commercial or residential purposes. It is so variable in nature in Allegany County that the suitability of any particular area for any use must be determined by onsite investigation. Not assigned to a capability unit or woodland suitability group.

Dekalb Series

The Dekalb series consists of moderately deep, well-drained, nearly level to very steep soils that formed in material weathered in place mostly from gray to pale-brown sandstone that has some thin strata of shale or siltstone. These soils are in mountainous areas. The native vegetation is mixed hardwoods, mostly black oak.

In a representative profile in a wooded area, the surface layer is sandy loam about 8 inches thick. It is dark grayish-brown in the upper part and dark yellowish-brown in the lower part. The subsoil is about 18 inches thick. The upper part is brown heavy sandy loam that is somewhat sticky when wet. The lower part is yellowish-brown sandy loam. The substratum, at a depth of about 26 to 36 inches, is light yellowish-brown sandy loam that contains many coarse fragments. Hard sandstone bedrock is at a depth of 36 inches.

The Dekalb soils are easy to work, except where they are too stony. Their sandstone fragments abrade equipment. Available water capacity is low. These soils are limited for most uses by low available water capacity, low content of plant nutrients, reaction that is very strongly acid to extremely acid, slope, the hazard of erosion, and stoniness. The stoniness is present in about 85 percent of the areas.

Representative profile of Dekalb very stony sandy loam, 0 to 12 percent slopes, in a wooded area on Jackson Road, about 2 miles south of Lonaconing:

- O1—2 inches to 1 inch, leaf litter consisting of black oak and maple.
- O2—1 inch to 0, felty layer of black organic material.
- A1—0 to 2 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, fine, granular structure; loose; many roots; many stones; very strongly acid; clear, wavy boundary.
- A2—2 to 8 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, fine, subangular blocky structure; loose; many roots; 20 percent coarse fragments; very strongly acid; clear, wavy boundary.
- B2—8 to 18 inches, brown (10YR 5/3) heavy sandy loam; moderate, fine, subangular blocky structure; very friable, slightly sticky; many roots; 30 percent coarse fragments; very strongly acid; gradual, wavy boundary.
- B3—18 to 26 inches, yellowish-brown (10YR 5/6) sandy loam; weak, fine, subangular blocky structure; very friable; few roots; 35 to 45 percent coarse fragments; very strongly acid; gradual, irregular boundary.

C—26 to 36 inches, light yellowish-brown (10YR 6/4) sandy loam; single grained; loose to very friable; very few roots; 45 to 55 percent coarse fragments; very strongly acid; abrupt, irregular boundary.

R—36 inches, hard, gray to pale-brown, fractured sandstone and siltstone.

The solum ranges from about 20 to 36 inches in thickness. Bedrock is generally at a depth of less than 40 inches. In unlimed areas reaction ranges from very strongly acid to extremely acid, and acidity generally increases with depth.

The A, B, and C horizons generally have the same texture. In places the B horizon is slightly finer in texture than the A and C horizons, but in these places no clay films are on aggregates and the material shows no other evidence of clay accumulation. Coarse fragments of acid sandstone that range in size from channers to stones are on and near the surface. All horizons generally contain such fragments throughout.

Horizons are generally 10YR in hue throughout, but the A and C horizons range to 2.5Y and the B horizon ranges chroma, and only the very thin A1 horizon is 2 and 3 in chroma, and only the very thin A1 horizon is 2 and 3 in value and 1 in chroma. The B and C horizons are 4 to 6 in value, and the C horizon generally is higher in value than the B. These horizons are 3 to 6 in chroma.

Dekalb soils are closely associated with and are similar to Lelew soils. Their B horizon is not reddish, whereas the one in Lelew soils is, and they formed in material weathered from gray to pale-brown sandstone and siltstone instead of mostly red sandstone. They formed in the same kind of material as Cookport, Leetonia, Lickdale, and Nolo soils. They are well drained, like Leetonia soils, but do not have the thin organic hardpan in the B horizon that Leetonia soils have. They have better natural drainage than Cookport, Lickdale, and Nolo soils.

Dekalb channery sandy loam, 0 to 12 percent slopes, moderately eroded (DeB2).—This nearly level to moderately sloping soil has a profile similar to that described as representative for the series, but the surface layer is 15 to 30 percent or more hard flat channers of sandstone as long as 6 inches. Few if any stones, however, are present. In places the subsoil is as much as 50 percent such fragments, by volume. Part of the surface layer has eroded away in most areas of this soil. Included in mapping are a number of areas where few if any sandstone fragments are in the surface layer and some spots where the soil is more silty and less sandy than it is elsewhere.

The coarse fragments in this soil do not significantly limit its use for farming. They do, however, constitute a limitation for other uses, and they abrade and damage some types of equipment. The fragments also adversely affect such operations as preparation and seeding of pasture areas and lawns. Capability unit IIe-20; woodland suitability group 3f3.

Dekalb channery sandy loam, 12 to 25 percent slopes, moderately eroded (DeC2).—This moderately sloping to strongly sloping soil has a severe hazard of erosion. In most cleared areas it has lost a significant part of the surface layer, and in some of these areas sandstone channers have accumulated on the surface.

Included with this soil in mapping in places are wooded areas where the soil has not been significantly eroded. Also included are areas where few if any fragments are on the surface, and spots where the surface layer is more silty and less sandy than it is elsewhere. Capability unit IIIe-20; woodland suitability group 3f3.

Dekalb channery sandy loam, 25 to 45 percent slopes (DeD).—Most areas of this steep soil have not been completely cleared, and in these areas little or no erosion has occurred. Included in mapping, however, are cleared areas where erosion has caused the loss of a considerable part of the surface layer. In some places in these areas, gullies extend deeply into the subsoil. Also included are small areas where the soil contains relatively few sandstone channers throughout.

This soil is not well suited to cultivation because of slope. It is better suited to less intensive uses such as pasture, sodded orchards, and original or replanted wooded areas. Capability unit VIe-3; woodland suitability group 2f4 (north aspects) and 3f4 (south aspects).

Dekalb very stony sandy loam, 0 to 12 percent slopes (DkB).—This nearly level to moderately sloping soil has the profile described as representative for the series. It contains sandstone fragments that are a few feet apart and range from 10 inches in diameter to the size of boulders.

This soil is not suitable for cultivation. It is well suited to production of wood crops, and in some areas it produces fairly good hay or pasture crops. A considerable acreage is used for or intended to be used for community development and recreation. Capability unit VI-4; woodland suitability group 3f3.

Dekalb very stony sandy loam, 12 to 25 percent slopes (DkC).—This moderately sloping to strongly sloping soil contains sandstone fragments that are a few feet apart and range from 10 inches in diameter to the size of boulders. Slope does not severely limit use for farming or wood crops, but does for community development and some recreational purposes. Capability unit VI-4; woodland suitability group 3f3.

Dekalb and Lehigh very stony soils, 25 to 45 percent slopes (DIE).—This undifferentiated group consists of very stony soils of the Dekalb and Lehigh series. Individual areas are either all Dekalb, all Lehigh, or a combination of both soils. The surface layer is loam, sandy loam, or fine sandy loam. The Dekalb soil differs from the Lehigh soil mainly in color, because it formed in material weathered from grayish or yellowish sandstone rather than reddish sandstone. The Lehigh soil has the profile described as representative for the Lehigh series. Included in mapping at very high elevations are a number of scattered areas where a thin organic-iron horizon is in the subsoil.

The steep and very stony soils in this group do not have significant differences in use and management. They are more difficult to manage for wood crops or other suitable uses than similar but less sloping soils. On south slopes fully exposed to sunlight, trees suitable for timber generally grow slower than on north slopes where moisture evaporates less. Some areas are suitable for hay or pasture crops but need greater protection and control than less steep areas of the same or similar soils. Capability unit VII-3; woodland suitability group 2f4 (north aspects) and 3f4 (south aspects).

Dekalb and Lehigh very stony soils, 45 to 75 percent slopes (DIF).—This undifferentiated group consists of

very stony soils of the Dekalb and Lehigh series. These soils are on the steepest and most rugged mountainsides in the county. Individual areas are either all Dekalb, all Lehigh, or a combination of both soils. Included in mapping at very high elevations are some areas where a thin organic-iron horizon is in the subsoil.

The very steep and very stony soils in this group produce wood crops, although slope hinders planting, harvesting, and other woodland management practices somewhat. They are almost unsuitable for any more intensive use because of slope. Capability unit VII-3; woodland suitability group 2f4 (north aspects) and 3f5 (south aspects).

Edom Series

The Edom series consists of moderately deep, well-drained, gently sloping to steep soils that formed in place in material weathered from impure limestone. These soils are on ridges mostly in the central part of the county. The native vegetation is mostly mixed upland hardwoods, dominantly oaks.

In a representative profile in a wooded area, the surface layer is silt loam about 7 inches thick. It is very dark brown in the upper part and brown to dark brown in the lower part. The subsoil, about 17 inches thick, is strong-brown silty clay in the upper part and brown or dark-brown silty clay loam in the lower part. It is sticky and plastic when wet. Limestone bedrock is at a depth of 24 inches.

The Edom soils are fairly difficult to work. The friable silt loam surface layer is fairly thin, and plowing penetrates the sticky and potentially cloddy subsoil in places, especially in severely eroded areas. Available water capacity is moderate. These soils have a good supply of lime and some other plant nutrients, and they are high in natural fertility. Under very good management they are highly productive in irrigated areas and also in other areas during periods of adequate rainfall.

Representative profile of Edom silt loam, 15 to 25 percent slopes, moderately eroded, in a wooded area on Hinkle Road, about ½ mile south of U. S. Highway No. 40:

- O1—2 inches to ½ inch, litter of hardwood leaves and twigs.
- O2—½ inch to 0, felty layer of dark-brown organic material.
- A1—0 to 3 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; very friable, slightly sticky and slightly plastic; many roots; 5 to 10 percent flat channers of limestone; neutral; clear, wavy boundary.
- A2—3 to 7 inches, brown to dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; 5 to 10 percent shaped channers of limestone; slightly acid; abrupt, smooth boundary.
- B21t—7 to 16 inches, strong-brown (7.5YR 5/6) silty clay; strong, medium, blocky structure; firm, sticky and plastic; common roots; distinct clay films; about 10 percent channers; medium acid; clear, wavy boundary.
- B22t—16 to 24 inches, brown or dark-brown (7.5YR 4/4) silty clay loam; moderate, fine, blocky structure; firm, sticky and plastic; few roots; faint clay

films on aggregates, distinct coatings on fragments; 25 to 40 percent shaped channers of limestone; neutral to mildly alkaline; abrupt, wavy to irregular boundary.

R—24 inches, hard gray limestone.

The solum ranges from about 14 to 36 inches in thickness. Bedrock is generally at a depth of 24 to 40 inches. In unlimed areas reaction is strongly acid in places, but in the lower part of the solum and in the C horizon, it ranges generally from neutral to mildly alkaline. Base saturation is very high.

The A horizon is generally silt loam. The B2t horizon is silty clay loam to clay and averages between 35 and 60 percent clay. In places a highly channery C horizon a few inches thick is present. Flat channers of impure limestone make up as much as 10 percent of the A horizon, as much as 50 percent of the B horizon, and as much as 90 percent of the C horizon where present. Subangular to semiflaglike fragments are on and near the surface of these soils in many areas. In addition, some rock outcrops are present in places, although these outcrops are not significant anywhere in the county.

Horizons are generally 7.5YR in hue, but the A horizon ranges to 10YR and the B to 5YR. The A horizon is 2 to 4 in value, and the thin A1 horizon is lowest in value. The A horizon is also 2 to 4 in chroma. The B horizon is 4 or 5 in value and 4 to 8 in chroma.

Edom soils are closely associated in some limestone areas with Opequon soils. They are not so shallow to bedrock and in most areas do not contain so many coarse limestone fragments as Opequon soils. They are less closely associated in limestone areas with the much deeper Elliber and Hagrestown soils.

Edom silt loam, 3 to 8 percent slopes, moderately eroded (EdB2).—This gently sloping soil has a profile similar to that described as representative for the series, but this soil is a little thicker over bedrock. In most areas part of the surface layer has eroded away, and a few gullies are present locally. In some spots the surface layer is more than 10 percent flat fragments of limestone.

Most areas of this soil are cleared and cultivated. Where the soil is used for intertilled or row crops, the hazard of erosion is moderate. Capability unit IIe-11; woodland suitability group 2o3.

Edom silt loam, 8 to 15 percent slopes, moderately eroded (EdC2).—In cleared areas this moderately sloping soil has lost a large part of the surface layer as a result of erosion. In most areas fragments of limestone are few. Locally some small flat channers of limestone are in the surface layer. Included in mapping are wooded areas that have been only slightly affected by erosion. Also included are a few stony areas.

This soil, like other Edom soils, is not very thick or deep and cannot easily tolerate losses of soil material. If it is regularly cultivated, the hazard of erosion is severe. Capability unit IIIe-11; woodland suitability group 2o3.

Edom silt loam, 15 to 25 percent slopes, moderately eroded (EdD2).—This strongly sloping soil has the profile described as representative for the series. In cleared areas it is gullied to some extent. The gullies, although not very deep, cut through the subsoil and extend to bedrock in places. The gullies in many places and the surface layer in some local areas contain common to fairly abundant amounts or accumulations of flat channers of limestone. Included in mapping are

a few very stony areas. They are shown on the maps by the symbol for stoniness.

This soil is not well suited to cultivated crops because of slope. Even where small losses of soil material have occurred as a result of erosion, this soil soon thins to such an extent that any farming use becomes impractical. Capability unit IVe-10; woodland suitability group 2r4.

Edom silt loam, 25 to 45 percent slopes, moderately eroded (EdE2).—This steep soil is high in natural fertility but is not suitable for cultivation. It is capable of producing good hay or pasture crops, however, when it has sufficient moisture. It is also well suited to orchards if it is kept under a protective plant cover and other appropriate conservation measures are practiced. Wooded areas, especially those where the soil is stony and steep, are better suited to trees than to other uses.

Included with this soil in mapping are some areas where many flat channers of limestone are on and near the surface. Also included are a few areas where slopes are slightly steeper than 45 percent, and a few stony areas, which are shown on the maps by the symbol for stoniness. Capability unit VIe-3; woodland suitability group 2r5.

Edom silty clay loam, 25 to 45 percent slopes, severely eroded (EeE3).—This steep soil has a profile similar to that described as representative for the series, but the surface layer and in most places part of the subsoil have been eroded away. The soil is gullied locally and some of the gullies extend to bedrock. The gullies and dips, and in places the surface layer, contain accumulations of limestone fragments. Included in mapping are a few areas where slopes are a little less than 25 percent.

This soil is better suited to trees and to limited and controlled grazing areas than it is to other uses. Any cultivation of it works the sticky, clayey subsoil, which becomes very cloddy. Capability unit VIIe-3; woodland suitability group 2r5.

Elliber Series

The Elliber series consists of deep, well-drained, nearly level to very steep, cherty soils that formed in material weathered in place from very cherty impure limestone. These soils are on uplands mostly in the central part of the county. The native vegetation is mixed hardwoods, dominantly oaks.

In a representative profile in a cultivated area, the surface layer is cherty silt loam about 13 inches thick. It is dark grayish brown in the upper part and grayish brown in the lower part. The subsoil, about 29 inches thick, is yellowish-brown very cherty loam. The underlying material, at a depth of 42 to 50 inches, is also yellowish-brown very cherty loam, but it consists mostly of chert fragments. Hard, very cherty limestone bedrock is at a depth of about 50 inches.

The Elliber soils are difficult to work in places because of the high content of chert, especially in areas of severely eroded soils where additional concentrations of chert are on the surface. The chert is very abrasive to implements and machinery. Available

water capacity is moderate. The thick solum and the generally quite thick substratum, however, provide a large moisture storage capacity for most crops, especially deep-rooted crops. Also, water moves through these soils readily. The soils are mostly used for orchards. They are limited for some uses chiefly by the high content of chert, and in some areas by slope, the hazard of erosion, and stoniness.

Profile of Elliber cherty silt loam, 12 to 25 percent slopes, moderately eroded, in an orchard on Oliver Beltz Road:

- Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) cherty silt loam; weak, fine, granular structure; very friable, slightly sticky; many roots; medium acid; gradual, smooth boundary.
- A2—10 to 13 inches, grayish-brown (10YR 5/2) cherty silt loam; weak, fine, granular structure; very friable, slightly sticky and slightly plastic; many roots; strongly acid; abrupt, smooth boundary.
- B21—13 to 30 inches, yellowish-brown (10YR 5/4) very cherty loam or light clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; about 70 percent chert fragments; discontinuous silt coatings; strongly acid; gradual, smooth boundary.
- B22—30 to 42 inches, yellowish-brown (10YR 5/6) very cherty loam; weak, fine, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; few roots; about 80 percent chert fragments; some patchy silt coatings; very strongly acid; gradual, smooth boundary.
- C—42 to 50 inches, yellowish-brown (10YR 5/6) very cherty loam; single grained; firm; very few roots; 90 to 95 percent chert fragments; very strongly acid; abrupt, wavy to irregular boundary.
- R—50 inches, hard, very cherty, light-gray to very pale brown limestone.

The solum ranges generally from 40 to 60 inches in thickness, but it is thicker in places. Hard bedrock is at a depth of about 4 to 30 feet or more. In unlimed areas reaction ranges from strongly acid to very strongly acid.

The A horizon is silt loam but borders on loam. It generally contains enough sand to feel gritty. The B horizon is loam, light clay loam, or light silt loam. It shows no evidence of clay accumulation from the horizons above. The A horizon ranges from about 25 to more than 50 percent chert, and the B horizon is generally 60 to 80 percent chert fragments. Also, horizons in some areas contain many stones of hard cherty limestone throughout.

Horizons generally are 10YR in hue throughout, but the B horizon ranges to 7.5YR in places. The A horizon is 3 to 6 in value, and only the very thin A1 horizon, where it is under a cover of trees or sod, is 3 in value. The A horizon is 2 to 4 in chroma. The B horizon is 5 to 7 in value and 4 to 8 in chroma.

Elliber soils are similar to Weikert soils in content of skeletal or fragmented rock material. They are deeper to bedrock than those soils, however, and the skeletal material is dominantly chert and does not include shale. Elliber soils formed in cherty limestone residuum instead of the colluvium from cherty limestone that Landisburg and Loysville soils formed in. Also unlike Landisburg and Loysville soils, Elliber soils are more than 50 percent chert fragments. The are better drained than Landisburg and Loysville soils.

Elliber cherty silt loam, 0 to 5 percent slopes (E1A).—This nearly level to gently sloping soil has a profile similar to that described as representative for the series, but a little less chert generally is in the surface layer. In some areas this soil is slightly eroded.

This soil is somewhat limited for cultivation by its content of chert. The chert is very abrasive to imple-

ments. Capability unit IIs-26; woodland suitability group 3f3.

Elliber cherty silt loam, 5 to 12 percent slopes, moderately eroded (E1B2).—In cultivated areas this gently sloping to moderately sloping soil has lost some of the fine material of the plow layer because of erosion, resulting in some local accumulations of chert fragments. Included in mapping are a few wooded areas that have been less affected by erosion. Also included are areas where the lower part of the subsoil is somewhat firmer or harder than it is in other areas.

This soil is used extensively for orchards. It is also used for general crops and truck crops. Generally the hazard of erosion is a more important limitation of this soil than its cherty nature. This hazard, however, is not very difficult to control. Capability unit Iie-26; woodland suitability group 3f3.

Elliber cherty silt loam, 12 to 25 percent slopes, moderately eroded (E1C2).—This moderately sloping to strongly sloping soil has the profile described as representative for the series. It is the most extensive and important of the Elliber soils in the county. In areas of orchards it has had some moderate losses of soil material because of erosion. Included in mapping are some spots where the soil is more severely eroded and is gullied to some extent, some scattered areas where the subsoil is somewhat finer and stickier, but less cherty, than it is in other areas, and some places where the subsoil is harder or firmer in the lower part than it is in other areas.

This soil is used mostly for orchards (fig. 4). Capability unit IIIe-26; woodland suitability group 3f3.

Elliber cherty silt loam, 25 to 45 percent slopes (E1D).—In local spots this steep soil is severely eroded and has deep gullies. Included in mapping are a few areas where the subsoil is less cherty than it is in other places and areas where slopes are somewhat steeper than 45 percent.

This soil is suited to orchards and extensively used for them. Many of the orchards are planted on the contour, and all need a protective cover of sod or other vegetation. The soil is severely limited for cultivated crops because of the hazard of erosion. Capability unit VIe-3; woodland suitability group 2f4 (north aspects) and 3f4 (south aspects).

Elliber very stony silt loam, 0 to 25 percent slopes (EmC).—This nearly level to strongly sloping soil has many loose stones of hard cherty limestone on the surface and throughout. The stones are more than 10 inches in diameter and they are so close together that cultivation of the soil is not practical. Some outcropping ledges of bedrock also are present. Included in mapping are small extremely stony areas where rock outcrops are more numerous than in other areas.

This soil is mostly in trees and is well suited to this use. Trees for timber grow well and are not difficult to manage where slopes are moderate. Capability unit VI-2; woodland suitability group 3f3.

Elliber very stony silt loam, 25 to 45 percent slopes (EmD).—This steep soil is generally not as deep to bedrock as less stony soils that have similar slopes. Many outcrops of hard limestone are present locally. These outcrops are generally, but not always, cherty.



Figure 4.—Young peach orchard on Irons Mountain. The soil is Elliber cherty silt loam, 12 to 25 percent slopes, moderately eroded. The Elliber soils are used extensively for orchards in Allegany County.

Trees for timber are somewhat more difficult to manage on these steep slopes, but growth is as rapid as it is in areas of more gently sloping soils. Capability unit VII_s-2; woodland suitability group 2f4 (north aspects) and 3f4 (south aspects).

Elliber very stony silt loam, 45 to 75 percent slopes (EmF).—This very steep soil is less stony than usual in places where it is steepest. Where some of these areas have been cleared, however, the soil is eroded and is gullied to some extent.

This soil is too stony for cultivation, and so steep that even management of woodland is difficult. Tree planting is not practical in places, and the soil is severely limited for harvesting wood crops. Despite the difficulties and limitations, however, the soil is still better suited to trees than it is to other uses. Wooded areas provide watershed protection and some kinds of wildlife habitat, in addition to the wood crops. Capability unit VII_s-2; woodland suitability group 2f4 (north aspects) and 3f5 (south aspects).

Ernest Series

The Ernest series consists of deep, somewhat poorly drained to moderately well drained, nearly level to strongly sloping soils that formed in local accumula-

tions of debris made up of colluvium, mostly derived from areas of acid shaly material. These soils are on foot slopes and at their bases. The native vegetation is water-tolerant hardwoods, dominantly oaks and hickories.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches. The upper 16 inches is yellowish-brown silty clay loam that has gray mottles in the lower part. The rest of the subsoil is a gray light silty clay loam fragipan that has yellowish-red mottles and is very firm, dense, and brittle.

The Ernest soils are fairly easy to work at the optimum moisture content, but they generally are wet in spring. Wetness delays plowing and planting in places. Available water capacity is moderate. Under good management these soils are highly productive in places. They are limited for some uses by seasonal wetness, a perched water table, slow movement of water in the fragipan, a somewhat restricted rooting zone, and, in local areas, by slope and the hazard of erosion.

Representative profile of Ernest silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area

on Stottlemeyer Road, about $\frac{7}{8}$ mile northeast of its intersection with Middle Ridge Road:

- Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; many roots; slightly acid (limed); abrupt, wavy boundary.
- B21t—8 to 15 inches, yellowish-brown (10YR 5/4) light silty clay loam; weak, fine, subangular blocky structure; friable, sticky and plastic; many roots; distinct but discontinuous clay films; strongly acid; clear, wavy boundary.
- B22t—15 to 24 inches, yellowish-brown (10YR 5/8) silty clay loam; common, medium, prominent, gray or light-gray (10YR 6/1) mottles; moderate, fine, subangular blocky structure; friable; sticky and plastic; many roots; prominent reddish-brown (5YR 4/4) clay films; about 10 percent shale; very strongly acid; clear, wavy boundary.
- Bx—24 to 60 inches, gray or light-gray (10YR 6/1) light silty clay loam; common, coarse, prominent, yellowish-red (5YR 5/8) mottles; strong, thick, platy structure and medium, blocky; very firm, brittle, sticky and plastic; few roots in upper 12 inches; prominent yellowish-brown (10YR 5/6) clay films; about 10 percent shale; very strongly acid.

The solum ranges from about 40 to more than 60 inches in thickness. Unconforming bedrock is at a depth of 6 to 20 feet or more. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity increases with depth.

The A horizon is silt loam, and the B horizon ranges from heavy silt loam to silty clay loam. The B21t horizon is less than 10 inches in thickness. The Bx horizon is not as fine in texture as the finest parts of the B2t horizon. In places a C horizon is present at a depth of about 48 inches. This horizon has platy structure in some places but not in others. It does not have distinct clay films, and it generally is very shaly. In places any horizon in the solum is as much as 20 percent shale fragments and flat fragments of sandstone. Generally the sandstone fragments, where present, are only on and near the surface, but the content of shale increases with depth.

Horizons are mostly 10YR in hue throughout, but in places the B horizon is 7.5YR and the Bx horizon is 2.5Y. The A horizon is 3 to 5 in value and 1 to 4 in chroma. The very thin, undisturbed A1 horizon is lowest in value and chroma. The B2t horizon is 4 to 6 in value and 3 to 8 in chroma. The Bx horizon is 5 to 7 in value. It is 1 or 2, and in places 3, in chroma. The B21t horizon is not mottled, but the B22t horizon has mottles of chroma 2 or less. The Bx and C horizons have mostly high-chroma mottles.

Ernest soils are similar to Albrights, Buchanan, Cookport, Landisburg, Monongahela, and Tyler soils in that they have the same kind of natural drainage and have a fragipan. They are not so red as Albrights soils. They have more silt and less sand in all horizons than Buchanan soils. They are deeper to bedrock than Cookport soils. They are more strongly acid than Landisburg soils and, unlike those soils are not cherty. They are more clayey than Monongahela soils and, unlike those soils, do not contain waterworn gravel. They do not have low-chroma mottles as near the surface as Tyler soils. They formed in the same general kind of somewhat shaly local colluvium as the well-drained Shelocta soils.

Ernest silt loam, 0 to 3 percent slopes (ErA).—This nearly level soil has little or no hazard of erosion. Included in mapping are a few areas that have been affected by runoff from adjacent higher areas.

If this soil is used for cultivated crops, drainage improvement is needed in places. The most important limitation for cultivated crops, however, is seasonal wetness. Capability unit IIw-3; woodland suitability group 3w1.

Ernest silt loam, 3 to 8 percent slopes, moderately eroded (ErB2).—This gently sloping soil has the profile described as representative for the series. In cleared areas it has lost a significant part of the surface layer as a result of erosion. Some scattered gullies are present, a few of which are very deep. Included in mapping are a few areas where numerous fragments of hard sandstone are on and near the surface.

This soil needs drainage improvement where it is used for cultivated crops and some other purposes. If it is regularly cultivated, the most important concern of management generally is the hazard of erosion. This soil has excellent pond sites in places (fig. 5). Capability unit IIe-13; woodland suitability group 3w1.

Ernest silt loam, 8 to 15 percent slopes, moderately eroded (ErC2).—In cultivated areas this moderately sloping soil has lost a significant part of the surface layer as a result of erosion. Included in mapping are a few areas where the soil contains hard sandstone gravel, and some spots where enough colluvial stones are on and near the surface to interfere with cultivation. These spots are shown on the maps by the symbol for stoniness.

In all cultivated areas this soil is severely limited by the hazard of erosion. For continued safe cultivation, intensive conservation practices are needed. Capability unit IIIe-13; woodland suitability group 3w1.

Ernest silt loam, 15 to 25 percent slopes, moderately eroded (ErD2).—This strongly sloping soil is not very suitable for cultivated crops. It is safer and more suitable for long-term hay or improved pasture crops, and for these uses drainage improvement is not necessary in places. Included in mapping are a few gullied areas, some gravelly areas, and a few areas where slopes are a little steeper than 25 percent. Capability unit IVE-9; woodland suitability group 3w1.

Ernest-Landisburg-Urban land complex, 0 to 8 percent slopes (EuB).—This complex consists of nearly level to gently sloping soils of the Ernest and Landisburg series that have been graded, cut, filled, or otherwise disturbed and altered for urban development. To a significant extent these soils are in the Cumberland city area. Included in mapping are small areas of Monongahela soils that have a similar kind of drainage and subsoil as Ernest and Landisburg soils. Also included are some small areas of the somewhat wetter Loysville and Nolo soils.

Relatively undisturbed Ernest and Landisburg soils and the soils included in mapping make up about 15 percent of this complex. The more disturbed Ernest and Landisburg soils make up about 60 percent. These soils have been covered by as much as 18 inches of fill material or have had about two-thirds of the original soil removed by cutting or grading. The remaining 25 percent of the complex is areas where the soils have been covered by more than 18 inches of fill or have had all or most of their original material graded away. Where fill has been used, it consists of variable material, most of which is from adjacent areas of the same kinds of soils.

Internal drainage is impeded by the fragipan in the soils of this complex. The soils are somewhat poorly



Figure 5.—Pond on Ernest silt loam, 3 to 8 percent slopes, moderately eroded, near Town Creek. The Ernest soils in Allegany County are generally in areas of foot slopes and depressions. They provide good sites for ponds.

drained or moderately well drained in most areas, but in spots they are poorly drained. They generally provide fairly good support for footings, foundations, and basements. The soils tend to be seasonally wet, however, except where drainage is improved. The soils and soil material of this complex range from fairly well suited to very well suited to vegetation.

Much of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Ernest-Landisburg-Urban land complex, 8 to 25 percent slopes (EuD).—This complex consists of gently sloping to strongly sloping soils of the Ernest and Landisburg series that have been graded, cut, filled, or otherwise disturbed and altered for urban development. These soils are mostly in the suburbs of Cum-

berland. Included in mapping are a few small areas of Loysville and Monongahela soils.

Relatively undisturbed Ernest and Landisburg soils make up about 10 percent of this complex. The more disturbed Ernest and Landisburg soils make up about 50 percent. They have been covered by as much as 18 inches of fill material, or about two-thirds of the original soil has been removed. The remaining 40 percent of the complex is areas where the soils have been covered by more than 18 inches of fill or where all or most of the original soil has been graded or cut away.

Internal drainage is impeded by the fragipan in the soils of this complex. The soils are somewhat poorly drained to moderately well drained. They provide fairly good support for footings, foundations, and basements. They tend to be seasonally wet, however, except where drainage is improved. In places where

these soils are on accumulations of colluvium, they tend to slip and slide, especially when wet and under heavy load. The soils and soil material of this complex range from fairly well suited to very well suited to ornamentals and other types of vegetation. The hazard of erosion is severe. Runoff generally is excessive. Limitations for many residential and community uses are greater in areas of steeper slopes.

About 20 to 25 percent of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Gilpin Series

The Gilpin series consists of moderately deep, well-drained, nearly level to very steep soils that formed in material weathered mostly from acid shale and siltstone but also from thin beds of fine-grained sandstone. These soils are on uplands. The native vegetation is mixed upland hardwoods, dominantly oaks.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown channery silt loam about 9 inches thick. The subsoil, about 12 inches thick, is yellowish-brown channery silt loam in the upper part and grades to yellowish-brown channery light silty clay loam in the lower part. The substratum, at a depth of 21 to 26 inches, is strong-brown very channery silt loam. Bedrock of siltstone and shale is at a depth of 26 inches.

The Gilpin soils are easy to work, but cultivation is impractical because of stoniness. In places these soils contain flat fragments of hard fine-grained sandstone. These fragments do not affect suitability of the soils for crops but they do abrade farm implements. Available water capacity is moderate. Under good management these soils are moderately to highly productive. They are limited for some uses mostly by slope, the hazard of erosion, and the moderate depth to bedrock.

Representative profile of Gilpin channery silt loam, 0 to 10 percent slopes, moderately eroded, in a cultivated area just off Hinkle Lane, about 2 miles northeast of Mount Savage:

- Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) channery silt loam; weak, fine, granular structure; friable, sticky and slightly plastic; many roots; about 15 percent channers and some fine shale; slightly acid (limed); abrupt, smooth boundary.
- B1—9 to 14 inches, yellowish-brown (10YR 5/4) channery silt loam; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; about 15 percent channers; slightly acid; gradual, smooth boundary.
- B2t—14 to 21 inches, yellowish-brown (10YR 5/6) channery light silty clay loam; moderate, fine, subangular blocky structure; friable to firm, sticky and plastic; few roots; thin discontinuous clay films; 15 to 25 percent channers and shale chips; medium acid; gradual, irregular boundary.
- C—21 to 26 inches, strong-brown (7.5YR 5/6) very channery silt loam; massive; friable, slightly sticky; 50 to 75 percent sandstone channers and shale chips; strongly acid; abrupt, irregular boundary.
- R—26 inches, bedrock of gray siltstone and shale, fractured but mostly unseparated.

The solum ranges from about 20 to 36 inches in thickness but is generally nearer the lower part of this range. Bedrock is at a depth ranging between 24 and 40 inches but also is generally nearer the lower part of the range. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity generally increases with depth.

The A horizon is silt loam. The B horizon ranges from silt loam to light silty clay loam. It is significantly higher in content of clay than the A horizon. The Bt horizon is 18 to about 30 percent clay. The C horizon is coarser textured than the B horizon. In many areas the surface and solum are very stony. The stones are angular or subangular sandstone or hard siltstone. The solum is about 0 to 30 percent coarse fragments of shale, siltstone, fine-grained sandstone, or combinations of these.

Horizons are generally 10YR in hue throughout, but the lower part of the solum and the C horizon range to 7.5YR. The A horizon is 3 to 5 in value, and the thin A1 horizon is lowest in value. The A horizon is 2 to 4 in chroma. The B horizon is generally 5 in value and ranges from 3 to 8, but is mostly 4 or 6, in chroma.

Gilpin soils are similar to Litz and Weikert soils but differ in that they have horizons of evident clay accumulation. They are deeper to bedrock than Weikert soils. They have a thinner B horizon and are much shallower to bedrock than Shelocta soils.

Gilpin silt loam, 0 to 10 percent slopes, moderately eroded (G1B2).—This soil has a profile similar to that described as representative for the series, but it contains few if any hard channers of fine-grained sandstone or siltstone in the surface layer and subsoil. In most places it has lost a few inches of the surface layer as a result of erosion, and a few shallow gullies are present. In most areas the soil is gently sloping to moderately sloping. In some areas the surface layer contains many small flat fragments of relatively soft shale.

This soil is one of those that is used most intensively for farming in the western part of the county. Its most important limitation is the moderate hazard of erosion. Capability unit IIe-10; woodland suitability group 3o3.

Gilpin silt loam, 10 to 20 percent slopes, moderately eroded (G1C2).—This moderately sloping to strongly sloping soil has lost a significant part of the surface layer as a result of erosion, and in a few places plowing turns up the sticky subsoil. In places the surface layer contains small shale fragments. A few shallow gullies are present locally.

This soil is limited for certain uses by slope and the consequent severe hazard of erosion. It is an important soil for farming in the county, however, and if proper conservation measures are intensively applied, it can be cultivated continuously. Capability unit IIIe-10; woodland suitability group 3o3.

Gilpin silt loam, 20 to 30 percent slopes, moderately eroded (G1D2).—Locally this strongly sloping to steep soil has a number of shallow gullies and a few deeper ones. Included in mapping are a few areas where considerable soft shale is in the surface layer.

This soil is excellent for close-growing noncultivated crops such as hay or for highly improved pasture crops. It is also good for orchards if the surface is kept under protective vegetation. Capability unit IVe-10; woodland suitability group 2r4 (north aspects) and 3r4 (south aspects).

Gilpin channery silt loam, 0 to 10 percent slopes, moderately eroded (GnB2).—This nearly level to moder-

ately sloping soil has the profile described as representative for the series. In most areas it has lost part of the surface layer as a result of erosion, and shallow gullies are present in places. Included in mapping are a few spots where few if any channers are in the surface layer.

This soil is used mostly for farming. Its hard channers of sandstone do not limit capability for farming, but they abrade and in places damage some kinds of equipment. Capability unit IIe-10; woodland suitability group 3o3.

Gilpin channery silt loam, 10 to 20 percent slopes, moderately eroded (G_nC2).—Included with this moderately sloping to strongly sloping soil in mapping are cleared areas where part of the surface layer is missing and many local spots where the surface layer has completely eroded away. In some of these areas an accumulation of hard sandstone fragments is on the surface and also in some of the shallow gullies that are present. Also included are a few small areas where few if any hard channers of sandstone are in the surface layer.

This soil is severely limited for some uses by the hazard of erosion, but if it is intensively and carefully managed and protected, can be safely kept in regular cultivation. Capability unit IIIe-10; woodland suitability group 3o3.

Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded (G_nD2).—Included with this strongly sloping to steep soil in mapping are a few areas where almost no coarse fragments are in the surface layer, many widely scattered spots where erosion has been severe, and many local areas of shallow gullies.

Because of slope and the consequent very severe hazard of erosion, this soil is not very well suited to cultivated crops. Wooded areas are better suited to trees than to other uses. They should remain wooded unless they are needed for important uses other than cultivated crops, such as hay crops, pasture, or sodded orchards. Capability unit IVe-10; woodland suitability group 2r4 (north aspects) and 3r4 (south aspects).

Gilpin channery silt loam, 30 to 45 percent slopes (G_nE).—This steep soil mostly has not been cleared and thus is eroded only in some scattered spots. Included in mapping are some areas where relatively few coarse fragments are on and near the surface, and some spots, generally near foot slopes, where the soil is deeper to bedrock than usual.

This soil is too steep for intensive uses such as for cultivated crops. If it is very well protected, it can be safely used for some hay or pasture crops or orchards in places. Capability unit VIe-3; woodland suitability group 2r5 (north aspects) and 3r5 (south aspects).

Gilpin very stony silt loam, 0 to 10 percent slopes (G_sB).—This nearly level to moderately sloping soil has stones that are chiefly hard, fine-grained sandstone but in places are siltstone. The stones range from about 10 to 20 inches in diameter, but locally larger boulders are present in places. The stones are mostly close together, both on the surface and in the soil. They seldom are as much as 30 feet apart.

This soil is too stony for customary kinds of cultivation, but in places areas are cleared and used for hay

or pasture. It has no significant limitations for management and production of wood crops and only moderate limitations for most nonfarm uses. Capability unit VIe-3; woodland suitability group 3o3.

Gilpin very stony silt loam, 10 to 30 percent slopes (G_sD).—This moderately sloping to steep soil is generally more irregular and bouldery on the surface than more gently sloping Gilpin soils. As a result, it has greater limitations for most uses. It is suitable for some hay and pasture crops, but in places stones have to be removed. It is somewhat difficult to manage for wood crops. Trees in most wooded areas grow faster on northern slopes that are partly shaded than those in areas fully exposed to sunlight. Capability unit VIe-3; woodland suitability group 2r4 (north aspects) and 3r4 (south aspects).

Gilpin-Urban land complex, 0 to 10 percent slopes (G_uB).—This complex consists of nearly level to moderately sloping soils of the Gilpin series that have been graded, cut, filled, or otherwise disturbed and altered for urban development. These soils are well drained and silty. Some are channery or gravelly, some are somewhat shaly, and a few are stony. They are in parts of Frostburg and its surrounding area and in other smaller areas. Included in mapping are small areas where bedrock is at a greater depth than it is in other areas.

Relatively undisturbed Gilpin soils make up about 15 percent of this complex. The more disturbed Gilpin soils make up about 60 percent. These soils have been covered by as much as 18 inches of fill material, or have had about two-thirds of the original soil material removed by cutting or grading. The rest of the complex is areas where the soils have been covered by fill more than 18 inches thick or have had all or most of their original profile graded away. Where fill has been used, it consists of variable material, most of which is from local areas of Gilpin soils.

Internal drainage is medium to rapid in the soils of this complex, except where they have been modified. The soils generally provide good support for footings and foundations. Hard bedrock generally is at a depth of 24 to 40 inches in undisturbed areas and excavations for basements or other uses are difficult to make in places. Where made, however, the excavations are generally stable and dry. The soils and soil material of this complex are well suited to ornamentals and other types of vegetation.

Much of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Gilpin-Urban land complex, 10 to 30 percent slopes (G_uD).—This complex consists of moderately sloping to steep soils of the Gilpin series that have been graded, cut, filled, or otherwise disturbed and altered for urban development. These soils are mostly in or near Frostburg. They are stony in about 20 percent of their acreage, and in the rest of their acreage contain many smaller rock fragments. Included in mapping are some local areas where bedrock is at a greater depth than it is in other areas.

Relatively undisturbed Gilpin soils make up about 10 percent of this complex. The more disturbed Gilpin soils make up about 55 percent. These soils have been covered by as much as 18 inches of fill material or about two-thirds of the original soil material has been graded away. The remaining 35 percent of the complex is areas where the soils have been covered by fill more than 18 inches thick or have had all or most of their original soil material graded away. Where fill has been used, it consists mostly of material of local origin graded from higher areas.

Internal drainage is medium to rapid in the soils of this complex. The soils generally provide good support for footings and foundations. Excavations for basements are difficult to make in places because of bedrock, but where made they are mostly stable and dry. The soils and generally the soil material of this complex are suitable for vegetation. The hazard of erosion is severe because of slope, even under the prevalent urban conditions. Runoff generally is excessive.

Much of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Gilpin and Weikert very stony silt loams, 30 to 65 percent slopes (G_wF).—This undifferentiated group consists of very stony and very steep soils of the Gilpin and Weikert series. Areas are made up of either Gilpin or Weikert soils or a combination of both. Weikert very stony silt loam is shallower to bedrock than Gilpin very stony silt loam. Included in mapping are a few spots where the soils are deeper to bedrock than they are in other areas.

The soils in this group have no important differences in use and management. In most areas they are in trees. The soils are too steep to be suitable for other more intensive uses. Capability unit VII_s-3; woodland suitability group 2r5 (north aspects) and 3r5 (south aspects).

Gravel Pits

Gravel pits (G_x) are mostly in areas of Allegheny soils, but local deposits of gravel are under some Monongahela and Tyler soils on terraces and under Pope, Philo, and some other soils on flood plains. The number of pits increases as new sources of gravel are sought. Most pits are along terraces or second bottoms of the Potomac River.

Gravel pits have no farming value. They are exploited for the waterworn alluvial gravel in the underlying strata of some of the soils on terraces. Some areas possibly could be converted and used for recreation or other purposes. Capability unit VIII_s-4; not assigned to a woodland suitability group.

Hagerstown Series

The Hagerstown series consists of deep, well-drained, moderately sloping to steep soils that formed in material weathered in place from hard, gray, almost pure limestone. These soils are on ridges mostly in the central part of the county. The native vegetation is

mixed upland hardwoods, but most areas have been cleared.

In a representative profile in a cultivated area, the surface layer is silt loam about 13 inches thick. It is dark yellowish brown in the upper part and yellowish brown in the lower part. The subsoil is about 51 inches thick. It is strong-brown silty clay loam in the upper 8 inches and yellowish-red silty clay, or clay that is sticky to very sticky when wet, below. The substratum is yellowish-red clay about 5 inches thick. Hard limestone bedrock is at a depth of 69 inches.

The Hagerstown soils are easy to work, except at times when they are too wet. Rooting and movement of water are not impeded in these very thick and deep soils. Available water capacity is very high. The soils generally have a good supply of calcium and other natural plant nutrients. They are among the most highly productive soils for adapted crops in Maryland and other Eastern States. Their only significant limitation for most uses is slope, as it relates to the hazard of erosion.

Representative profile of Hagerstown silt loam, 20 to 40 percent slopes, moderately eroded, in a pasture just off Herdinger Road, about ¼ mile east of Christie Road:

- Ap—0 to 8 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine, granular structure; friable; slightly sticky and slightly plastic; many roots; medium acid; abrupt, smooth boundary.
- A2—8 to 13 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, granular structure; friable; slightly sticky and slightly plastic; common roots; slightly acid; clear, smooth boundary.
- B1—13 to 21 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, fine, subangular blocky structure; friable to firm, sticky and slightly plastic; very few roots; medium acid; gradual, smooth boundary.
- B2t—21 to 42 inches, yellowish-red (5YR 4/6) light silty clay; strong, fine, subangular blocky structure; firm, sticky and plastic; very few roots in upper part; thin but distinct clay films; medium acid; diffuse boundary.
- B22t—42 to 64 inches, yellowish-red (5YR 5/6) silty clay or clay; strong, fine, blocky and subangular blocky structure; very firm, plastic and very sticky; thin continuous clay films; medium to strongly acid; diffuse boundary.
- C—64 to 69 inches, yellowish-red (5YR 5/6) clay; massive; firm, plastic and very sticky; medium to strongly acid; abrupt, irregular boundary.
- R—69 inches, hard gray limestone.

The solum generally is less than 50 inches thick. Except for ledges in places, bedrock generally is at a depth of 5 to 10 feet. Reaction ranges mostly from neutral to strongly acid throughout, but it is alkaline in some places close to weathering limestone. The C horizon is calcareous in the lower part in places. Base saturation is high.

The A horizon is silt loam. The B2t horizon ranges from heavy silty clay loam to clay, and it averages 40 to 70 percent clay. The C horizon ranges from heavy clay loam to clay. Horizons contain residual chert and limestone fragments ranging in size from channers to large flagstones throughout. Also present locally are a few outcrops of hard limestone.

The A horizon ranges from 10YR to 5YR in hue. It is 3 to 5 in value, and the thin A1 horizon is generally lowest. The A horizon is 2 to 4 in chroma. The B horizon is mostly 5YR or 7.5YR in hue, but hue ranges to 2.5YR. This horizon is generally 4 or 5 in value and 4 to 6 in chroma. The C horizon is similar to the B horizon in color but in places is variegated, generally with yellower hues.

Hagerstown soils are similar to Belmont, Brooke, Edom, Elliber, Opequon, and Westmoreland soils. They are thicker and deeper than all of these soils except Elliber. They are not so yellow or as highly cherty throughout as Elliber soils, and they do not have the very weakly developed B horizon that those soils have. They are most closely associated geographically with Opequon soils, but Hagerstown soils are not shallow to limestone bedrock and do not contain so many medium to very large limestone fragments as those soils.

The Hagerstown soils in Allegany County have a thicker solum than is within the range defined for the series, but this difference does not greatly alter the usefulness or behavior of these soils.

Hagerstown silt loam, 8 to 20 percent slopes, moderately eroded (HeC2).—This moderately sloping to strongly sloping soil is mostly in cultivated areas where it has lost part of the surface layer as a result of erosion, but the loss is not significant enough to seriously affect capability, use or management. A few shallow gullies are present, but they do not penetrate deeply into the subsoil. Included in mapping are a few areas where reddish shale material is present in places and a few areas where bedrock is not at as great a depth as it is in other areas. In these areas the surface layer also is a little finer textured and stickier than usual.

This soil has a silty, granular surface layer that is easily worked and is used mostly for farming. Under good management that includes proper conservation practices, this soil can be cultivated continuously. Areas of it are in orchards of very high quality. Capability unit IIIe-1; woodland suitability group 1c3.

Hagerstown silt loam, 20 to 40 percent slopes, moderately eroded (HeE2).—This strongly sloping to steep soil has the profile described as representative for the series. Included in mapping are some small spots where erosion has been severe, some areas of shallow gullies, and a few areas where slopes are a little steeper than 40 percent. Also included in places are areas where the soil contains some reddish shale material, has a stickier surface layer, and is a little shallower than usual.

This soil is generally not suitable for cultivation because of the severe hazard of erosion. It is used mostly for pasture crops and orchards. Capability unit IVe-1; woodland suitability group 1c4.

Huntington Series

The Huntington series consists of deep, well-drained, nearly level to moderately sloping soils that formed in sediment washed from areas of limestone or in limestone residuum. These soils are on flood plains and foot slopes. The native vegetation is mixed hardwoods, but almost all areas have been cleared.

In a representative profile in a cultivated area, the surface layer is dark-brown silt loam about 11 inches thick. The subsoil is brown to dark-brown heavy silt loam about 20 inches thick. The substratum, to a depth of 60 inches, is dark-brown, stratified gravelly silt loam and gravelly silty clay loam.

The Huntington soils are easy to work. Available water capacity and natural fertility are high. These are possibly the most productive soils in the county.

Where they are on flood plains, the soils are subject to a hazard of flooding, and this generally is their only significant limitation. The flooding generally is not severe, but at times it is severe in places. Most floods occur infrequently and are of short duration. Where they are not on flood plains, soils that are gently sloping to moderately sloping have a hazard of erosion.

Representative profile of Huntington silt loam in the Murley Branch flood plain, just south of Williams Road at Rush:

- Ap—0 to 11 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; friable, slightly sticky; many roots; few fine waterworn pebbles; neutral; clear, smooth boundary.
- B1—11 to 23 inches, brown to dark-brown (10YR 4/3) heavy silt loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; few fine waterworn pebbles; neutral; gradual, smooth boundary.
- B2—23 to 31 inches, brown to dark-brown (10YR 4/3) heavy silt loam; moderate, fine, subangular blocky structure; friable; sticky and slightly plastic; common roots; about 10 percent fine waterworn pebbles; neutral; clear, smooth boundary.
- C—31 to 60 inches, dark-brown (10YR 4/3) stratified gravelly silt loam and gravelly silty clay loam; friable to very friable, slightly sticky; few roots in upper 12 inches; gravel consists of waterworn limestone and shale and some sandstone; neutral.

The C horizon is at a depth of about 30 to more than 50 inches. Unconforming bedrock is at a depth of 6 to 20 feet or more. In most areas reaction is neutral throughout, but in some horizons it ranges to medium acid and in others it ranges to mildly alkaline in places.

Horizons are silt loam throughout, but in places some subsurface horizons are as fine as light silty clay loam because of stratification. Horizons contain some waterworn pebbles in most places, and the C horizon contains many of them in places. Horizons in a few spots are free of coarse fragments throughout.

Horizons generally are 10YR in hue, but in places some range to 7.5YR. The A horizon is 3 in value and 1 to 3 in chroma. Chromas of 1 are generally restricted to the thin A1 horizon. The B horizon is 4 or less in value but ranges from 2 to 6, and generally is 3 or 4, in chroma. In places, at a depth of more than 36 inches, the B3 horizon or the upper part of the C horizon has faint grayish mottles.

Huntington soils are similar to Pope soils in that they have the same kind of natural drainage. They are generally higher in content of clay than Pope soils, are not so acid in reaction, and are more fertile and productive. They formed in the same or similar kind of material as the moderately well drained Lindside and the poorly drained Melvin soils.

Huntington silt loam (Hn).—This soil has the profile described as representative for the series. It is on flood plains. Most of this soil is nearly level, but in a few acres slopes are about 3 percent. Included in mapping are a few spots where the soil is less silty but slightly more sandy and gritty than it is in other areas.

In most areas this soil is subject to a moderate hazard of flooding at the most, and it is used intensively for crops or for highly improved pasture. It has more limitations for growth of crops where this hazard is greater, and these limitations can only be estimated after studying the history of each individual tract. Capability unit I-6; woodland suitability group 1o3.

Huntington silt loam, local alluvium, 0 to 3 percent slopes (HxA).—This nearly level soil has a profile similar to that described as representative for the series,

but in places where coarse fragments are present, they are angular instead of rounded. Also, the soil is on foot slopes along drainageways that generally do not have channels and has, thus, little or no hazard of flooding. It does, however, receive considerable runoff from adjacent higher soils in places.

Under good management this soil has practically no limitations for farming. Capability unit I-6; woodland suitability group 1o3.

Huntington silt loam, local alluvium, 3 to 8 percent slopes (HxB).—This gently sloping soil is on foot slopes where silty material washed from areas of limestone have accumulated. The soil is in good condition in most areas but in some areas has lost a part of the surface layer as a result of erosion. Also, shallow gullies are present in places. These coarse fragments that are on or near the surface of this soil tend to be angular rather than smooth and rounded.

Because of slope, this soil has a hazard of erosion mostly in areas where the soil receives runoff from adjacent higher areas. Capability unit IIe-6; woodland suitability group 1o3.

Huntington silt loam, local alluvium, 8 to 15 percent slopes (HxC).—This moderately sloping soil has lost a few inches of the friable surface layer as a result of erosion, and in places gullies have cut into the subsoil. Included in mapping are scattered areas where slopes are a little steeper than 15 percent.

This soil is generally in very good condition, like most Huntington soils, but because of slope it is severely limited for cultivated crops by the hazard of erosion. Under intensive good management that includes appropriate protective measures, it can be used regularly for farming. Capability unit IIIe-6; woodland suitability group 1o3.

Laidig Series

The Laidig series consists of deep, well-drained, nearly level to strongly sloping soils that have a fragipan. These soils formed in local accumulations of colluvium derived from gray-to-brown acid sandstone and some shale. They are on foot slopes. The native vegetation is mixed hardwoods, dominantly oaks.

In a representative profile in a wooded area, the surface layer is gravelly loam about 11 inches thick. It is dark grayish brown in the upper 2 inches and yellowish brown below. The subsoil, about 27 inches thick, is yellowish-brown gravelly light clay loam and variegated strong-brown and yellowish-red sandy clay loam. The substratum is a variegated yellowish-brown, yellowish-red, and red sandy clay loam or light sandy clay fragipan that is very firm, dense, and brittle.

The Laidig soils are not difficult to work, except where they are too stony. The hard sandstone gravel abrades implements and machinery in places. Available water capacity is moderate. Although water movement through the fragipan is somewhat restricted, these soils are essentially well drained and aerated, especially in the solum. Seep spots are present in places on some slopes. They are not extensive enough to modify internal drainage conditions, however, except at the exact sites of seepage. Under good

management these soils are moderately productive. They are limited for some uses by slope and the consequent hazard of erosion, and in places by stoniness.

Representative profile of Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded, in a wooded area on Brice Hollow Road, about 3 miles north-northeast of Spring Gap:

- O1—2 inches to ½ inch, litter of hardwood leaves and twigs.
- O2—½ inch to 0, felty mat of decomposed organic material.
- A1—0 to 2 inches, dark grayish-brown (10YR 4/2) gravelly loam, weak, fine, granular structure; very friable, slightly sticky; many roots; strongly acid to very strongly acid; abrupt, smooth boundary.
- A2—2 to 11 inches, yellowish-brown (10YR 5/4) gravelly loam; weak, fine, granular structure; friable, slightly sticky; many roots; contains enough sand to feel gritty; 10 to 15 percent angular sandstone gravel and some shale; strongly acid to very strongly acid; clear, wavy boundary.
- B21—11 to 24 inches, yellowish-brown (10YR 5/6) gravelly light clay loam to sandy clay loam; moderate, fine, subangular blocky structure; friable to firm, sticky and slightly plastic; common roots; contains enough sand to feel gritty; 5 to 10 percent angular sandstone gravel and some shale; strongly acid to very strongly acid; gradual, wavy boundary.
- B22t—24 to 38 inches, variegated strong-brown (7.5YR 5/6) and yellowish-red (5YR 4/8) sandy clay loam; strong, fine, subangular blocky structure; friable to firm, sticky and plastic; few roots; about 1 percent sandstone and shale fragments; distinct but discontinuous yellowish-brown (10YR 5/6) clay films; very strongly acid to extremely acid; gradual, wavy boundary.
- Cx—38 to 78 inches, variegated yellowish-brown (10YR 5/6), yellowish-red (5YR 4/8), and red (2.5YR 4/6) sandy clay loam or light sandy clay; common, medium, prominent, grayish-brown (10YR 5/2) mottles; strong, thick, platy structure and coarse, subangular blocky; very firm, brittle, sticky and plastic; very few roots in upper part; some very thin clay or silt films; about 1 percent shale and sandstone fragments; very strongly acid to extremely acid; abrupt, irregular boundary.
- IIR—78 inches, pale-brown (10YR 6/3) fractured shale, mostly unseparated.

The solum generally ranges from 30 to 40 inches in thickness. The solum and the fragipan combined range from about 60 to 100 inches in thickness. Unconforming bedrock is at a depth of 5 to 12 feet or more. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity generally increases with depth.

The A horizon is gravelly loam. The B horizon is heavy loam, clay loam, or sandy clay loam. In places a friable C horizon is present between the Cx horizon and the unconforming bedrock. This horizon conforms with the horizon above in some places, but in other places it does not. Where the C horizon conforms it is dominantly sandy, but where it does not conform it is variable in texture. All horizons generally contain enough sand to feel distinctly gritty. In some areas horizons decrease in content of coarse fragments with depth, and in other areas they increase. In places the A horizon contains numerous colluvial stones that generally are sandstone on and near the surface. The solum is about 10 to 25 percent sandstone gravel, shale, or both.

The solum is generally 10YR in hue, but the B horizon is 7.5YR in places, and variegations in redder hues are present in places. The A horizon is 3 to 5 in value and 1 to 4 in chroma. The thin A1 horizon is lowest in both value and chroma. The B horizon is generally 4 or 5 in value and 4 to 8 in chroma. The Cx horizon is generally strongly variegated, has some low-chroma mottles at a depth of more than 20 inches below the upper limit of the B2 horizon, and has some reticulate high-chroma mottles in places.

Laidig soils are similar to Meckesville soils in that they have the same kind of natural drainage and have a fragipan; however, they are not so red as those soils. They formed in the same kind of colluvium as the somewhat poorly drained to moderately well drained Buchanan soils.

Laidig gravelly loam, 0 to 8 percent slopes, moderately eroded (LaB2).—In most areas this nearly level to gently sloping soil has lost a good part of the granular surface layer as a result of erosion. Some gullies are present, and a few of them are deep. In most places this soil has slopes of 3 to 8 percent. Included in mapping are a few spots where the surface layer is sandier than it is in other areas.

This soil is moderately limited for some uses because of the hazard of erosion. Capability unit IIe-4; woodland suitability group 3o3.

Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded (LaC2).—This moderately sloping soil has the profile described as representative for the series. Included in mapping are a few areas where erosion has been severe and some small areas where the soil is a little sandier throughout than it is in other areas.

Unless conservation practices are used intensively, this soil is severely limited for farming because of slope and the consequent hazard of erosion. Capability unit IIIe-4; woodland suitability group 3o3.

Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded (LaD2).—This strongly sloping soil is subject to a severe hazard of erosion. Included in mapping are areas where erosion damage has already been severe and areas under a cover of trees that, although severely cut over, have not been badly eroded. Also included are some sandy spots and a few areas where slopes are a little steeper than 25 percent.

This soil is only marginally suitable for cultivated crops. Under good management it can be safely used for forage or pasture crops or for sodded orchards. Capability unit IVe-3; woodland suitability group 3r4.

Laidig very stony loam, 3 to 15 percent slopes (LbC).—This gently sloping to moderately sloping soil has a profile similar to that described as representative for the series. Many loose stones, however, are on and near the surface of this soil and are present but less abundant in the lower part of the profile. These stones are mostly sandstone and have mostly been deposited from adjacent higher areas of other soils.

This soil is not suitable for cultivation. It is better suited to production of wood crops and to community development and other nonfarm uses than it is to cultivated crops. If some of the stones are removed, it can produce fairly good hay and pasture crops. Capability unit VIe-3; woodland suitability group 3o3.

Laidig very stony loam, 15 to 25 percent slopes (LbD).—This strongly sloping soil has a few wet spots or wet-weather springs in local areas. It is suitable for production of wood crops and for hay and pasture crops, if some of the stones are removed. It has more severe limitations for community development and other nonfarm uses than less sloping Laidig soils. Capability unit VIe-3; woodland suitability group 3r4.

Landisburg Series

The Landisburg series consists of mostly deep, moderately well drained to somewhat poorly drained, nearly level to strongly sloping soils that have a fragipan. These soils formed in local accumulations of colluvium debris from areas of cherty limestone. They are on foot slopes and at the bases of foot slopes. The native vegetation is hardwoods, dominantly oaks.

In a representative profile in a cultivated area, the surface layer is cherty silt loam 9 inches thick. It is dark grayish brown in the upper part and dark yellowish brown in the lower part. The subsoil is about 27 inches thick. It is strong-brown silty clay loam. The upper part is sticky when wet. The lower part is a strong-brown silty clay loam fragipan that has grayish mottles and is dense, firm, and brittle. The substratum, about 8 inches thick, is a continuation of the fragipan. It is yellowish-brown cherty silt loam or light silty clay loam. Cherty limestone bedrock is at a depth of 44 inches.

The Landisburg soils are fairly easy to work at the optimum moisture content. Generally, however, they are wet in spring, and plowing and planting are delayed. The chert in these soils generally abrades implements and machinery. Available water capacity is moderate. These soils are high in fertility, and under superior management they are very productive. The soils are limited for some uses by seasonal wetness, a perched water table, slow movement of water through the fragipan, a somewhat restricted rooting zone, and, in places, by slope and the hazard of erosion.

Representative profile of Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area on the south side of Breakneck Road, about 1/2 mile southwest of its intersection with Wilson Road:

- Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) cherty silt loam; weak, fine, granular structure; friable, slightly sticky; many roots; neutral; clear, wavy boundary.
- A2—5 to 9 inches, dark yellowish-brown (10YR 4/4) cherty silt loam; weak, fine, granular structure; friable, slightly sticky; many roots; neutral; clear, smooth boundary.
- B1—9 to 15 inches, strong-brown (7.5YR 5/6) light silty clay loam; weak to moderate, fine, subangular blocky structure; friable, sticky and slightly plastic; many roots; few chert fragments; slightly acid; gradual, smooth boundary.
- B2t—15 to 22 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; friable to firm, sticky and plastic; few roots; distinct brown or dark-brown (7.5YR 4/4) clay films; few chert fragments; medium to slightly acid; gradual, smooth boundary.
- Bx—22 to 36 inches, strong-brown (7.5YR 5/6) light silty clay loam; common, coarse, prominent, gray or light-gray (10YR 6/1) mottles; moderate, thick, platy structure and medium, blocky and subangular blocky; very firm, brittle, sticky and slightly plastic; prominent reddish-brown (5YR 5/4) clay films; about 10 percent chert fragments; medium to slightly acid; gradual, wavy boundary.
- Cx—36 to 44 inches, yellowish-brown (10YR 5/6) cherty silt loam or light silty clay loam; common, medium, distinct, dark grayish-brown (10YR 4/2) mottles and streaks; strong, medium, platy structure;

very firm, very brittle; some shale fragments and limestone flags; neutral; abrupt, irregular boundary.

IIR—44 inches, hard, fractured but unseparated cherty limestone.

The solum ranges generally from 30 to 40 inches in thickness. Unconforming bedrock is at a depth of 3 to 10 feet or more, but is mostly at a depth of 5 to 10 feet. Reaction ranges to medium acid in places, but it is mostly less acid than this or is neutral, especially in the Cx horizon.

The A horizon is silt loam. The B1 and B2 horizons range from heavy silt loam to silty clay loam. The Bx and Cx horizons range from silt loam to light silty clay loam. The A horizon is generally 15 to 25 percent chert, but it is as little as 10 percent chert in places. The B horizon is less than 10 percent chert in places.

The A horizon is 10YR or 2.5Y in hue, and the B horizon is 10YR or 7.5YR. The A horizon is 3 to 5 in value, and the thin A1 horizon is lowest in value. The A horizon is 2 to 4 in chroma. The B horizon is 4 to 6 in value and 4 to 8 in chroma. Mottles of chroma 2 or less are within 10 inches of the upper boundary of the B2t horizon. The Bx and Cx horizons have high-chroma mottles in places.

Landisburg soils are similar to Albrights, Buchanan, Cookport, Ernest, Monongahela, and Tyler soils in that they have the same kind of natural drainage. They are not so acid as those soils, however, and unlike those soils, Landisburg soils are characteristically cherty. Landisburg soils formed in the same kind of cherty limestone colluvium as the poorly drained Loysville soils.

The Landisburg soils in Allegany County are less acid and higher in bases than is defined as within the range for the series. These differences do not alter the usefulness or behavior of these soils.

Landisburg cherty silt loam, 0 to 3 percent slopes (LdA).—This soil has a profile similar to that described as representative for the series, but the surface layer, on the average, is about 9 or 10 inches thick. Although this nearly level soil is not generally subject to erosion, the surface layer has been eroded in places by runoff from adjacent higher soils. In addition to chert, some limestone fragments are on and near the surface in places.

This soil generally needs artificial drainage if it is used for some crops and other purposes. Capability unit IIw-2; woodland suitability group 3w1.

Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded (LdB2).—This soil has the profile described as representative for the series. In most areas a large part of the surface layer of this gently sloping soil has been lost as a result of erosion, and some shallow gullies are present locally. In addition to chert, unweathered limestone fragments are in the soil material in places, especially in the substratum.

Internal drainage of this soil needs to be improved if the soil is to be used to grow certain crops or for some other purposes. If it is regularly cultivated, however, the hazard of erosion is a more important concern of management than drainage. Capability unit IIe-14; woodland suitability group 3w1.

Landisburg cherty silt loam, 8 to 15 percent slopes, moderately eroded (LdC2).—In most areas this moderately sloping soil has lost a large part of the surface layer as a result of erosion and has a number of shallow gullies. Included in mapping are many seep spots, which are shown on the maps by a wet-spot symbol.

This soil is subject to a severe hazard of erosion. The hazard of erosion is more severe than usual

because of runoff from adjacent higher soils and also because this soil does not readily take in more water when it is wet or moist. This soil needs artificial drainage if it is used for some crops, but it generally does not need artificial drainage in places where it is used for hay or pasture crops. Control of erosion is the most important concern of management. Capability unit IIIe-14; woodland suitability group 3w1.

Landisburg cherty silt loam, 15 to 25 percent slopes, moderately eroded (LdD2).—Included with this strongly sloping soil in mapping are a few areas where the soil is under a cover of trees and has not been significantly affected by erosion. Also included are a few seep spots and a few areas where slopes are slightly steeper than 25 percent.

Even under a high level of management this soil is only marginally suitable for cultivated crops because of slopes. It can be used more safely for hay or pasture crops than for cultivated crops. Wooded areas are better suited to trees than to other uses, and should remain in trees unless needed for some more intensive use other than cultivated crops. Capability unit IVe-9; woodland suitability group 3w1.

Leetonia Series

The Leetonia series consists of moderately deep, well-drained, nearly level to strongly sloping soils that formed in material derived from coarse-grained sandstone. These soils are only at very high elevations near crests of sandstone ridges. The native vegetation is mixed hardwoods and a cover of laurel and other acid-adapted plants.

In a representative profile the surface layer is sandy loam about 7 inches thick. It is very dark gray in the upper part and grayish brown in the lower part. The subsoil is about 13 inches thick. It is dark reddish-brown sandy loam in the upper 2 inches and yellowish-brown sandy loam below. The substratum is light yellowish-brown very channery sandy loam about 10 inches thick. Hard sandstone bedrock is at a depth of 30 inches.

The Leetonia soils in Allegany County are not used for farming. They are very stony and are only at very high elevations where terrain is generally rough. These soils are surrounded by other soils in lower areas of rough terrain that are stony and steep and are on ridges and mountains. Thus, Leetonia soils are not easily accessible. In addition to this, they are very strongly acid, low in natural fertility, and have a low available water capacity. Most areas of these soils are almost entirely wooded.

Representative profile of Leetonia very stony sandy loam, 0 to 25 percent slopes, in a wooded area about ½ mile east of Lonaconing:

- O1—2 inches to 1 inch, litter of leaves and twigs that are mostly oak.
- O2—1 inch to 0, black mat of decomposed organic material.
- A1—0 to 3 inches, very dark gray (10YR 3/1) sandy loam; weak, fine, granular structure; loose; many roots; many sandstone channers to stones on and near the surface; very strongly acid; clear, irregular boundary.

- A2—3 to 7 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; loose to very friable; many roots; about 10 percent sandstone gravel and stones; very strongly acid; abrupt, irregular boundary.
- B2h—7 to 9 inches, dark reddish-brown (5YR 3/4) sandy loam; weak, medium, granular structure; friable to somewhat firm, slightly sticky; many roots; intermittently weakly cemented; very strongly acid to extremely acid; abrupt, wavy boundary.
- B3—9 to 20 inches, yellowish-brown (10YR 5/4) sandy loam; weak, medium, granular structure; very friable, slightly sticky; few roots; 10 to 15 percent coarse fragments; very strongly acid to extremely acid; gradual, irregular boundary.
- C—20 to 30 inches, light yellowish-brown (10YR 6/4) very channery sandy loam; single grained; loose to very friable; very few roots; 60 to 75 percent coarse fragments; very strongly acid to extremely acid; abrupt, irregular boundary.
- R—30 inches, hard, gray, fractured, coarse-grained sandstone.

The solum ranges from 15 to 30 inches in thickness. Bedrock is generally at a depth between 20 and 40 inches. In the natural state reaction ranges from strongly acid to extremely acid throughout the profile.

Horizons are generally light sandy loam that grades to loamy sand throughout. They contain common coarse fragments of sandstone that range in size from fine gravel to large flagstones and boulders.

Horizons are 10YR or 7.5YR in hue, except the B2h horizon, which is generally somewhat redder in hue than the rest of the solum. The A horizon is 2 to 7 in value, and only in the thin A1 horizon is value 2 or 3. The A horizon is 1 or 2 in chroma. The B2h horizon is 2 to 5 in value and 2 to 4 in chroma. The B3 and C horizons are 4 to 6 in value and 3 to 8 in chroma.

Leetonia soils are unique in Allegany County in that they have an organic-stained Bh horizon. They formed in sandstone material similar to that in which the well-drained Dekalb, the moderately well drained to somewhat poorly drained Cookport, the poorly drained Nolo, and the very poorly drained Lickdale soils formed.

Leetonia very stony sandy loam, 0 to 25 percent slopes (LgD).—This nearly level to strongly sloping soil has stones or boulders of hard acid sandstone on the surface and throughout. The stones and boulders are generally only a few feet apart. A few outcropping ledges of hard sandstone also are present.

This soil does not produce a large amount of wood crops, and in places areas are almost inaccessible to logging equipment. It is better suited to trees, however, than to other uses. The wooded areas provide watershed protection and wildlife habitat. Capability unit VI_s-4; woodland suitability group 5f3.

Lehew Series

The Lehew series consists of moderately deep, well-drained, nearly level to very steep soils that formed in material weathered in place mostly from red sandstone, but also from some red shale and gray sandstone. These soils are in mountainous areas. The native vegetation is mixed hardwoods, mainly oaks.

In a representative profile in a wooded area, the surface layer is loam about 9 inches thick. It is dark reddish brown in the upper 2 inches and brown or dark brown below. The subsoil, about 10 inches thick, is reddish-brown friable loam to light sandy clay loam. The substratum, about 17 inches thick, is reddish-brown sandy loam that contains many rock fragments

of various sizes. Hard bedrock is at a depth of 36 inches.

The Lehew soils are easy to work, except where they are too stony. The coarse fragments, however, abrade and sometimes damage equipment. Available water capacity is low. These soils are low in natural fertility, and even under very good management they are only moderately productive. In nonstony areas they are limited for farming mostly by slope and the consequent hazard of erosion. They are limited for some other uses by the limited depth to hard bedrock.

Representative profile of Lehew very stony loam in a wooded area of Dekalb and Lehew very stony soils, 25 to 45 percent slopes, on the east side of Town Hill, about ½ mile north of U. S. Highway No. 40:

- O1—5 to 2 inches, leaf litter from black and white oaks.
- O2—2 inches to 0, thick, felty layer of dark-brown organic material.
- A1—0 to 2 inches, dark reddish-brown (5YR 3/3) loam; weak, fine, granular structure; loose to very friable; many roots; contains enough sand to be gritty; fine rock fragments; medium acid; abrupt, smooth boundary.
- A2—2 to 9 inches, brown or dark-brown (7.5YR 4/4) loam; weak, fine, granular structure; friable; many roots; contains enough sand to be gritty; fine rock fragments; about 40 percent coarse fragments that are channers to stones; strongly acid; abrupt, smooth boundary.
- B2—9 to 19 inches, reddish-brown (5YR 4/4) loam to light sandy clay loam; weak, fine, subangular blocky structure; friable; many roots; contains enough sand to be gritty; about 20 percent coarse fragments; strongly acid; clear, smooth boundary.
- C—19 to 36 inches, reddish-brown (5YR 4/3) sandy loam; single grained; very friable; few roots; 40 to 50 percent coarse fragments; strongly acid; abrupt, irregular boundary.
- R—36 inches, hard, fractured but unseparated sandstone, about 90 percent red and 10 percent gray seams of sandstone.

The solum ranges from about 12 to 30 inches in thickness. Bedrock is at a depth of about 24 to 40 inches. In unlimed areas reaction generally ranges from strongly acid to extremely acid, and acidity increases with depth. In places in wooded areas immediately below leaf-fall accumulations, however, the A1 horizon is less strongly acid than the material in the rest of the profile.

The solum is generally loam but grades to light sandy clay loam in the lower part in places. The C horizon ranges from loam to loamy sand. Horizons in most areas contain many stone-sized coarse fragments, mostly reddish sandstone, but also some paler sandstone and reddish shale material. In other areas horizons contain smaller fragments of this kind that range up to 6 inches in length. In the other areas the A horizon is 15 to 20 percent such fragments, the B horizon nearly 50 percent, and the C horizon even more in places.

The A horizon is 7.5YR or 5YR in hue. It is 3 to 6 in value and 1 to 4 in chroma. The thin A1 horizon is lowest in value and chroma. The B horizon is generally 5YR in hue but ranges to 2.5YR in places. This horizon is 4 to 6 in value and 3 to 6 in chroma. The C horizon generally is similar to the B horizon in hue and value, but it is lower in chroma in most places.

Lehew soils are very similar to Dekalb soils but are redder. They are sandier in all horizons and have a lower available water capacity than Calvin soils. Their fragmental material is mainly sandstone instead of shale as it is in Calvin soils. Lehew soils are shallower to bedrock and contain less clay than Meckesville soils, and unlike those soils, do not have a fragipan in the lower part of the B horizon.

Lehew channery loam, 3 to 10 percent slopes, moderately eroded (LhB2).—This soil has a profile similar to that described as representative for the series, but it contains few or no stones. Those coarse fragments present are mostly flat pieces of red sandstone that range up to 6 inches in length. In cleared areas this gently sloping to moderately sloping soil has lost at least a part of the surface layer, but in wooded areas it has been less affected by erosion. Few or no gullies are present.

If it is adequately protected against erosion, this soil can be regularly cultivated, although high crop production is not generally expected. More areas of this soil are in hay or pasture than in cultivated crops. Capability unit IIe-10; woodland suitability group 4f3.

Lehew channery loam, 10 to 20 percent slopes, moderately eroded (LhC2).—This moderately sloping to strongly sloping soil has some gullies in local areas. Included in mapping are uncleared areas where the soil is in trees and has been only slightly affected by erosion.

In most areas this soil is not cultivated. It is suitable for cultivation, but high yields are not to be expected. If it is regularly cultivated, suitable conservation measures, intensively applied, are required to protect it against erosion. Capability unit IIIe-10; woodland suitability group 4f3.

Lehew channery loam, 20 to 45 percent slopes (LhE).—In most areas this strongly sloping to steep soil has lost part of the surface layer as a result of erosion. Slopes are mostly steeper than 30 percent. Included in mapping are many spots where erosion has been more severe and gullies are present. Also included are relatively uncleared wooded areas where the soil has been only slightly affected by erosion and a few small areas where slopes are somewhat steeper than 45 percent.

This soil is not safe for cultivation because of the very severe hazard of erosion. If necessary, it can safely be used for some hay or pasture crops. Capability unit VIe-3; woodland suitability group 3f4 (north aspects) and 5f3 (south aspects).

Lehew very stony loam, 0 to 10 percent slopes (LlB).—This nearly level to moderately sloping soil contains coarse red sandstone fragments that range in size from stones to boulders. These fragments are only a few feet apart on the surface and throughout the soil.

This soil is not suitable for cultivation without expensive and difficult stone removal. It is well suited to wood crops, and its good stands of trees provide excellent watershed protection. In a few areas it produces hay crops or is used for pasture. This soil has moderate limitations for most nonfarm uses. Capability unit VIa-4; woodland suitability group 4f3.

Lehew very stony loam, 10 to 30 percent slopes (LlD).—This moderately sloping to steep soil is more severely limited for community development and other nonfarm uses than less sloping Lehew soils. It is well suited to wood crops and in some places produces hay or pasture crops. Capability unit VIa-4; woodland suitability group 3f4 (north aspects), and 5f3 (south aspects).

Lickdale Series

The Lickdale series consists of deep, very poorly drained, nearly level soils that formed in material weathered mostly from acid sandstone. These soils are on flats or in slight depressions on uplands. The native vegetation is wetland hardwoods.

In a representative profile in a cultivated area, the surface layer is black silt loam about 10 inches thick. It is sticky when wet. The subsoil, about 23 inches thick, is firm and very firm silty clay loam that also is sticky when wet. The upper part of the subsoil is gray and has yellowish-brown mottles, and the lower part is yellowish brown and has gray mottles. The substratum, about 9 inches thick, is loose to very friable gravelly sandy loam that is mostly dark gray in color. Sandstone bedrock is at a depth of 42 inches.

The Lickdale soils are sticky and difficult to work when they are even slightly wet. Available water capacity is high. If these soils are used for cultivated crops, artificial drainage is the most important management requirement. They are difficult to drain, however, especially where outlets are not readily available, such as in some depressions. For most crops these soils also need heavy and frequent applications of lime. Under the best management these soils are highly productive. They are severely limited for most nonfarm uses because of wetness and very poor natural drainage.

Representative profile of Lickdale silt loam in a cultivated area near Dolly Road, about $\frac{1}{4}$ mile north of Black Valley Road:

- Ap—0 to 10 inches, black (10YR 2/1) silt loam; weak, medium, granular structure; friable, sticky and slightly plastic; many roots; medium acid (limed); abrupt, smooth boundary.
- B21tg—10 to 21 inches, gray (10YR 5/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; moderate, medium, subangular blocky structure; firm, sticky and plastic; many roots in upper part; very dark gray (10YR 3/1) patchy clay films; medium acid; clear, smooth boundary.
- B22tg—21 to 33 inches, yellowish-brown (10YR 5/6) silty clay loam; many, coarse, prominent, gray (10YR 5/1) mottles; moderate-to-strong, coarse, blocky structure; very firm, sticky and plastic; dark-gray (10YR 4/1) prominent clay films; contains enough sand to be gritty; about 10 percent sandstone gravel in lower part; strongly acid; clear, smooth boundary.
- Cg—33 to 42 inches, variegated dark-gray (10YR 4/1) and very dark grayish-brown (10YR 3/2) gravelly sandy loam; single grained; loose to very friable; some angular cobblestones; gravel and cobblestones are weathered sandstone; some shale chips; strongly acid to very strongly acid; clear, irregular boundary.
- R—42 inches, weathered gray to pale-brown sandstone.

The solum ranges from about 24 to 40 inches in thickness. Bedrock is generally at a depth of $3\frac{1}{2}$ to 6 feet. In unlimed areas reaction ranges generally from strongly acid to extremely acid, and acidity increases with depth.

The A horizon is silt loam. This horizon is stickier than most silt loam horizons. It is 10 percent or more organic matter. The B2t horizon is mostly silty clay loam but is clay loam in places, and texture approaches sandy clay loam in the lower part in places. The upper part of the solum is 0 to about 10 percent coarse fragments, and the lower part is 0 to about 20 percent. These fragments are

mostly angular to subangular sandstone that is weathered but not waterworn. The C horizon generally is even higher in content of such coarse fragments. Some horizons also contain shale fragments in places.

The A1 and Ap horizons are generally black, but in places the Ap horizon is very dark gray or very dark grayish brown. In undisturbed areas an A12 horizon that is 1 or 2 units higher in value than the A1 horizon is present in places. The B horizon ranges from neutral to 10YR in hue, 4 to 6 in value, and generally is 0 to 2 in chroma. In the lowest part, however, the B horizon is high in chroma and in places has many low-chroma mottles. Where high-chroma mottles are present, they are 10YR or 7.5YR in hue, 5 or 6 in value, and 4 to 8 in chroma.

Lickdale soils are the most poorly drained soils in Allegany County. They formed in material weathered from sandstone that is similar to or the same as the parent material of the well-drained Dekalb and Leetonia soils, the moderately well drained to somewhat poorly drained Cookport soils, and the poorly drained Nolo soils.

The Lickdale soils in Allegany County have more clay in the B horizon than is within the range defined for the series. This difference does not alter the usefulness or behavior of these soils.

Lickdale silt loam (Lm).—This soil is nearly level or depressional in most areas. Slopes are as much as 3 percent in only a few acres. Included in mapping are a few stony spots that are shown on the maps by the symbol for stoniness. Also included are some small areas where the subsoil is finer textured, stickier, and generally less strongly acid than it is in other areas. Capability unit IVw-2; woodland suitability group 1w9.

Lindside Series

The Lindside series consists of deep, moderately well drained, nearly level, silty soils that are subject to occasional flooding. These soils are on flood plains of streams mostly in the central part of the county. The native vegetation is mixed hardwoods, dominantly oaks, hickories, and maples. Most areas, however, have been cleared.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil is about 22 inches thick. It is dark yellowish-brown silt loam in the upper part, brown to dark-brown light silty clay loam in the middle part, and gray or light-gray light silty clay loam that has some yellowish-brown mottles in the lower part. The substratum, to a depth of 70 inches, is gray very firm silty clay that is very sticky when wet. Mottles in the substratum are brighter colored than the matrix.

The Lindside soils are fairly easy to work at the optimum moisture content. They generally are very wet in spring, however, and are late to warm. These soils also are subject to flooding, especially in spring. For all of these reasons, plowing and planting dates generally are very late. Available water capacity is high. Water moves through these soils readily but not rapidly. The soils are very highly productive and are suited to most crops if they are artificially drained and protected from floods. Artificial drainage also increases the grazing period of pasture and improves suitability for most other uses. These soils are generally not very difficult to drain where adequate outlets

are available. They have few limitations other than seasonal wetness and the hazard of flooding.

Representative profile of Lindside silt loam in a cultivated area on the flood plain of Evitt's Creek, about 400 feet northeast of Williams Road Bridge:

- Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; slightly acid; clear, smooth boundary.
- B1—9 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular and subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; medium to slightly acid; gradual, smooth boundary.
- B2—14 to 22 inches, brown (10YR 5/3) to dark-brown (10YR 4/3) light silty clay loam; weak to moderate, fine, subangular blocky structure; firm, sticky and plastic; many roots in upper part; slightly acid; clear, smooth boundary.
- B3g—22 to 31 inches, gray or light-gray (10YR 6/1) light silty clay loam; few, fine, distinct, dark-brown (10YR 4/3) to yellowish-brown (10YR 5/4) mottles; moderate, fine, blocky and subangular blocky structure; firm, sticky and plastic; few roots; slightly acid; clear, wavy boundary.
- IICg—31 to 70 inches, gray (10YR 5/1) silty clay; common, coarse, distinct, yellowish-brown (10YR 5/6) and yellowish-red (5YR 5/6) mottles; strong, coarse, blocky structure; very firm, very sticky and very plastic; prominent seams of silt or clay in old fractures; slightly acid to neutral.

The C horizon is generally at a depth ranging from 30 to 40 inches. Unconforming bedrock is at a depth ranging from 6 to 20 feet or more. In unlimed areas reaction ranges from slightly acid to medium acid, and acidity generally decreases with depth. Base saturation is very high.

The A horizon is silt loam. The B horizon ranges from silt loam to silty clay loam. Horizons in the solum differ in texture because of stratification or differential sedimentation. In places the IICg horizon consists of variable unconforming material. All horizons contain fine waterworn pebbles in places, but only the IICg horizon commonly in local places.

Horizons generally are 10YR in hue throughout but are yellow or neutral in the lower part of the profile. The A horizon is 3 or 4 in value and 1 to 4 in chroma. The thin A1 horizon is lowest in value and chroma. The B1 and B2 horizons are 4 or 5 in value and 3 to 6 in chroma. In places the B3 horizon is strongly gleyed or is 3 or 4 in chroma. The IICg horizon is 4 to 7 in value and 0 to 2 in chroma. This horizon is always gleyed. The B2 horizon has either high- or low-chroma mottles in the lower part in places. The B3 horizon has common to many mottles of chroma 2 or less in places. The IICg horizon has high-chroma mottles in places.

Lindside soils are similar to Philo soils in that they have the same kind of natural drainage and have a hazard of flooding. They have more clay in the B horizon, however, are less acid, and generally are more productive than those soils. They formed in the same kind of material and are on the same flood plains as the well-drained Huntington and the poorly drained Melvin soils.

Lindside silt loam (Ln).—This soil is very smooth and nearly level, but slopes are as much as 3 percent in a few acres. Some very low hummocks are present in places, some slightly elevated natural levees along streams, and some traces of old water courses or channels.

The most important concerns of management are drainage improvement and local protection from flooding. In areas where the hazard of flooding is moderate or less, excellent production of hay and such row crops as corn (fig. 6) are possible, though planting of

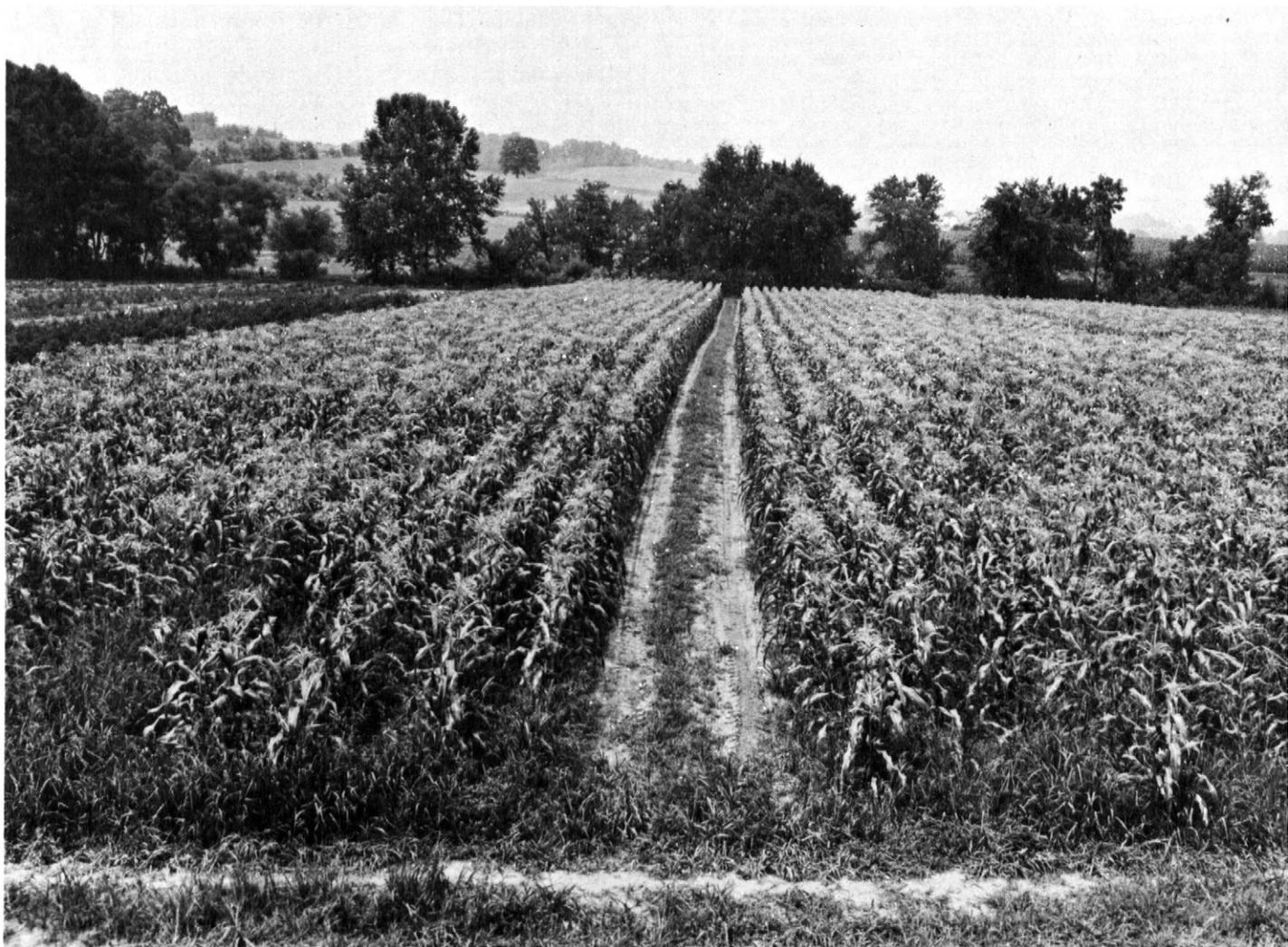


Figure 6.—Sweet corn in an area of Lindside silt loam that has improved drainage. This is one of the truck crops grown intensively on the flood plain of Evitt's Creek.

annual crops is late in places. It is possible for pasture crops to be highest in quality and production in these areas. Where the flood hazard is severe, use of the soil for cultivated crops is strongly limited, and where this hazard is very severe, use is limited chiefly to pasture and wooded areas. The hazard of flooding for any particular site can be properly assessed only after a study of the history of its flooding. Capability unit IIw-7; woodland suitability group 1w1.

Litz Series

The Litz series consists of moderately deep, well-drained, gently sloping to steep soils that formed in material weathered mostly from acid shale that has thin seams of limestone or calcareous shale. These soils are on uplands. The native vegetation is mixed hardwoods and, in places, Virginia pine.

In a representative profile in a wooded area, the surface layer is shaly silt loam about 8 inches thick. It

is very dark grayish brown in the upper part and brown to dark brown in the lower part. The subsoil, about 4 inches thick, is yellowish-brown light silty clay loam that contains many fine shale chips. The substratum, about 12 inches thick, is yellowish-brown very shaly silt loam. Bedrock is at a depth of 24 inches.

The Litz soils are easy to work. They are thin, however, and consequently have a low available water capacity. They are limited for some uses chiefly because of low available water capacity but also because of low natural fertility. Under superior management these soils are only moderately productive. They need irrigation if they are used regularly for farming. They are also limited for most uses by slope and the consequent hazard of erosion.

Representative profile of Litz shaly silt loam, 20 to 30 percent slopes, moderately eroded, in a wooded area on Christie Road, about $\frac{1}{2}$ mile north of Williams Road:

- O1—1 to ½ inch, litter of hardwood leaves and twigs.
 O2—½ inch to 0, very thin mat of decomposed organic material.
 A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) shaly silt loam; weak, very fine, granular structure; loose to very friable; many roots; about 10 percent fine shale; very strongly acid; abrupt, smooth boundary.
 A2—1 to 8 inches, brown to dark-brown (10YR 4/3) shaly silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; about 15 percent fine shale; very strongly acid; clear, smooth boundary.
 B2—8 to 12 inches, yellowish-brown (10YR 5/6) shaly light silty clay loam; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; faint intermittent clay films in intermittent segments; horizon horizontally discontinuous; about 15 to 20 percent fine shale; very strongly acid; clear, broken boundary.
 C—12 to 24 inches, yellowish-brown (10YR 5/6) very shaly silt loam; friable, slightly sticky; common roots in upper part; 40 to 80 percent shale fragments, increasing in abundance with depth; fragments range up to 4 inches in length; very strongly acid to extremely acid; gradual, irregular boundary.
 R—24 inches, yellowish-brown (10YR 5/4) to pale-brown (10YR 6/3) fractured but mostly unseparated shale.

The solum generally is less than 20 inches thick, and the B2 horizon not more than 6 inches. Bedrock is at a depth ranging from 20 to 40 inches, but the average depth is 24 to 30 inches. Although the soils formed in lime-bearing material, horizons throughout the profile are very strongly leached. Thus, reaction ranges generally from strongly acid to extremely acid, and the acidity increases with depth. In random places in the lower part of the C horizon, however, reaction is less strongly acid.

The A horizon is shaly silt loam. The B2 horizon ranges from shaly silt loam to shaly silty clay loam and averages about 18 to 30 percent clay. In this horizon the finer textured parts are discontinuous. The A horizon is about 15 to 25 percent shale fragments as long as 1 inch, and the B2 horizon is about 15 to 35 percent shale fragments of this size. The C horizon contains more of these fragments and they are coarser.

Horizons generally are 10YR in hue throughout, but the A and C horizons grade to 2.5Y in places and the B and C horizons to 7.5YR in places. The A horizon is 2 to 6 in value and 1 to 4 in chroma. Only the thin A1 horizon is 2 and 3 in value and 1 in chroma. The B2 horizon is 4 to 6 in value and generally is 6 to 8 in chroma. The C horizon is as high in value as the B2 horizon or higher, but it is lower in chroma in places.

Litz soils are similar to Gilpin and Westmoreland soils. They do not have the B2t horizon that those soils have, however, and they are shallower to bedrock and do not retain so much moisture available for plants as those soils. Also, Litz soils are much more strongly acid than Westmoreland soils. They are deeper to bedrock than Weikert soils.

Litz shaly silt loam, 3 to 10 percent slopes, moderately eroded (LsB2).—This gently sloping to moderately sloping soil has a profile similar to that described as representative for the series. The subsoil is so thin and weakly expressed in this soil, however, that it is difficult to determine its boundaries in places.

Under good management this soil can be cultivated continuously, but good production of crops should not be expected. It is limited for farming and some other uses by shallowness, low available water capacity, and the hazard of erosion. The most important concern of management is the control of erosion. Capability unit IIe-11; woodland suitability group 5f3.

Litz shaly silt loam, 10 to 20 percent slopes, moderately eroded (LsC2).—This moderately sloping to strongly sloping soil has lost a large part of the surface layer as a result of erosion, and gullies are present in places. Included in mapping are wooded areas where the soil has not been noticeably affected by erosion.

This soil is severely limited for cultivation by the hazard of erosion. If it is regularly cultivated, appropriate measures to control erosion must be intensively applied and maintained. Capability unit IIIe-11; woodland suitability group 5f3.

Litz shaly silt loam, 20 to 30 percent slopes, moderately eroded (LsD2).—This soil has the profile described as representative for the series. In areas not under a cover of trees, the surface layer of this strongly sloping to steep soil is even thinner than the one in the representative profile. Some shallow gullies are present, even in wooded areas. Included in mapping are scattered areas where erosion damage has been severe.

This soil is so thin that any loss of soil material at all is critical. It is unsafe to cultivate this soil because of the hazard of erosion. The soil is better suited to hay or pasture crops or to orchards than it is to cultivated crops. Wooded areas should be retained and trees should be planted in other areas unless these areas are needed for some other more intensive use than cultivated crops. Capability unit IVe-10; woodland suitability group 5f3.

Litz shaly silt loam, 30 to 45 percent slopes (LsE).—Most areas of this steep soil are wooded, and in these areas little erosion has occurred. Included in mapping, however, are cleared areas where the soil is severely eroded and where gullies are as deep as the bedrock in places. Also included are a few areas where slopes are steeper than 45 percent.

This soil needs to be put and kept under a permanent cover of vegetation. In this state it will provide watershed control and thus prevent damage to surrounding soils in lower areas. Capability unit VIIe-3; woodland suitability group 5f3.

Loysville Series

The Loysville series consists of mostly deep, poorly drained, nearly level to gently sloping, cherty soils that formed in local accumulations of colluvium debris derived from highly cherty limestone. These soils have a firm, brittle fragipan. They are in low positions on foot slopes. The native vegetation is mixed wetland hardwoods.

In a representative profile in a cultivated area, the surface layer is brown or dark-brown cherty silt loam about 8 inches thick. The subsoil is about 28 inches thick. The upper part is grayish-brown and gray silty clay loam that has brown and dark-brown mottles and is sticky when wet. The lower part is a dark-gray clay loam fragipan that has yellowish-brown mottles and is very firm, dense, and brittle. The substratum, to a depth of 56 inches, is dominantly gray cherty light silty clay loam.

The Loysville soils are fairly easy to work at the optimum moisture content. They are often wet, however,

for long periods. If these soils are used for cultivated crops, artificial drainage is necessary. Such drainage also lengthens the grazing period of pasture. Available water capacity is moderately high. Water moves through the fragipan very slowly, however, and in hot dry periods the soil in the upper part of the profile tends to dry out almost completely. These soils are high in natural fertility and under a high level of management are highly productive. They are severely limited by wetness for some nonfarm uses. In areas where they are more sloping, the hazard of erosion is a concern of management.

Representative profile of Loysville cherty silt loam, 0 to 8 percent slopes, in a cultivated area on the south side of Williams Road immediately east of Rush:

- Ap—0 to 8 inches, brown or dark-brown (10YR 4/3) cherty silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; neutral; clear, wavy boundary.
- B1—8 to 16 inches, grayish-brown (10YR 5/2) cherty light silty clay loam; common, medium, faint, brown or dark-brown (10YR 4/3) mottles; weak, fine, subangular blocky structure; friable, sticky and slightly plastic; many roots; slightly acid; gradual, wavy boundary.
- B2tg—16 to 24 inches, gray (10YR 5/1) silty clay loam; common, medium, distinct, brown (7.5YR 5/4) or dark-brown (7.5YR 4/4) mottles; moderate, medium and coarse, angular and subangular blocky structure; firm, sticky and plastic; many roots; prominent brown clay films; few chert fragments; slightly acid; abrupt, wavy boundary.
- Bx—24 to 36 inches, dark-gray (N 4/0) clay loam; common, coarse, prominent, yellowish-brown (10YR 5/6) mottles; moderate, thick, platy structure and strong, coarse, angular and subangular blocky; very firm, brittle, sticky and plastic; few roots in upper part; thick, prominent strong-brown (7.5YR 5/6) clay films; few chert fragments; slightly acid; abrupt, wavy boundary.
- Cg—36 to 56 inches, variable gray (10YR 5/1) to very dark gray (10YR 3/1) cherty light silty clay loam; many, medium, prominent, yellowish-brown (10YR 5/6) mottles; massive, but fractures widely spaced; friable, sticky and plastic; 20 percent or more chert; slightly acid to neutral.

The solum ranges generally from 30 to 40 inches in thickness, but is thicker in places. Unconforming bedrock is mostly at a depth of 5 to 10 feet or more, but is also at a depth of 3 feet in places. Reaction ranges from neutral to medium acid.

The A horizon is silt loam. The B1 and B2 horizons range from heavy silt loam to silty clay loam. The Bx horizon is silt loam, light silty clay loam, or clay loam. The C horizon is coarser textured than the finest textured part of the B horizon and is very gritty in places. Horizons are generally 20 to 30 percent chert, but the A horizon is as little as 10 or 15 percent chert in places, and the B horizon, in the finest textured part, is even less in places.

Horizons are 10YR or 2.5Y in hue. The A horizon is 3 to 5 in value, and the thin A1 horizon is lowest in value. The A horizon ranges from 2 to 4 in chroma. The B horizon is 4 to 6 in value and 0 to 2 in chroma. This horizon has mottles that are 10YR or 7.5YR in hue, 4 to 6 in value, and 3 to 6, and in a few places 8, in chroma. The C horizon is similar to the B horizon in color.

Loysville soils are somewhat similar to Nolo and Robertsville soils. They are not so strongly acid as those soils, however, and unlike those soils, they contain chert fragments. They are more clayey in the B horizon than Nolo soils and less clayey throughout than Robertsville soils. They formed in the same kind of cherty colluvium as that in which the moderately well drained to somewhat poorly drained Landisburg soils formed.

Loysville cherty silt loam, 0 to 8 percent slopes (LyB).—This nearly level to gently sloping soil has a hazard of erosion in all areas except those where it is most nearly level. Since it is used relatively little for cultivated crops, however, only moderate soil losses have occurred in small areas.

This soil is severely limited for cultivated crops and many nonfarm uses by poor natural drainage. Corn and pasture crops are produced, however, and some hay is grown. Capability unit IIIw-1; woodland suitability group 2w6.

Meckesville Series

The Meckesville series consists of deep, well-drained, nearly level to strongly sloping soils that have a fragipan. These soils formed in local accumulations of colluvium derived from reddish shale and siltstone and gray to reddish sandstone. They are on foot slopes. The native vegetation is mixed hardwoods, dominantly black, red, and scarlet oaks.

In a representative profile in a wooded area, the surface layer is silt loam about 9 inches thick. It is very dark brown in the upper 2 inches and brown to dark brown below. The subsoil is about 31 inches thick. It is reddish-brown and yellowish-red light silty clay loam in the upper part. The lower part is a yellowish-red light silty clay loam fragipan that has brown and red mottles and is dense, firm, and brittle. The substratum, to a depth of 60 inches, is dark reddish-brown loam to silt loam.

The Meckesville soils are fairly easy to work, except where they are too stony. The fragipan does not seem to retard or impede internal drainage of these soils, but it restricts root penetration and movement of water. Available water capacity is moderate. Under good management, these soils are productive. They are limited for most uses chiefly by slope and the consequent hazard of erosion. The fragipan in these soils affects movement and disposal of effluent from septic tanks.

Representative profile of Meckesville very stony silt loam, 0 to 15 percent slopes, in a wooded area in Green Ridge State Forest, on Oldtown Road about 1/3 mile east of Malcolm Road:

- O1—2 inches to 1/2 inch, litter of leaves from red, white, and black oaks.
- O2—1/2 inch to 0, thin, felty layer of black organic material.
- A1—0 to 2 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; very friable, slightly sticky; many roots; about 30 percent channers to stones of shale and sandstone; strongly acid; abrupt, smooth boundary.
- A2—2 to 9 inches, brown to dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure; very friable, slightly sticky and slightly plastic; many roots; about 30 percent channers to stones; strongly acid; clear, smooth boundary.
- B21t—9 to 17 inches, reddish-brown (5YR 4/4) light silty clay loam; weak to moderate, fine, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; many roots; about 30 percent coarse fragments; clay films on some aggregates; medium acid; clear, smooth boundary.

B2t—17 to 31 inches, yellowish-red (5YR 5/6) light silty clay loam; contains enough sand to be distinctly gritty; moderate, fine to medium, subangular blocky structure; firm, sticky and plastic; few roots; 20 to 30 percent coarse fragments; discontinuous brown or dark-brown (7.5YR 4/4) clay films; medium to strongly acid; clear, wavy boundary.

Bx—31 to 40 inches, yellowish-red (5YR 4/6) light silty clay loam; common, medium, distinct, brown (7.5YR 5/2) and few, fine, prominent, red (2.5YR 5/8) mottles; weak, coarse, prismatic structure and moderate, fine, subangular blocky; contains enough sand to be gritty; firm, brittle, sticky and slightly plastic; very few roots; 40 to 50 percent coarse fragments; brown (10YR 5/3) coatings on prisms; strongly to very strongly acid; gradual, irregular boundary.

C—40 to 60 inches, dark reddish-brown (5YR 3/4) loam to silt loam; interstitial between shale and sandstone fragments; contains enough sand to be gritty; massive; friable, slightly sticky; 70 percent or more coarse fragments; strongly to very strongly acid.

The solum ranges generally from 40 to 60 inches in thickness. Depth to unconforming bedrock ranges from 4 to 30 feet. In unlimed areas reaction generally ranges from medium acid to very strongly acid, but it is extremely acid in places. Acidity generally increases with depth.

The A horizon is silt loam. The B horizon ranges from heavy loam or heavy silt loam to light silty clay loam, and on the average it is generally 18 to 30 percent clay. At the extreme, the fragipan is moderately expressed, and in places it is only faintly or weakly expressed. In some areas the A horizon is very stony and has colluvial stones on and near the surface. Horizons vary in content of coarse fragments smaller than stones, ranging from less than 10 percent in the A horizon to more than 50 percent in the C horizon.

The A horizon is generally 5YR or 7.5YR in hue, but it is 10YR in places. This horizon is 2 to 5 in value and 1 to 4 in chroma. The thin A1 horizon is lowest in value and chroma. The B2t and Bx horizons are mostly 5YR or 2.5YR in hue, but in places hue is 10R in the lower part of these horizons. Value is 3 to 5 in these horizons, and chroma is 3 to 6. Generally horizons have no mottles above a depth of 30 inches. The Bx horizon has common mottles that are 4 to 6 in value and 2 to 8 in chroma.

Meckesville soils are similar to Laidig soils in that they have the same kind of natural drainage and have a fragipan. Unlike those soils, however, they have a reddish B horizon. They formed in the same kind of reddish shaly accumulations of colluvium as that in which the poorly drained to moderately well drained Albrights soils formed.

Meckesville silt loam, 0 to 8 percent slopes, moderately eroded (McB2).—This soil has a profile similar to that described as representative for the series, but almost no coarse fragments are in the surface layer of this soil, and generally few are in the upper part of the subsoil. Most areas of this nearly level to gently sloping soil are cleared for farming, and the soil has lost a few inches of the granular surface layer as a result of erosion. A few gullies are present in places. Slopes are mostly 3 to 8 percent.

Under reasonably good management, it is safe to cultivate this soil continuously. Capability unit IIe-4; woodland suitability group 2o3.

Meckesville silt loam, 8 to 15 percent slopes, moderately eroded (McC2).—This moderately sloping soil is in positions on the landscape where, in places, much seepage and runoff water from higher soils drain and wash across it. It has thus been eroded in an irregular

pattern, and rills and small gullies are in areas of the greatest runoff concentration.

This soil is severely limited for cultivation unless appropriate management practices are intensively applied and maintained. Capability unit IIIe-4; woodland suitability group 2o3.

Meckesville silt loam, 15 to 25 percent slopes, moderately eroded (McD2).—This strongly sloping soil has a severe hazard of erosion. Included in mapping are a few spots where the soil is severely eroded and a few areas where slopes are steeper than 25 percent.

This soil is so severely limited by slope and the consequent hazard of erosion that it is only marginally suitable for cultivated crops. It can be more safely used for, and is generally better suited to, improved pasture, hay, or sodded orchards. This soil, like other Meckesville soils, is in positions on foot slopes where still, frosty air settles in pockets in places. Thus, suitability for orchards can be determined from studies of the local histories of spring frosts. Capability unit IVe-3; woodland suitability group 2r4.

Meckesville very stony silt loam, 0 to 15 percent slopes (McC).—This nearly level to moderately sloping soil has the profile described as representative for the series. Many stones, mostly 10 to 15 inches in diameter, are close together on and near the surface. Similar stones that are fewer in number are below the surface.

This soil is not suitable for cultivation. It can produce hay or pasture crops in places. It is moderately limited for most nonfarm uses. Capability unit VI-3; woodland suitability group 2o3.

Meckesville very stony silt loam, 15 to 25 percent slopes (McD).—This strongly sloping soil is not suitable for cultivation. It can produce hay or pasture crops in places. Because of slope, limitations for community development and other nonfarm uses are greater for this soil than they are for less sloping Meckesville soils. This soil is generally excellently suited to trees. Capability unit VI-3; woodland suitability group 2r4.

Melvin Series

The Melvin series consists of deep, poorly drained, nearly level soils that formed in recent sediment washed from areas of limestone and from soils that formed in limestone residuum. These soils are on first bottoms of streams, mostly in the central part of the county. The native vegetation is wetland hardwoods and, in places, willows and alders.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil, about 37 inches thick, is gray or light-gray heavy silt loam to light clay loam that has brightly colored mottles. The substratum is gray gravelly sand about 2 inches thick. Bedrock is at a depth of about 48 inches.

The Melvin soils are generally difficult to work if they are even slightly too wet or too dry. They are often very wet until late in spring, and plowing and planting are delayed. Available water capacity is high. Water moves fairly rapidly through the surface layer,

but it generally moves much more slowly through the subsoil. If these soils are used intensively, they require artificial drainage. Such drainage also lengthens the growing period of pasture. The soils are not very difficult to drain where adequate outlets are available. They are very high in natural fertility and under good management are highly productive. They are limited mostly by poor internal drainage, a seasonal high water table, and the hazard of flooding. The degree of flooding hazard for any particular site is estimated by studying the flooding history of that site. Where these soils are frequently flooded they are used mostly for pasture and for growing trees.

Representative profile of Melvin silt loam on the flood plain of Evitt's Creek, about 800 feet north of Smouse Road:

- Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; many wormholes; few, fine, smooth pebbles; neutral; clear, wavy boundary.
- B1g—9 to 32 inches, gray (10YR 5/1) heavy silt loam; common, medium, distinct, yellowish-brown (10YR 5/6) and reddish-brown (5YR 4/3) mottles; weak to moderate, medium, angular and subangular blocky structure; friable to firm, sticky and slightly plastic; many roots; many wormholes in upper part; few, fine, smooth pebbles; slightly acid; clear, smooth boundary.
- B2g—32 to 46 inches, gray or light-gray (10YR 6/1) light clay loam to heavy silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) and reddish-brown (5YR 4/3) mottles; moderate, medium, angular and subangular blocky structure; friable to firm, sticky and plastic; few roots in upper part; few, fine, smooth pebbles; medium acid; abrupt, smooth boundary.
- IICg—46 to 48 inches, gray (10YR 5/1) gravelly sand; single grained; loose; some inclusions of silty or clayey material; medium acid; abrupt, smooth boundary.
- IIIR—48 inches, unconforming bedrock of hard sandstone.

The C horizon is generally at a depth ranging from 40 to 50 inches. Unconforming bedrock is at a depth of 4 to 20 feet or more. Reaction ranges generally from slightly acid to mildly alkaline, but in places it is medium acid.

The A horizon is silt loam. The B horizon ranges from silt loam to silty clay loam. The A and B horizons differ in texture because of stratification. The conforming C horizon is structureless. A silty Cg horizon is present in places between the solum and the IICg horizon. This horizon is abruptly and distinctly different in texture from overlying horizons, and it generally is sandy and gravelly. The solum is no more than 2 or 3 percent coarse fragments, if fragments are present. Generally no fragments are in the solum.

Horizons are generally 10YR or yellower in hue or are neutral. In places, however, hue is 7.5YR, probably because of deposits of reddish alluvium. The A horizon is 3 to 6 in value, and the thin undisturbed A1 horizon is lowest in value. The A horizon is 0, 1, or 2 in chroma. The B horizon is 5 to 7 in value and 0 or 1 in chroma. The conforming C horizon is very similar to the B horizon in color. The unconforming IIC horizon is variable in color, but it generally ranges from gray to pale brown.

Melvin soils are very similar to Atkins soils in that they have the same kind of drainage and have a hazard of flooding. They are not so acid as those soils, however, and they contain more plant nutrients and are generally more productive than those soils. They are on the same flood plains and formed in recent sediment the same as that in which the well-drained Huntington and the moderately well drained Lindsides soils formed.

Melvin silt loam (Me).—This soil has a hazard of flooding. It is mostly level, but in a few areas slopes are as much as 3 percent. Included in mapping are a few areas where soils are on foot slopes above drainageways and have almost no hazard of flooding. In these areas the soils formed in local alluvium.

If this soil is artificially drained (fig. 7), and adequately protected so that the hazard of flooding is only moderate, it is very well suited to corn, many hay crops, and highly improved pasture crops. Capability unit IIIw-3; woodland suitability group 1w9.

Monongahela Series

The Monongahela series consists of deep, moderately well drained, nearly level to moderately sloping soils that have a very hard and dense fragipan. These soils formed in acid sediment, mostly from areas of sandstone and shale, deposited on flood plains when the major streams of the county were at high elevations. They are on terraces or second bottoms above some of these streams. The native vegetation is mixed hardwoods that are mostly oaks and maples.

In a representative profile in an undisturbed area, the surface layer is silt loam about 10 inches thick. It is very dark grayish brown in the upper part and yellowish brown in the lower part. The subsoil is about 42 inches thick. The upper 18 inches is yellowish-brown light silty clay loam and silty clay loam that has gray mottles. The rest of the subsoil is a brown to dark-brown silt loam fragipan that has gray mottles and is very firm, dense, and very brittle. It extends to a depth of 52 inches. The substratum, to a depth of about 62 inches, is a continuation of the fragipan. It is yellowish-brown loam that has gray mottles and is firm and brittle. Below this, to a depth of 72 inches, the substratum is very firm, yellowish-brown gravelly loam.

The Monongahela soils are fairly easy to work at the optimum moisture content. They are somewhat wet in spring, however, and are late to warm. Planting is delayed in places, especially for crops that are normally early. For some uses these soils need artificial drainage in places, especially where they are less sloping. Available water capacity is moderate. Water moves very slowly through the subsoil and substratum, however, and the soils generally dry out more quickly in hot dry periods than most soils that are more porous and permeable. These moderately productive soils are limited for some uses by impeded drainage, a seasonally perched water table, the very slow movement of water through the subsoil, and by slope and the consequent hazard of erosion.

Representative profile of Monongahela silt loam, 0 to 3 percent slopes, in a pasture about 1 mile northwest of North Branch:

- A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, very fine, granular structure; very friable, slightly sticky and slightly plastic; many roots; medium acid (limed); abrupt, wavy boundary.
- A2—3 to 10 inches, yellowish-brown (10YR 5/4) light silt loam, faintly variegated with yellowish red (5YR 5/8); weak, coarse, granular structure to fine,



Figure 7.—Installation of drainage system on Melvin silt loam near Flintstone. This fertile and productive soil is on flood plains and is poorly drained. A properly installed drainage system helps improve its usefulness.

subangular blocky; friable, slightly sticky and slightly plastic; many roots; about 5 percent fine smooth pebbles; medium acid; clear, smooth boundary.

B21t—10 to 21 inches, yellowish-brown (10YR 5/6) light silty clay loam, faintly variegated with yellowish red (5YR 5/6); weak to moderate, fine, subangular blocky structure; friable to firm, sticky and slightly plastic; common roots; thin, pale-brown (10YR 6/3) clay films; strongly acid; clear, smooth boundary.

B22t—21 to 28 inches, yellowish-brown (10YR 5/6) silty clay loam, faintly variegated with yellowish red (5YR 5/6); common, medium, distinct, gray (10YR 5/1) mottles; weak, medium, subangular blocky structure; firm, sticky and slightly plastic; few roots; thin but distinct clay films; very strongly acid; clear to abrupt, smooth boundary.

Bx—28 to 52 inches, brown or dark-brown (10YR 4/3) silt loam; common, medium, distinct, gray or light-gray (10YR 6/1) mottles; strong, thick, platy and medium, blocky structure; very firm, dense, very brittle, slightly sticky and slightly plastic; few roots in upper part only; prominent yellowish-

brown (10YR 5/4) clay films and flows; very strongly acid; gradual, irregular boundary.
Cx—52 to 62 inches, yellowish-brown (10YR 5/4) loam, horizontally streaked with light gray (N 7/0); moderate, medium, platy structure; firm, brittle, slightly sticky; very strongly acid; clear, smooth boundary.

C2—62 to 72 inches, yellowish-brown (10YR 5/4) gravelly loam, irregularly streaked with light gray (N 7/0); massive; very firm, slightly sticky; about 20 percent smooth waterworn pebbles; very strongly acid.

The solum ranges generally from 40 to 60 inches in thickness. Unconforming bedrock generally is at a depth of 20 feet or more, but in places locally it is at a depth of less than 6 feet. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity generally increases with depth.

The A horizon is silt loam. The B horizon ranges from heavy loam or silt loam to silty clay loam, and it is more than 15 percent sand and pebbles. The C horizon contains less clay and more sand than the solum. The A horizon contains numerous pebbles on and near the surface in places, and the solum contains thin lines or strata of these

pebbles in places. The C horizon contains more coarse fragments than the solum. These fragments are mostly waterworn sandstone pebbles and are abundant in places.

Horizons are generally 10YR in hue throughout, except in some variegations and mottles. The A horizon is 3 to 5 in value and 1 to 6 in chroma. The thin A1 horizon is lowest in value and chroma, and generally only the A2 horizon is 6 in chroma. The B and C horizons are generally 4, 5, or 6 in value and 3 to 8 in chroma. The Bt horizon, below a depth of 10 inches from its upper limit, and the Bx horizon have mottles that are 2 or less in chroma. The B2t, Bx, and C horizons also have high-chroma mottles in places.

Monongahela soils are similar to Albrights, Buchanan, Cookport, Ernest, Landisburg, and Tyler soils in that they have the same kind of natural drainage and have a fragipan. Their B horizon is not so red as that of Albrights soils. They contain less sand in all horizons than Buchanan soils. They are deeper to bedrock and contain more coarse fragments than Cookport soils. They are lower in content of clay than Ernest soils. They are more acid than Landisburg soils. They are lower in content of clay than Tyler soils, and are not so sticky or as slowly permeable in the upper part of the B horizon as those soils.

Monongahela silt loam, 0 to 3 percent slopes (MhA).—This soil has the profile described as representative for the series. Erosion is not generally a serious concern of management on this nearly level soil, although a few areas of it are slightly eroded. In places some waterworn pebbles are on and near the surface, but they do not affect use and management.

This soil needs artificial drainage if it is intensively cultivated (fig. 8). Capability unit IIw-3; woodland suitability group 4w1.

Monongahela silt loam, 3 to 8 percent slopes, moderately eroded (MhB2).—This gently sloping soil has lost up to about 6 inches of the surface layer in almost all areas except a few that are still under a cover of trees. The loss is attributable to erosion intensified by runoff. Included in mapping are some small severely eroded spots and a few acres where the surface layer is 10 to 15 percent waterworn pebbles.

Excess surface water runs off of this soil readily, but in places improvement of internal drainage is needed where this soil is used to grow certain crops or for other purposes. The control of erosion, however, is a more important concern of management than drainage improvement. Capability unit IIe-13; woodland suitability group 4w1.

Monongahela silt loam, 8 to 15 percent slopes, moderately eroded (MhC2).—This moderately sloping soil has a severe hazard of erosion. The hazard is intensified by runoff of excess surface water, because water does not readily penetrate the soil, especially when the soil is already wet or moist. Included in mapping are a few areas where the surface layer is entirely or almost entirely eroded away and some gullies are pres-



Figure 8.—Peppers on Monongahela silt loam, 0 to 3 percent slopes, on a terrace above Evitt's Creek. This area is farmed intensively for truck crops.

ent. Also included are a few areas where slopes are slightly steeper than 15 percent.

This soil needs artificial drainage in places if it is used for certain cultivated crops. If it is used less intensively, such as for hay or pasture crops, artificial drainage is generally not needed. The main concern of management is the control of erosion. Capability unit IIIe-13; woodland suitability group 4w1.

Nolo Series

The Nolo series consists of deep, poorly drained, nearly level to strongly sloping soils that have a firm and brittle fragipan. These soils formed in material weathered in place mostly from sandstone but also from shale and siltstone. They are on uplands in the western part of the county. The native vegetation is water-tolerant hardwoods and some hemlock and white pine.

In a representative profile in a cultivated area, the surface layer is about 12 inches thick. It is dark grayish-brown silt loam in the upper 8 inches and grayish-brown loam to light silt loam in the lower 4 inches. The subsoil is about 24 inches thick. It is dark-gray sticky clay loam that has yellowish-brown mottles in the upper part. The lower part is a grayish-brown, mottled, light clay loam fragipan that is very firm, dense, and brittle and is sticky when wet. The substratum, to a depth of 60 inches, is a continuation of the fragipan. It is light-gray channery loam.

The Nolo soils are easy to work at the optimum moisture content, but they are often wet for long periods, especially in spring. If these soils are used for cultivated crops, they need artificial drainage. They also benefit from such drainage where they are used less intensively, such as for hay and pasture crops. Available water capacity is moderate. Water moves very slowly through the fragipan, however, and in hot dry periods the soils generally dry out almost completely in the upper part of the profile. In areas where these soils are more sloping, they are limited for most uses by the hazard of erosion.

Representative profile of Nolo silt loam, 0 to 3 percent slopes, in a cultivated area about $\frac{1}{3}$ mile west of Rose Meadow Cemetery, near Eckhart Mines:

- Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; slightly acid (limed); clear, smooth boundary.
- A2—8 to 12 inches, grayish-brown (10YR 5/2) loam or light silt loam; weak, medium, granular structure to fine, subangular blocky; friable, slightly sticky and slightly plastic; many roots; slightly acid; clear, wavy boundary.
- B2tg—12 to 23 inches, dark-gray (10YR 4/1) clay loam; common, medium, distinct, yellowish-brown (10YR 5/4 and 5/6) mottles; moderate, fine, blocky structure; friable to firm, sticky and plastic; few roots; faint clay films; strongly acid; abrupt, wavy boundary.
- Bx—23 to 36 inches, grayish-brown (10YR 5/2) light clay loam; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure and fine, subangular blocky; very firm, brittle, sticky and slightly plastic; prominent dark-gray (10YR 4/1) coatings; strongly acid; clear, wavy boundary.

Cx—36 to 60 inches, light-gray (10YR 7/1) channery loam; weak, coarse, prismatic structure; very firm, slightly sticky and slightly plastic; occasional large blotches of yellowish brown (10YR 5/6); about 20 percent flat sandstone channers; very strongly acid.

The solum ranges from 24 to 40 inches in thickness. Bedrock is at a depth ranging from about $3\frac{1}{2}$ to 6 feet. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity generally increases with depth.

The A horizon is silt loam in texture, verging on loam. The A2 horizon is loam in places. The A horizon of these soils contains more sand than most horizons of silt loam or loam in other soils in the county. In places the B horizon is loam, clay loam, sandy clay loam, or light silt loam. This horizon averages between 18 and 30 percent clay. It is relatively high in content of sand and low in silt. The A horizon ranges from about 0 to 10 percent coarse fragments that are mostly channers or gravel of sandstone. Such fragments make up 0 to 20 percent of the B horizon and 10 to 30 percent of the C horizon. In places horizons are very stony and stones are somewhat concentrated on and near the surface.

Horizons are mostly 10YR in hue but grade to 2.5Y in the lower part of the profile in places. The A horizon is 3 to 6 in value. Only the very thin A1 horizon is 3 in value, and in places the A2 horizon is 6 in value. The A horizon is 1 or 2 in chroma. The B horizon is 4 to 7 in value and mostly 1 or 2 in chroma, but in the upper part in places it is 3 in chroma. The C horizon has about the same color range as the B horizon. In the B horizon mottles are mostly 10YR in hue but are 7.5YR in places. They are 4 to 6 in value and 4 to 8 in chroma.

Nolo soils are similar to Loysville and Robertsville soils in that they have the same kind of natural drainage and have a fragipan. Unlike Loysville soils, however, they are strongly acid to extremely acid in reaction and do not contain chert fragments. Their subsoil contains more sand and less clay than that of Robertsville soils. Nolo soils formed in the same general kind of material as the well-drained Dekalb and Leetonia soils, the moderately well drained to somewhat poorly drained Cookport soils, and the very poorly drained Lickdale soils. Some Nolo soils are more sloping than any other soils in Allegany County that are as poorly drained.

Nolo silt loam, 0 to 3 percent slopes (NoA).—This nearly level soil has the profile described as representative for the series. Generally erosion is not a significant hazard. In a few acres, however, the soil is eroded to some extent because of runoff from adjacent higher soils.

This soil needs artificial drainage if it is used for cultivated crops. Such drainage also improves it for other uses. Capability unit IVw-2; woodland suitability group 3w9.

Nolo silt loam, 3 to 10 percent slopes (NoB).—This gently sloping to moderately sloping soil is subject to erosion to some extent, but in most areas is not badly eroded. It has not been significantly eroded where it is still under a cover of trees. Included in mapping, however, are some areas where up to about 6 inches of the surface layer has been lost as a result of erosion.

This soil needs improvement of internal drainage if it is used for farming and for some other purposes. Drainage improvement is the most important concern of management. Capability unit IVw-2; woodland suitability group 3w9.

Nolo silt loam, 10 to 20 percent slopes, moderately eroded (NoC2).—In most areas this moderately sloping to strongly sloping soil has lost 6 to 8 inches of its surface layer as a result of erosion. Despite its slope,

this soil remains wet for long periods. Much seepage occurs in places, and locally the soil receives much runoff from other higher soils. Control of wetness is a more important concern of management than control of erosion. Capability unit IVw-2; woodland suitability group 3w9.

Nolo very stony silt loam, 0 to 20 percent slopes (NsC).—This nearly level to strongly sloping soil has sandstone stones and boulders on the surface and throughout. The stones are generally only a few feet apart.

This soil is mostly in trees, and should remain so wherever possible. It is not very suitable for any more intensive use than this because of wetness, stoniness, and slope. Capability unit VIIs-4; woodland suitability group 3w9.

Opequon Series

The Opequon series consists of shallow, well-drained, gently sloping to very steep soils that formed in material weathered in place from hard flaggy limestone. These soils are on ridges mostly in the central part of the county. They contain many coarse fragments of limestone rock. The native vegetation is mostly mixed upland hardwoods.

In a representative profile in a cultivated area, the surface layer is dark-brown clay loam about 5 inches thick. The subsoil is about 12 inches thick. It is reddish-brown and dark reddish-brown heavy silty clay loam in the upper part and yellowish-red silty clay in the lower part. Hard limestone bedrock is at a depth of less than 20 inches.

The Opequon soils are generally difficult to work. The surface layer is somewhat thin, even where it is not eroded, and plowing to usual depths penetrates the subsoil in most places. The subsoil is hard when dry, and it is firm and tough when moist. It is sticky and plastic where it is even slightly wet. In flaggy areas cultivation is hindered further, and in very stony areas it is not practical. Available water capacity is low, and because the soils are shallow to bedrock, they can hold only limited amounts of water available for plants. These soils are high in natural fertility. Under generally good conditions and the best possible management, they are highly productive of adapted crops. They are limited by their low available water capacity, shallow rooting depth, heaviness or intractability, and coarse fragments or ledges of limestone. Most importantly, these shallow soils cannot tolerate losses of soil material without sustaining serious and permanent damage.

Representative profile of Opequon very stony clay loam, 3 to 25 percent slopes, in a pasture on Hardinger Road, about 1/4 mile east of Christie Road:

Ap—0 to 5 inches, dark-brown (7.5YR 3/2) clay loam; moderate, medium, granular structure and fine, subangular blocky; friable, slightly sticky and slightly plastic; many roots; many stones; slightly acid; abrupt, wavy boundary.

B21t—5 to 10 inches, reddish-brown (5YR 4/4) and dark reddish-brown (5YR 3/3) heavy silty clay loam; moderate, fine, angular and subangular blocky structure; firm, sticky and plastic; many roots;

prominent clay films; many stones; slightly acid; gradual, wavy boundary.

B22t—10 to 17 inches, yellowish-red (5YR 4/6) silty clay; moderate, medium, blocky structure; very firm, sticky and plastic; common roots; prominent clay films; many stones; neutral; abrupt, irregular boundary.

R—17 inches, hard, gray, coarsely fractured limestone.

The solum ranges from about 10 to 20 inches in thickness. Bedrock is at a depth of 20 inches or less. In places, however, thickness of the solum and depth to bedrock vary sharply and erratically over short distances. Reaction ranges from slightly acid to mildly alkaline, and the C horizon, where present, is calcareous in places. Base saturation is very high.

The A horizon is clay loam that is somewhat sticky when wet. The Bt horizon ranges from heavy silty clay loam to clay, and it is 35 to about 60 percent clay. In places a 1- to 3-inch C horizon of clay is present. The material in this horizon generally contains enough sand to feel somewhat gritty and is structureless (massive). It is sticky and is alkaline to calcareous. Horizons contain numerous coarse fragments throughout. These flat fragments are mostly flagstones of limestone that range from about 6 to 15 inches in length. In places horizons contain many similar fragments that are much more than 15 inches long. Outcropping limestone ledges also are present but are relatively less extensive and significant.

The A horizon is generally 7.5YR in hue but grades to 10YR and 5YR. In this horizon value is mostly 3 but is 4 in places, and chroma is 2 or 3. The Bt horizon is mostly 5YR in hue but ranges to 7.5YR or 2.5YR in subhorizons in places.

Opequon soils formed in the same general kind of material as Belmont, Brooke, Edom, Elliber, Hagerstown, and Westmoreland soils. They are shallower to bedrock, however, than any of those soils. They formed in material derived from the same kind of limestone or from limestone similar to the parent material of the deeper, well-drained Hagerstown soils. Also, they are closely associated with the very deep, well-drained, cherty Elliber soils.

Opequon flaggy clay loam, 3 to 8 percent slopes, moderately eroded (OpB2).—This soil has a profile similar to that described as representative for the series, but it contains coarse fragments the size of flagstones, up to 15 inches long. This gently sloping soil has lost part of the surface layer as a result of erosion in almost all areas. Included in mapping are a few areas where the soil is nearly level, and some areas of dips and slight draws where local accumulations of soil material over rock are a little more than 20 inches in thickness.

Nearly all areas of this soil are in hay and pasture crops or in orchards. Capability unit IIIe-30; woodland suitability group 3c1.

Opequon flaggy clay loam, 8 to 15 percent slopes, moderately eroded (OpC2).—This moderately sloping soil has a severe hazard of erosion. It has lost part of the surface layer as a result of erosion in almost all areas. Plowing penetrates the tough sticky subsoil in places. Included in mapping are a few areas that are still under a cover of trees and consequently have not been damaged by erosion. Also included are a few spots where the subsoil has been exposed by erosion and places where a few shallow gullies are present. In places in areas where the soil has been terraced and planted on the contour, local accumulations of soil material more than 20 inches in thickness are on terraces.

This soil is mostly in hay and pasture crops and orchards (fig. 9). It is not suitable or is only marginally



Figure 9.—Area of Opequon flaggy clay loam, 8 to 15 percent slopes, moderately eroded, about 2 miles east of Wolfe Mill. Flagstones on and in this soil hinder but do not prevent use for crops, orchards, or pasture.

suitable for cultivated crops, because of slope, the hazard of erosion, and shallowness. Capability unit IVe-1; woodland suitability group 3c1.

Opequon flaggy clay loam, 15 to 25 percent slopes, moderately eroded (OpD2).—This shallow soil is strongly sloping. Because of slope, the hazard of erosion is severe in areas used for cultivated crops. Included in mapping are many small areas where the surface layer and even part of the subsoil have eroded away and other areas where gullies extend to the depth of bedrock. In places in orchards on contoured terraces, spots of accumulated soil material more than 20 inches thick are present. This material has washed from higher areas.

Where erosion damage has not been too extensive, this soil is in pasture or in orchards protected by a cover of sod. Capability unit VIe-1; woodland suitability group 3c4 (north aspects) and 4c4 (south aspects).

Opequon flaggy clay loam, 25 to 50 percent slopes, moderately eroded (OpE2).—In many spots this steep to very steep soil has lost the surface layer and also much of the subsoil as a result of erosion. In places in these areas, gullies extend to the depth of bedrock. Flagstones that were not removed with the soil mate-

rial are present in places, and they fill some of the gullies almost completely.

Many areas of this soil are wooded. Some of the areas of less sloping soils have been cleared and are used mostly for orchards. Because it generally needs a permanent cover of vegetation for watershed protection and other purposes, this soil needs sodding in some areas and reforestation in others. Capability unit VIIe-1; woodland suitability group 3c4 (north aspects) and 4c4 (south aspects).

Opequon very stony clay loam, 3 to 25 percent slopes (OuD).—This nearly level to strongly sloping soil has the profile described as representative for the series. Loose slabs of limestone that are 15 to 30 inches or more in length and smaller flagstones are throughout the soil material (fig. 10). The slabs and flagstones are only a few feet apart, on the average. Included in mapping are a few areas where the soil is less clayey and more silty and is deeper than it is in other areas.

This soil is not suitable for ordinary cultivation. It can be used for hay crops or for grazing in places to a limited extent, and a few areas are possibly suited to orchards. If used for these purposes, stones need to be removed in places. Capability unit VIe-2; woodland



Figure 10.—Area of Opequon very stony clay loam, 3 to 25 percent slopes, just north of Warrior Mountain. This soil is too stony for tillage, but is useful for improved pasture.

suitability group 3c4 (north aspects) and 4c4 (south aspects).

Opequon very stony clay loam, 25 to 50 percent slopes (O_uE).—This steep to very steep soil is generally not suitable for any more intensive use than trees, watershed protection, and wildlife habitat. Included in mapping are a few areas where the soil is deeper and more silty than it is in other areas. Capability unit VII_s-2; woodland suitability group 3c4 (north aspects) and 4c4 (south aspects).

Philo Series

The Philo series consists of deep, moderately well drained, nearly level soils that formed in sediment washed from areas of acid soils. These acid soils formed mostly in material derived from shale and sandstone. The Philo soils are on flood plains of streams in many parts of the county. They are subject to occasional flooding. The native vegetation is mostly water-tolerant oaks, maples, and other hardwoods.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil is silt loam about 23 inches thick. It is dark yellowish brown in the upper part and yellowish-brown in the lower part. The lower part has strong-brown and grayish-brown mottles. The substratum, to a depth of 56 inches, is variegated gray and brown silt loam that has yellowish-red mottles.

The Philo soils are fairly easy to work at the optimum moisture content. They are generally wet in spring, however, and late to warm. They have a hazard of flooding, especially in winter and spring. Plowing and planting are often delayed. These soils are improved for most uses by artificial drainage, which also lengthens the grazing period of pasture. They are not difficult to drain if adequate outlets are available. Available water capacity is high. Water

moves readily through these soils. If drainage is improved and measures for flood protection are taken, the soils are suitable for many crops and are moderately productive. They are limited for all uses mainly by seasonal wetness, a high water table, and the hazard of flooding. The degree of flooding hazard for any particular site can only be estimated from a study of its flooding history.

Representative profile of Philo silt loam in a level cultivated area on the flood plain of Town Creek:

- Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable, slightly sticky and slightly plastic; many roots; neutral (limed); clear, smooth boundary.
- B1—8 to 15 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, subangular blocky structure; friable, sticky and slightly plastic; common roots; slightly acid; clear, smooth boundary.
- B2—15 to 31 inches, yellowish-brown (10YR 5/4) silt loam; few, medium, distinct, strong-brown (7.5YR 5/6) and grayish-brown (10YR 5/2) mottles; weak to moderate, fine, subangular blocky structure; friable; sticky and slightly plastic; few roots; medium acid; clear, smooth boundary.
- C—31 to 56 inches, variegated gray (10YR 5/1) to brown (7.5YR 5/2) loam or light silt loam; common, medium, distinct, yellowish-red (5YR 4/6) mottles; massive; firm, sticky and plastic; strongly acid to very strongly acid.

The solum ranges from 24 to 40 inches in thickness. Unconforming bedrock is at a depth of 6 to 20 feet or more. In unlimed areas reaction ranges from medium acid to very strongly acid, and acidity increases with depth.

Horizons are mostly silt loam throughout, but they range from loam to light silty clay loam in places because of differential deposition of sediment. The B horizon generally averages less than 18 percent clay. The material in the C horizon is somewhat coarser than that of the B horizon in places. All horizons contain smooth waterworn pebbles in places, but generally only the C horizon contains large amounts locally.

Horizons are mostly 10YR in hue but grade to 2.5Y at some depths. The A horizon is 3 to 5 in value, and the thin, unplowed A₁ horizon is lowest in value. The A horizon is 2 to 4 in chroma. The B horizon is 3 to 5 in value and 3 to 6 in chroma. In the B₂ horizon are mottles that have chroma of 2 or less. All horizons below the A horizon have high-chroma mottles in places.

Philo soils are similar in drainage to Lindsides soils, and they have a similar hazard of flooding. They are lower in content of clay than those soils, however, and are more strongly acid, less fertile, and generally less productive. They formed in the same kind of material and on the same flood plains as the well-drained Pope and the poorly drained Atkins soils.

Philo silt loam (Ph).—This soil is mostly nearly level, but it is also gently sloping in some areas along narrow flood plains and at the margins of wider ones. Generally erosion is not a concern, except in some places during periods of flooding. Included in mapping are areas of soils that are somewhat poorly drained.

Where the hazard of flooding is severe, this soil is strongly limited for cultivated crops. Where the hazard is very severe, use of the soil is almost entirely limited to wooded and grazing areas. Capability unit IIw-7; woodland suitability group 1w1.

Pope Series

The Pope series consists of deep, well-drained, nearly level soils that formed in sediment washed

from areas of acid soils. The acid soils formed mostly in material derived from sandstone and shale. The Pope soils are on flood plains of streams in many parts of the county. They are subject to flooding during periods of extended heavy rain or very rapidly melting snow. The native vegetation is mixed hardwoods, dominantly oaks and maples.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown fine sandy loam about 11 inches thick. The subsoil is dark yellowish-brown fine sandy loam about 37 inches thick. The substratum, to a depth of 60 inches, is variegated brown, yellowish-brown, and grayish-brown stratified gravelly sand and sandy loam.

The Pope soils are easy to work. They are well drained and can generally be worked very early in spring, if the area is not flooded. In places water that runs off of adjacent higher areas needs to be diverted. Available water capacity is moderate. Water moves readily through these soils. Under a high level of management the soils are moderately to highly productive. They respond well to additions of lime and fertilizer. Their main limitation for some uses is the hazard of flooding. The degree of flooding hazard for any particular site can only be estimated from a study of its flooding history.

Representative profile of Pope fine sandy loam in a level area of pasture on the flood plain of Town Creek, just north of Oldtown:

- Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium, granular structure; very friable, slightly sticky; many roots; medium acid to slightly acid (limed); clear, smooth boundary.
- B2—11 to 48 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, medium, granular structure and fine, subangular blocky; friable, slightly sticky; many roots in upper part, few below; strongly acid; abrupt, wavy boundary.
- IIC—48 to 60 inches, variegated brown, yellowish-brown, and grayish-brown stratified gravelly sand to gravelly sandy loam; massive to single grained; very friable to firm; about 25 percent waterworn pebbles; very strongly acid to extremely acid.

The solum generally ranges from 40 to 50 inches in thickness. Unconforming bedrock is at a depth ranging from 6 to 20 feet or more. In unlimed areas reaction ranges from strongly acid to extremely acid, and acidity increases with depth.

The A and B horizons are fine sandy loam or silt loam. These horizons are generally uniform in texture but have some slight differences in subhorizons, particularly in the B horizon. The textural differences are a result of differential sedimentation. The A and B horizons generally average less than 18 percent clay. The C horizon is similar to the A and B horizons in texture but differs in places. All horizons contain waterworn pebbles in places, but generally only the unconforming IIC horizon contains large amounts in places.

Horizons are generally 10YR in hue throughout, but in places hue is 7.5YR in the B horizon. The A horizon is generally 4 in value and 1 to 4 in chroma. The B horizon is 4 or 5 in value and 4 or 6 in chroma. In places the C horizon is similar to the B horizon in color, and in other places it is variegated. In places elsewhere this horizon is variously mottled.

Pope soils are similar to Huntington soils in that they are well drained and on flood plains. They are not so silty throughout as those soils, however, and they are lower in content of clay and higher in content of sand. They are more acid and lower in natural fertility than those soils,

and they do not produce adapted crops so well. They formed in the same kind of material and are generally on the same flood plains as the moderately well drained Philo soils and the poorly drained Atkins soils.

Pope fine sandy loam (Pn).—This soil has the profile described as representative for the series. It is mostly nearly level, but included in mapping are areas of gently sloping soil on narrow flood plains in V-shaped valleys.

This soil can generally be worked over a wide range of moisture content. Its only important limitation for most uses is the hazard of flooding (fig. 11). Where this hazard is severe or very severe, the soil is mostly in wooded areas or is used for grazing during flood-free periods. Capability unit I-6; woodland suitability group 2o1.

Pope silt loam (Ps).—This nearly level soil differs from Pope fine sandy loam in that it contains much more silt and much less sand in the surface layer and subsoil, is on broader and flatter flood plains, has a higher available water capacity, can be worked over a narrower range of moisture content, and is a little slower to dry out after periods of rain or flooding.

This soil is limited for most uses mainly by the hazard of flooding. Where this hazard is very severe or flooding occurs very frequently, the soil is mostly in wooded areas or is used for grazing during flood-free periods. Capability unit I-6; woodland suitability group 2o1.

Robertsville Series

The Robertsville series consists of deep, poorly drained, nearly level to gently sloping soils that have a moderately firm and brittle fragipan. These soils formed in acid very silty sediment deposited when the major streams of the county were at higher elevations. They are on terraces or second bottoms above some of these streams. The native vegetation is wetland hardwoods.



Figure 11.—Area of Pope fine sandy loam being plowed near Cumberland. Where it is protected from flooding, this soil has few or no limitations for farming.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown silt loam about 11 inches thick. The subsoil is about 26 inches thick. The upper part is gray to light-gray silty clay loam that is sticky and has prominent dark yellowish-brown and strong-brown mottles. The lower part is a gray to light-gray fragipan of light silty clay loam that is firm, dense, and brittle and has yellowish-brown mottles. The substratum, to a depth of 60 inches, is a continuation of the fragipan. It is gray to light-gray silt loam or light silty clay loam and has brown and yellowish-red mottles.

The Robertsville soils can be worked only over a somewhat narrow range of moisture content. They are very easy to work at the optimum moisture content. They are often wet for long periods, however, especially in spring. Cultivated areas of these soils need artificial drainage. Such drainage also improves these soils for growing hay and pasture crops. Available water capacity is moderate. Water moves very slowly, however, through the fragipan. These soils have a hazard of erosion where they are more sloping.

Representative profile of Robertsville silt loam, 0 to 8 percent slopes, in a pasture about 1 mile northwest of North Branch:

- Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint, yellowish-brown (10YR 5/6) mottles in lower part; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; slightly acid (limed); clear, smooth boundary.
- B2tg—11 to 28 inches, gray to light-gray (10YR 6/1) silty clay loam; common, medium, distinct to prominent, dark yellowish-brown (10YR 4/4) and strong-brown (7.5YR 5/8) mottles; moderate, fine, angular and subangular blocky structure; friable to firm, sticky and plastic; many roots in upper part, few below; faint clay films; medium acid to strongly acid; clear, smooth boundary.
- Bx—28 to 37 inches, gray to light-gray (N 6/0) light silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; weak, thick, platy structure and fine, subangular blocky; firm, moderately brittle, sticky and slightly plastic; distinct, brown, (10YR 4/3) clay films and flows, diminishing with depth; strongly acid; abrupt, smooth boundary.
- Cx—37 to 60 inches, gray (N 5/0) to light-gray (10YR 6/1) silt loam or light silty clay loam; common, medium, distinct, brown (10YR 4/3) and yellowish-red (5YR 5/6) mottles; moderate, medium, platy and subangular blocky structure; very firm, brittle, slightly sticky and slightly plastic; very strongly acid.

The solum ranges from about 24 to 40 inches in thickness. Unconforming bedrock is at a depth ranging from 6 to 20 feet or more. In unlimed areas reaction ranges from strongly acid to extremely acid and acidity increases with depth.

The A horizon is silt loam that is somewhat stickier than the silt loam in many silty soils. The B horizon is mostly silty clay loam, but in places it has thin strata of clay or silty clay. Both the A and B horizons are very silty and are less than 15 percent sand and coarser material. The A horizon averages from 18 to 27 percent clay and the B horizon from 27 to 35 percent clay. The C horizon is slightly higher in content of sand in the lower part, and contains some smooth pebbles in places.

Horizons are mostly 10YR in hue or yellow. The A horizon is 2 to 5 in value, and only in the thin, unplowed A horizon is value 2 or 3. The A horizon is 0 to 2 in chroma. The B and C horizons are 5 or 6 in value and 0 or 1 in

chroma. These horizons have mottles that range to 5GY, 5G, or 5BG in hue in places and are generally high in chroma.

Robertsville soils are similar to Loysville and Nolo soils in that they have a fragipan. They are more strongly acid than Loysville soils and, unlike those soils, Robertsville soils are not cherty. Robertsville soils are higher in content of clay and lower in content of sand than Nolo soils. They formed in material very similar to that in which the better drained Tyler soils formed, and like those soils are on terraces. They formed in coarser textured material than that in which the well-drained Allegheny and Chavies soils and the moderately well drained to somewhat poorly drained Monongahela soils formed.

Robertsville silt loam, 0 to 8 percent slopes (RbB).—

This soil has been damaged by erosion to some extent. Included in mapping are scattered acres where slopes are a little steeper than 8 percent.

Improvement of internal drainage in this soil is the most important concern of management. Internal movement of moisture is slow, however, so drainage improvement is somewhat difficult in places. Adequate outlets generally are available. Capability unit IVw-2; woodland suitability group 1w9.

Rock Outcrop

Rock outcrop (Rc) consists of mostly barren exposures of bedrock. Many areas, however, are covered by brushy growths to such an extent that the bedrock is not immediately apparent, even at close range. The outcropping rocks are mostly sandstone, but in some areas are hard shale and siltstone. The surface of many of these rocky areas is uneven and has many cracks, fissures, and small pockets in which soil and rock particles, plant remains, and other material accumulate. Such areas provide germination points for various kinds of seeds. After these seeds germinate, the plants that resist drought, cold, and heat sufficiently grow enough to cover a large part of the areas.

Rock outcrop is not used for farming. Although some stunted trees grow in places, economic production of wood crops is not feasible. Some areas provide shelter for some types of wildlife. Capability unit VIIIs-1; not assigned to a woodland suitability group.

Shelocta Series

The Shelocta series consists of deep, well-drained, nearly level to strongly sloping, shaly soils that formed mostly in shaly local colluvium. These soils are mainly on concave foot slopes. The native vegetation is mixed upland hardwoods, dominantly oaks but also many other species.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown shaly silt loam about 8 inches thick. The subsoil, about 40 inches thick, is strong-brown shaly silty clay loam that is sticky when wet. Bedrock of pale-brown acid shale is at a depth of 48 inches.

The Shelocta soils are generally easy to work. Available water capacity is high. Under the best possible management, these soils are highly productive. They are limited for all farm uses, mostly by slope and the consequent hazard of erosion. In places they are also

limited for some nonfarm uses by poor stability in the shaly substratum.

Representative profile of Shelocta shaly silt loam, 0 to 8 percent slopes, moderately eroded, in a pasture at the end of Buckley Road, about 2 miles southeast of Spring Gap:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) shaly silt loam; weak, fine, granular structure; very friable, slightly sticky and slightly plastic; many roots; about 15 percent fine shale fragments less than 1 inch in length; strongly acid; clear, wavy boundary.

B21t—8 to 28 inches, strong-brown (7.5YR 5/6) shaly light silty clay loam; weak to moderate, fine and medium, subangular blocky structure; friable, sticky and slightly plastic; many roots; distinct but discontinuous, dark yellowish-brown (10YR 4/4) clay films; about 15 percent fine shale fragments; strongly acid to very strongly acid; clear, smooth boundary.

B22t—28 to 48 inches, strong-brown (7.5YR 5/6) shaly silty clay loam; moderate, medium, angular and subangular blocky structure; friable to firm, sticky and plastic; few roots; prominent brown (7.5YR 5/4) clay films; about 15 percent fine shale fragments; very strongly acid; clear to abrupt, irregular boundary.

IIR—48 to 54 inches, pale-brown (10YR 6/3), highly weathered but mostly unseparated, acid shale.

The solum generally ranges from 40 to 60 inches in thickness. Unconforming bedrock is at a depth of 4 to 15 feet or more, and can be of almost any kind. In unlimed areas reaction ranges from strongly acid to extremely acid and acidity generally increases with depth.

The A horizon is silt loam. The B horizon ranges from heavy silt loam to silty clay loam. In places the C horizon is a few inches to several feet in thickness. The A horizon is 15 to 20 percent entirely unoriented fine shale fragments. The lack of orientation indicates that these fragments have been transported to their present location. The B horizon is about 15 to 40 percent such fragments. The C horizon, where present, consists largely of these fragments, but has some silt in interstices.

Horizons are generally 10YR in hue throughout, except for the B horizon in places. In the A horizon value is 3 to 6. Value is lowest in the thin A1 horizon and highest in the undisturbed A2 horizon. The A horizon is 2 to 6 in chroma, and the undisturbed A2 horizon has the highest chroma. The B horizon is generally 5 in value and 6 or 8 in chroma.

Shelocta soils are similar to Gilpin and Westmoreland soils. They are deeper to hard conforming bedrock than Gilpin soils, however, and are much more acid and generally less fertile and productive than Westmoreland soils. They are similar to Laidig soils in depth, position on the landscape, and drainage, but they do not have the dense fragipan in the lower part of the profile as those soils do, and they generally do not contain the coarse fragments of hard sandstone.

Shelocta shaly silt loam, 0 to 8 percent slopes, moderately eroded (ShB2).—This soil has the profile described as representative for the series. It is nearly level to gently sloping, but most slopes are between 3 and 8 percent. It has lost up to 6 inches of the granular surface layer as a result of erosion. Included in mapping are scattered areas where the surface layer contains some angular fragments of hard sandstone.

This soil is used mostly for farming. Capability unit IIE-4; woodland suitability group 1o3.

Shelocta shaly silt loam, 8 to 15 percent slopes, moderately eroded (ShC2).—Except in a few undisturbed

wooded areas, this moderately sloping soil has lost part of the surface layer as a result of erosion. In places in local areas, the soil has been severely damaged by erosion and a number of shallow gullies are present. Included in mapping are small areas where the surface layer contains hard angular fragments of sandstone.

This soil is severely limited for cultivated crops by the hazard of erosion. Under good management that includes suitable protective measures, however, it can be safely cultivated continuously. Capability unit IIIe-4; woodland suitability group 1o3.

Shelocta shaly silt loam, 15 to 25 percent slopes, moderately eroded (ShD2).—This strongly sloping soil has some slopes that are distinctly concave. It has lost part of the surface layer as a result of erosion, except in some small areas that are still wooded, and it has a number of shallow gullies in places in poorly protected areas where water has concentrated. In local places small landslips or caving are present. Included in mapping are spots where the surface layer contains hard gravel.

This soil is only marginally suitable for regular cultivation. It is generally more suitable for uses other than cultivated crops. Capability unit IVE-3; woodland suitability group 1r4.

Stony Land

Stony land consists of areas that are very stony and bouldery and have many outcroppings of rock. All the stones and rocks are acid; none of them are limestone. Small amounts of soils are present between the stones and boulders and are similar to Dekalb, Gilpin, Lehew, and Weikert soils. Slopes range from nearly level to very steep. Stony land is generally so rough and rugged that it is very severely limited for most uses.

Stony land, rolling (SrC).—This material is mostly strongly sloping or rolling, but in a few areas it is nearly level. Slopes range up to about 45 percent.

Areas are mostly wooded. This material is not well suited to growing trees for commercial purposes, but some wood crops can generally be harvested from natural stands. It is generally too rough for proper management of pasture areas, but it is used for grazing to a very limited extent in some cleared areas and for browsing in some brushy wooded areas (fig. 12). It also provides food and cover for some types of wildlife, and is used for some kinds of outdoor recreation in places. Capability unit VIIs-3; woodland suitability group 4x5 (north aspects) and 5x5 (south aspects).

Stony land, steep (SrF).—This material has slopes that range from 45 to 75 percent, or even more in some small areas. It is generally so steep, rough, and rugged that it is not suitable for any uses that provide economic returns. It is suitable only for wildlife habitat, watershed protection, and, to a limited extent, some kinds of outdoor recreation areas. Capability unit VIIIs-1; woodland suitability group 5x5 (north aspects) and 6x5 (south aspects).



Figure 12.—Area of Stony land, rolling. In places this stony and bouldery land type is used for limited part-time grazing.

Strip Mines and Dumps

Strip mines and Dumps (S+) consist of areas in the county where the soils and soil material are in several stages of disturbance, either separately or in various combinations. These are open pits from which the overburden of soil and rock has been removed and the underlying coal excavated; spoil areas and job piles, nearly always associated with such pits, where the overburden material was deposited during stripping operations and then left entirely rough and untreated (fig. 13); and places where the overburden material was used to partly refill pits and stripped areas and, in some spots, graded back into a more natural appearing landscape. The different kinds of areas that make up Strip mines and Dumps are not shown separately on the map mainly because their condition is subject to change within short periods in places.

Some of the refilled and graded areas are used for grazing to a limited extent. Other reclaimed areas are replanted in trees (fig. 14), and some others are used as sites for commercial or industrial buildings and for various other purposes. Capability unit VIIs-5; not assigned to a woodland suitability group.

Tyler Series

The Tyler series consists of deep, somewhat poorly drained, nearly level to gently sloping soils that have a

moderately firm and brittle fragipan. These soils formed in acid silty sediment deposited when streams of the county were at high elevations. They are on terraces above some of these streams. The native vegetation is mixed water-tolerant hardwoods.

In a representative profile in a wooded area, the surface layer is silt loam about 6 inches thick. It is very dark gray in the upper 2 inches and dark gray in the lower 4 inches. The lower part has some yellowish-brown mottles. The subsoil extends to a depth of about 54 inches. The upper part, to a depth of about 20 inches, is brown to strong-brown silty clay loam that is very sticky. The middle part, to a depth of about 29 inches, is gray silty clay loam or light silty clay that also is very sticky and in places has red mottles. The lower part, about 25 inches thick, is a gray very fine sandy clay loam fragipan that is firm, brittle, and platy. It has yellowish-red and yellowish-brown mottles.

The Tyler soils are fairly easy to work at the optimum moisture content. They are often wet, generally for long periods, however, especially in spring. If they are used for most cultivated crops common to the area, these soils need artificial drainage, especially in areas where they are less sloping. Artificial drainage also makes the soils more suitable for hay and pasture crops. Available water capacity is moderate. Water moves through these soils very slowly, however, espe-



Figure 13.—Rough, untreated strip-mine spoil on Big Savage Mountain.

cially in the fragipan. The soils have a hazard of erosion in all areas where they are more sloping.

Representative profile of Tyler silt loam, 0 to 3 percent slopes, in a wooded area on a terrace of the Potomac River about 1 mile northwest of North Branch:

- O2—½ inch to 0, mat of decomposed organic material.
 A1—0 to 2 inches, very dark gray (10YR 3/1) silt loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, wavy boundary.
 A2—2 to 6 inches, dark-gray (10YR 4/1) silt loam; few, medium, prominent, yellowish-brown (10YR 5/6) mottles; weak, fine, granular to subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; strongly acid; abrupt, wavy boundary.
 B21t—6 to 20 inches, brown to strong-brown (7.5YR 5/4 to 5/6) silty clay loam; common, medium, distinct, gray (10YR 5/1) to light-gray (10YR 7/2) mottles; moderate, fine to coarse, angular and subangular blocky structure; firm, very sticky and very plastic; many roots in upper part; faint to prominent, reddish-brown (5YR 4/3) clay films; strongly acid; abrupt, wavy boundary.
 B22tg—20 to 29 inches, gray (10YR 5/1) silty clay loam or light silty clay; common, coarse, prominent, red (2.5YR 4/6) mottles; strong, very coarse, blocky

structure; firm, very sticky and very plastic; very few roots; prominent, yellowish-red (5YR 4/6), clay films; strongly to very strongly acid; abrupt, wavy boundary.

Bx—29 to 54 inches, gray (10YR 5/1) very fine sandy clay loam; common, coarse, prominent, yellowish-red (5YR 4/6) and yellowish-brown (10YR 5/6) mottles; moderate, thin, platy structure and weak, fine, subangular blocky; firm, brittle, slightly sticky and slightly plastic; distinct but broken films of dark reddish gray (5YR 4/2); very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Unconforming bedrock is at a depth ranging from 6 to 20 feet or more in places. In unlimed areas reaction ranges from strongly acid to extremely acid and acidity increases with depth.

The A horizon is silt loam in texture. The Bt horizon ranges from silty clay loam to silty clay. In places the Bx horizon is silty clay loam, clay loam, or very fine sandy clay loam. Generally, horizons are free of coarse fragments.

Horizons are mostly 10YR in hue, except for the B horizon in places. The A horizon is 2 to 5 in value and 1 to 4 in chroma. Generally, only the thin A1 horizon is 2 and 3 in value and 1 in chroma. In places the B horizon is 7.5YR in hue. The B21t horizon is 4 or 5 in value and 4 to 8 in chroma. The B22tg horizon is 4 to 6 in value and 1 to 4 in



Figure 14.—Five-year-old planting of white pine on smoothed strip-mine spoil in the western part of Allegany County.

chroma. The Bx horizon generally has the same range of color as the B22tg horizon. The B21t horizon has mottles of chroma 2 or less, and also some that are 5YR or redder in hue and are high in chroma. The B22tg horizon, where it is 3 or 4 in chroma, has many mottles of chroma 2 or less. Where this horizon is 2 or less in matrix chroma, it has many high-chroma mottles.

Tyler soils are similar in morphology and drainage characteristics to Albrights, Buchanan, Cookport, Ernest, and Landisburg soils. They are higher in content of clay and contain fewer coarse rock fragments, however, than any of those soils. They formed in material that is the same as or very similar to that in which the poorly drained Robertsville soils formed, and they are on the same terrace formations as those soils. They are in positions on the landscape similar to those of the well-drained Allegheny and Chavies soils and the moderately well drained to somewhat poorly drained Monogahela soils, but they formed in coarser textured material than that in which those soils formed.

Tyler silt loam, 0 to 3 percent slopes (T_yA).—This soil has the profile described as representative for the series. It is nearly level and generally does not have a significant hazard of erosion. Included in mapping are spots where silty material washed from areas of adjacent higher soils has accumulated. Also included are a few places where the subsoil is higher in content of clay than it is in other areas and where little or no development of the fragipan has taken place.

This soil needs artificial drainage if it is used for cultivated crops. Such drainage also makes the soil

more suitable for good, fully developed hay and pasture crops. Capability unit IIIw-9; woodland suitability group 2w6.

Tyler silt loam, 3 to 8 percent slopes (T_yB).—This gently sloping soil has a moderate hazard of erosion. In most areas active erosion has been negligible, however, because the soil is used mostly for hay or pasture rather than for cultivated crops. In addition to this, some areas are still wooded. Included in mapping are a number of small areas where the subsoil shows little development of the fragipan and is somewhat higher in content of clay than normal. Also included are a few areas where slopes are somewhat steeper than 8 percent.

If this soil is regularly cultivated, management that carefully controls erosion is necessary. Drainage improvement, however, is the main concern of management. Capability unit IIIw-9; woodland suitability group 2w6.

Weikert Series

The Weikert series consists of shallow, somewhat excessively drained, nearly level to very steep, shaly soils that formed in material weathered from acid shale and siltstone and some fine-grained sandstone. These soils are in a landscape of rolling to very steep ridges in all parts of the county except the westernmost part. They are by far the most extensive soils of the county, and make up more than 30 percent of it. The native vegetation is mostly white oak, red oak, and chestnut oak, other hardwoods, and some white pine and Virginia pine.

In a representative profile the surface layer is shaly silt loam about 4 inches thick. It is dark brown in the upper part and brown to dark brown in the lower part. The subsoil, about 12 inches thick, is brown to yellowish-brown very shaly silt loam. The substratum is pale-brown fractured shale and some silty soil material about 3 inches thick. Shale bedrock is at a depth of about 19 inches.

The Weikert soils are not very difficult to work, even though the surface layer is almost 50 percent shale fragments in places, or more where plows penetrate the subsoil. These soils can be safely worked over a fairly wide range of moisture content. They have the lowest available water capacity, on the average, of all the soils in the county. These soils are severely restricted for farming and many other uses by this low available water capacity and also by the shallow depth to bedrock, very shaly nature of the material in the profile, looseness of soil material, and low to very low natural fertility.

These soils are used mostly for trees, although growth of economic species is slow. Farming and economic development generally are not extensive in the many parts of the county where these soils are dominant. Few areas now are cultivated. Much more extensive areas formerly were cleared for tillage or pasture. Where they are now cultivated, the soils are mostly gently sloping to moderately sloping. These soils are also used to a limited extent for grazing. Carrying

capacity of pasture, however, is lower than on almost all other soils in the county.

Representative profile of Weikert shaly silt loam, 0 to 10 percent slopes, moderately eroded, in a wooded area near the intersection of Orleans and Yonkers Roads:

- O1—1 inch to $\frac{1}{4}$ inch, leaf litter consisting mostly of oak and hickory.
- O2— $\frac{1}{4}$ inch to 0, thin, felty mat of decomposed organic material.
- A11—0 to 2 inches, dark-brown (7.5YR 3/2) shaly silt loam; weak, very fine, granular structure; loose to very friable; many roots; about 30 percent fine to medium shale fragments; extremely acid; clear, wavy boundary.
- A12—2 to 4 inches, brown to dark-brown (7.5YR 4/4) shaly silt loam; weak, fine, granular structure; loose to very friable; many roots; 30 to 40 percent shale fragments; extremely acid; clear, wavy boundary.
- B2—4 to 16 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4) very shaly silt loam; very weak, fine, subangular blocky structure; friable; fine material very slightly sticky; common roots; 60 to 75 percent oriented shale fragments; very strongly acid to extremely acid; gradual, irregular boundary.
- C—16 to 19 inches, pale-brown (10YR 6/3), fractured, separated but oriented shale; loose silty material in interstices; few roots; very strongly acid to extremely acid; abrupt, irregular to broken boundary.
- R—19 inches, pale-brown (10YR 6/3), fractured but unseparated shale.

The solum ranges from about 10 to 20 inches in thickness. Bedrock is at a depth of 20 inches or less. In unlimited areas reaction ranges from strongly acid to extremely acid throughout the profile.

Horizons are silt loam in texture throughout. The B2 horizon is somewhat stickier than other horizons, but no real evidence of clay accumulation is apparent. The thin A horizon is generally less than 50 percent, by volume, shale fragments; the B2 horizon, well over 50 percent; and the C horizon, almost 100 percent. Also, many areas of Weikert soils in Allegany County have enough fragments of shale, siltstone, or fine-grained sandstone on the surface to be separated as very stony phases.

The A horizon is 10YR or 7.5YR in hue, and ranges from 2 to 5 in value. The very thin A11 horizon is 2 or 3 in value, and is generally 5 only where an Ap horizon incorporates part of the B2 horizon. The A horizon ranges from 2 to 4 in chroma. The B horizon is generally 10YR in hue, 4 to 6 in value, and 3 to 6 in chroma. The C horizon is also generally 10YR in hue. This horizon is generally higher in value than the B horizon, and lower in chroma.

Weikert soils formed in material weathered from acid shale and siltstone similar to that in which Gilpin soils formed. Weikert soils, however, do not have the horizons of clay accumulation in their B horizon that Gilpin soils have. Also, they have more coarse rock fragments than Gilpin soils, are shallower to bedrock, and are generally less productive and manageable for most uses. Weikert soils have a coarser textured B horizon and are more shaly and shallower to bedrock than Litz soils. In some areas of the county Weikert soils are closely associated with Calvin soils. They are shallower to bedrock and have more coarse fragments than Calvin soils, and are not so red as those soils.

Weikert shaly silt loam, 0 to 10 percent slopes, moderately eroded (WeB2).—This soil has the profile described as representative for the Weikert series. Where this nearly level to moderately sloping soil is plowed and worked, a thin layer or mantle of shale fragments is generally on the surface. Several inches of the surface layer have been eroded from almost all

areas except some of the wooded ones that have not been severely cut over. A few gullies are present, some of which extend to bedrock.

Although it has many limitations, this is the only Weikert soil in Allegany County that is suitable for regular cultivation. If it is cultivated, intensive soil and water conservation measures are needed. Low available water capacity and low fertility, the shaly nature of this soil, and shallow depth to bedrock are more important considerations in use and management than the hazard of erosion. Capability unit IIIs-10; woodland suitability group 5d3.

Weikert shaly silt loam, 10 to 20 percent slopes, moderately eroded (WeC2).—This moderately sloping to strongly sloping soil is generally not suitable for any type of cultivation intended to result in assured economic returns. Included in mapping are many small, scattered areas that are more severely eroded.

Some areas of this soil are used for unimproved pasture, and others are in improved pasture. Carrying capacity of even the best pasture, however, is lower than on most other soils that have comparable slopes. Where pasture can be further improved, moderate yields of hay are possible in good years. Wooded areas of this soil are better suited to trees than to other uses, and should remain in trees unless they are needed for hay, pasture, or some important use other than cultivated crops. Good management of wood crops is necessary to improve production. Growth of most tree species, however, is generally slow. Capability unit IVe-10; woodland suitability group 5d3.

Weikert shaly silt loam, 20 to 45 percent slopes (WeE).—This is the most extensive single soil in Allegany County. It makes up about 17 percent of the county. Most of the acreage of this strongly sloping to steep soil is wooded and for this reason is only slightly or moderately eroded. Where the cover has been severely cut over or grazed and trampled extensively by livestock, however, erosion damage is greater.

Included with this soil in mapping is about 4,000 acres of severely eroded soil. The surface layer and much of the subsoil are missing in these areas, and many gullies are present. Such areas are widely scattered and make up less than 10 percent of the total acreage of this Weikert soil.

This soil is too steep and rugged to be suitable for cultivation or production of hay or pasture. It should not be used more intensively than for trees, either natural or planted, for the purpose of providing watershed protection, wildlife habitat, and wood crops. Growth of most species of trees, however, is slow. Capability unit VIIe-3; woodland suitability group 5d3 (north aspects), and 6d4 (south aspects).

Weikert very stony silt loam, 0 to 30 percent slopes (WkD).—This nearly level to steep soil has a profile similar to that described as representative for the series, but stones 10 inches or more in diameter are closely spaced throughout. The stones are mostly siltstone or fine-grained sandstone, but some are massive shale.

This soil is not suitable for cultivation. If necessary, some areas can be used for limited grazing or production of hay. Most areas are in trees and are better

sued to this use than to other uses. Tree growth is slow and yield of wood crops is limited, but management of woodland generally is not difficult. Capability unit VII_s-3; woodland suitability group 5d3 (north aspects), and 6d4 (south aspects).

Weikert-Urban land complex, 0 to 10 percent slopes (WIB).—This complex consists of nearly level to moderately sloping soils of the Weikert series that have been graded, cut, filled, or otherwise disturbed and altered for urban development. In a few places these soils are very stony. They are mostly in Cumberland and its suburbs.

Relatively undisturbed Weikert soils make up about 15 percent of this complex. These are mostly Weikert shaly silt loam and, in places, Weikert very stony silt loam. The more disturbed Weikert soils make up about 65 percent of the complex. Generally, these soils have been covered by fill material up to 18 inches thick, or have had about 10 to 15 inches of their original material removed by cutting or grading. The fills are more common. The other 20 percent of the complex is areas where the soils have been covered by fill more than 18 inches thick or have had all or most of their original material graded away. Where fill has been used, it consists of variable material, most of which was graded from areas of Weikert soils.

Internal drainage is generally rapid in the soils of this complex. The soils provide good support for footings and foundations. Basement excavations are generally difficult to make because of bedrock, but where made, they are mostly stable and dry. In most places the soils and soil material of this complex range from fairly well suited to poorly suited to ornamentals and other types of vegetation. Where they have graded too close to bedrock, they are very poorly suited.

Much of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Weikert-Urban land complex, 10 to 20 percent slopes (WIC).—This complex consists of moderately sloping to strongly sloping soils of the Weikert series that have been graded, cut, filled, or otherwise disturbed and altered for urban development. The soils are Weikert shaly silt loam and Weikert very stony silt loam. They are mostly in or near Cumberland. In places they are relatively undisturbed.

Relatively undisturbed Weikert soils make up about 5 to 10 percent of this complex. The more disturbed Weikert soils make up about 50 percent. The disturbed soils have been covered by fill material up to 18 inches thick, or have had about 10 to 15 inches of their original material removed by grading or leveling. The fills are more common. The remaining 40 to 45 percent of the complex is areas where the soils have been covered by fill to depths greater than 18 inches, or have had all or most of their original material graded away. Where fill has been used it consists of variable material, most of which was graded from areas of Weikert soils.

Internal drainage is rapid in the soils of this complex. The soils provide good support for footings and foundations. Basement excavations are generally diffi-

cult to make into bedrock, but where properly planned and made, they are stable and dry. In most areas the soils and soil material of this complex are fairly well suited to poorly suited to vegetation, but they are very poorly suited where they have been graded nearly to bedrock. The hazard of erosion is severe, even under the prevalent urban conditions, because of slope. Runoff is generally excessive. Limitations are moderate to severe for many residential and community uses.

Much of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings. Not assigned to a capability unit or woodland suitability group.

Weikert-Urban land complex, 20 to 45 percent slopes (WIE).—This complex consists of strongly sloping to steep soils of the Weikert series that have been graded, cut, filled, or otherwise disturbed and altered. The soils are mostly Weikert shaly silt loam and, in places, Weikert very stony silt loam. They are mostly in the suburbs of Cumberland. In places they are relatively undisturbed. More of the soils in this complex are undisturbed than in other Weikert-Urban land complexes, because these more sloping soils in the suburbs have undergone fewer cutting, grading, and filling operations. Included in mapping are a few acres of soil that has slopes greater than 45 percent.

Relatively undisturbed Weikert soils make up about 25 to 30 percent of this complex. The more disturbed Weikert soils make up about 40 percent. The disturbed soils have been covered by fill materials up to 18 inches thick, or have had about 10 inches of their original material removed by grading and leveling. The fills are more common. The remaining 30 to 35 percent of this complex is areas where the soils have been covered by fill greater than 18 inches thick, or have had all or most of their original material graded away. Where fill has been used, it consists of variable material, most of which was graded from areas of Weikert soils.

Internal drainage is rapid. Basement excavations are difficult to make because of bedrock, but where they have been made they are generally stable and dry. In most places the soils and soil material of this complex are fairly well suited to poorly suited to vegetation. The soils are very poorly suited where they have been graded nearly to bedrock. The hazard of erosion is very severe because of slope. Runoff is excessive in most areas. Limitations are severe for most residential and community uses, also because of slope.

Less of the total area of this complex is covered by streets, sidewalks, and various kinds of buildings than of the Weikert-Urban land complexes that have slopes of less than 20 percent. Not assigned to a capability unit or woodland suitability group.

Weikert and Gilpin channery silt loams, 45 to 65 percent slopes (W_nF).—This undifferentiated group consists of all the areas of very steep, channery soils of the Gilpin and Weikert series that are in Allegany County. Mapped areas are made up of Gilpin soils, Weikert soils, or both. Soils of this group were not mapped separately because use and management are essentially the same on the very steep slopes. The two differ in that Weikert soils generally have smaller

sandstone and shale fragments and are consistently shallower to bedrock than Gilpin soils.

Wooded areas of these soils are better suited to trees than to other uses. In this state they provide watershed protection and wildlife habitat. Management for wood crops, however, is difficult and generally not very productive. Capability unit VIIe-3; woodland suitability group 5d3 (north aspects) and 6d4 (south aspects).

Westmoreland Series

The Westmoreland series consists of moderately deep, well-drained, gently sloping to steep soils that formed in material weathered in place, mostly from shale, but also from shale containing some interbedded limestone and, in places, thin seams of sandstone. These soils are on uplands mostly in the western part of the county. The native vegetation is mainly oaks.

In a representative profile in a cultivated area, the surface layer is brown to dark-brown silt loam about 6 inches thick. The subsoil is about 30 inches thick. The upper 6 inches is strong-brown silt loam, and the next 18 inches is strong-brown and yellowish-brown shaly silty clay loam. The lower 6 inches of the subsoil is strong-brown loam to light silt loam. The substratum is yellowish-brown very shaly loam that extends to bedrock at a depth of 49 inches.

The Westmoreland soils are not very difficult to work except when they are too wet. Available water capacity is high. These soils are high in natural fertility, and they are highly productive under the best possible management. They are limited for most uses, mainly because of slope and the consequent hazard of erosion.

Representative profile of Westmoreland silt loam, 3 to 10 percent slopes, moderately eroded, in a pasture just off U.S. Highway 40, about 3 miles west of Flintstone:

- Ap—0 to 6 inches, brown to dark-brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable, slightly sticky, many roots; neutral (limed); clear, smooth boundary.
- B1—6 to 12 inches, strong-brown (7.5YR 5/6) silt loam; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; about 5 percent shale fragments; medium acid; gradual, smooth boundary.
- B21t—12 to 19 inches, strong-brown (7.5YR 5/8) shaly silty clay loam; strong, medium, subangular blocky structure; friable to firm, sticky and slightly plastic; common roots; thin clay films; about 15 percent shale fragments; medium acid to strongly acid; gradual, smooth boundary.
- B22t—19 to 30 inches, yellowish-brown (10YR 5/8) shaly light silty clay loam, faintly variegated with yellowish red (5YR 5/8); moderate to strong, coarse, blocky structure; friable to firm, sticky and slightly plastic; common roots in upper part, fewer below; prominent, strong-brown (7.5YR 5/6 and 5/8) clay films in places; about 20 percent shale fragments; strongly acid; gradual, wavy boundary.
- B3—30 to 36 inches, strong-brown (7.5YR 5/8) loam to light silt loam; weak, coarse, blocky structure; friable, slightly sticky; very few roots; some patchy black films; 25 to 35 percent shale fragments; medium acid; clear, irregular to broken boundary.

C—36 to 49 inches, yellowish-brown (10YR 5/8) very shaly loam, variegated with light gray (10YR 7/1); massive; friable, slightly sticky; few black films; 50 to 60 percent fine shale and few coarse siltstone or sandstone fragments; slightly acid; clear to abrupt, irregular boundary.

R—49 inches, hard gray and pale-brown shale that has some thin seams of gray limestone.

The solum ranges from 20 to 40 inches in thickness. Bedrock is generally at a depth ranging from 3½ to 6 feet. In unlimed areas reaction is strongly acid in places and acidity decreases with depth. Base saturation is high in the lower part of the soil.

The A horizon is silt loam. The Bt horizon ranges from light silt loam to silty clay loam, and it averages 18 to 35 percent clay. The C horizon is coarser textured than the B horizon. The A horizon contains few coarse fragments, but the B horizon ranges to 40 percent coarse fragments and the C horizon to 90 percent.

In places horizons are either 10YR or 7.5YR in hue. The A horizon is 3 to 5 in value and 2 or 3, and in places 4, in chroma. The B horizon is 4 or 5 in value and mostly 6 or 8 in chroma, but chroma is also 4 in this horizon in places. The C horizon is about the same in range of color as the B horizon. Where the C horizon is light gray, this color is inherent from the shale or limestone material and is not a result of wetness or poor aeration.

Westmoreland soils are similar to Shelocta soils, but they are not so strongly acid as those soils and are higher in natural fertility. They are closely associated with Belmont and Brooke soils. They are not so red in the B horizon as Belmont soils, however, and they are somewhat less sticky than those soils. They are coarser in texture, especially in the B horizon, and much less difficult to manage and work than Brooke soils. They are shallower to bedrock than Hagerstown soils and, unlike those soils, formed in interbedded impure limestone and shale. They formed in material similar to that in which the Litz soils formed. They are deeper to bedrock and have a thicker and more strongly developed B horizon than those soils, however, and they are not so strongly acid as those soils.

Westmoreland silt loam, 3 to 10 percent slopes, moderately eroded (WsB2).—This soil has the profile described as representative for the series. It is gently sloping to moderately sloping, and it has a moderate hazard of erosion in cultivated areas. Included in mapping are a few local spots where most of the granular silt loam surface layer has been lost as a result of erosion.

Under good management this soil can be cultivated continuously. Capability unit IIe-11; woodland suitability group 2o3.

Westmoreland silt loam, 10 to 20 percent slopes, moderately eroded (WsC2).—This moderately sloping to strongly sloping soil has a severe hazard of erosion. In most areas it has lost a few inches of the silt loam surface layer as a result of erosion. Included in mapping are a few wooded areas where the soil has not been seriously affected by erosion. Also included are a few areas where erosion has exposed the subsoil almost entirely and where a few gullies are present, some of which extend somewhat deeply into the subsoil.

If this soil is cultivated continuously, it needs good management that includes complex and intensively applied conservation practices. Capability unit IIIe-11; woodland suitability group 2o3.

Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded (WsD2).—This strongly sloping to steep soil has some shallow gullies in places. Included

in mapping are a few areas that are still under a cover of trees and have not been seriously affected by erosion.

This soil is not suited to regular and safe use for cultivated crops. If it is so used, appropriate conservation measures need to be applied as intensively as possible. The soil is more safely suited to hay or improved pasture crops, or to sodded orchards in certain places, than it is to cultivated crops. Capability unit IVe-10; woodland suitability group 2r4 (north aspects) and 3r4 (south aspects).

Westmoreland silt loam, 30 to 45 percent slopes (WsE).—This steep soil is still under a cover of trees in places. Included in mapping are areas where a good part of the surface layer and generally some of the subsoil have been lost as a result of erosion. Gullies are common in some areas.

This soil is somewhat intensively used, mostly for hay and improved pasture crops. It is not very suitable for cultivation because of slope and the consequent hazard of erosion. It needs the protection of permanent vegetative cover in all areas. Capability unit VIe-3; woodland suitability group 2r5 (north aspects) and 3r5 (south aspects).

Use and Management of the Soils

In the first part of this section, soils are grouped according to their capability for farming, and the capability units in Allegany County are described. In the second part the kinds of management for all of the soils in the county used for crops are discussed. In the third part are estimates of yields of common crops grown under a high level of intensive good management. Other parts give information about use of the soils for trees, wildlife habitat, engineering, and town and country planning, including recreation.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are so used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, forest trees, or engineering.

In the capability system, the kinds of soils are grouped at three levels: the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

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

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

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. (None in Allegany County.)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about the management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-5, IVw-2, or VIIs-3. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation as

defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages, the capability units in Allegany County are described and suggestions for use and management of the soils are given. The units are not numbered consecutively, because a statewide system is used for numbering the capability units in Maryland and not all of the units in the system are represented in Allegany County. To find the capability unit in which any individual soil has been placed, refer to that soil in the section "Descriptions of the Soils" or in the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I-4

Allegheny silt loam, 0 to 3 percent slopes, is the only soil in this unit. It is deep, nearly level, medium textured, and well drained. It retains moisture well and is fairly easy to work.

This soil is well suited to general crops, forage crops, pasture plants, and truck crops. It is also well suited to orchards where air drainage is adequate. If it is well managed, this soil can be cultivated intensively. It remains productive if it is adequately supplied with plant nutrients and if a system that includes legumes and green-manure crops in the cropping sequence is used. Minimum tillage and the use of crop residues are also good management practices. Artificial drainage and special measures for controlling erosion are not needed.

CAPABILITY UNIT I-5

Allegheny fine sandy loam, 0 to 3 percent slopes, is the only soil in this unit. It is deep, nearly level, and well drained, and it has a moderately coarse textured surface layer. This soil is easy to work, and it retains moisture well.

This soil is well suited to general crops, forage crops, and pasture plants. It is also well suited to orchards where air drainage is adequate. In this survey area this soil is especially well suited to early truck crops. If it is well managed, it can be cultivated intensively. This soil remains productive if it is adequately supplied with plant nutrients and a system that includes legumes and green-manure crops in the cropping sequence is used. Minimum tillage and the use of crop residues are also good management practices. Artificial drainage and special measures for controlling erosion are not needed.

CAPABILITY UNIT I-6

This unit consists of soils of the Chavies, Huntington, and Pope series. These soils are deep, nearly level, well drained, and moderately coarse textured to medium textured throughout. Flooding is an infrequent hazard in some areas.

These soils are well suited to corn, forage crops, and pasture plants. Most areas, however, lack the good air drainage necessary for orchards. Also, early truck crops and winter small grains are subject to damage by flooding in places. Minimum tillage and the use of crop residues are good management practices. Locally,

stream channels need improvement and streambanks should be stabilized in places.

CAPABILITY UNIT II-4

This unit consists of soils of the Allegheny, Laidig, Meckesville, and Shelocta series. These soils are deep, gently sloping, medium textured, and well drained. They are moderately eroded, and the hazard of further erosion is moderate.

These soils are well suited to general crops, forage crops, pasture plants, orchards, and truck crops. Generally they have better air drainage than some similar soils in the survey area and thus are more suitable for orchards. Contour tillage, contour stripcropping, the use of a suitable cropping system, minimum tillage, and the use of crop residues are good management practices that help reduce runoff and control erosion.

CAPABILITY UNIT II-5

Allegheny fine sandy loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this unit. It is deep, gently sloping, and well drained. The surface layer is moderately coarse textured and easy to work. The soil is moderately eroded, and the hazard of further erosion is moderate.

This soil is well suited to general crops, forage crops, pasture plants, and orchards. It is especially well suited to truck crops. Generally it has better air drainage than some similar soils in the survey area, and thus it is more suitable for orchards. Contour tillage, contour stripcropping, the use of a suitable cropping system, minimum tillage, and the use of crop residues are good management practices that help reduce runoff and control erosion.

CAPABILITY UNIT II-6

This unit consists of soils of the Chavies and Huntington series on low terraces and foot slopes and in upland depressions. These soils are deep, gently sloping, well drained, and medium textured throughout. They are subject to a moderate hazard of erosion and a slight hazard of flooding.

These soils are suited to nearly all crops grown in the county. In some areas they are not well suited to orchards because of inadequate air drainage. Contour tillage, contour stripcropping, and growing crops in a properly planned sequence are good management practices that help reduce soil losses. In places runoff from adjacent higher soils needs to be diverted (fig. 15) to prevent excessive washing during periods of heavy rainfall or rapid snowmelt.

CAPABILITY UNIT II-10

This unit consists of soils of the Calvin, Gilpin, and Lelew series on uplands. These soils are moderately deep, gently sloping, medium textured, and well drained. They are mostly moderately eroded, and the hazard of further erosion is moderate.

These soils are suited to most crops commonly grown in the county. They are well suited to sodded orchards. Because they are only moderately deep to bedrock, however, the soils are somewhat limited in their capacity to supply moisture to growing plants



Figure 15.—Area of Chavies soil in capability unit IIe-6. The diversion checks runoff and retards erosion by reducing length of the slope.

during extended dry periods. Contour tillage, contour stripcropping, minimum tillage, and the use of a suitable cropping system are good management practices that help control erosion. The use of crop residues not only helps to check erosion, but it also reduces runoff and adds to the moisture supply of the soil by facilitating the absorption of surface water.

CAPABILITY UNIT IIe-11

This unit consists of soils of the Edom, Litz, and Westmoreland series on uplands. These soils are moderately deep, gently sloping, medium textured, and well drained. They are moderately eroded, and the hazard of further erosion is moderate.

These soils are suited to most crops commonly grown in the county. They are especially well suited to sodded orchards, although they are somewhat limited

in their capacity to supply moisture for growing plants. Contour tillage, contour stripcropping, minimum tillage, the use of crop residues, and the use of a suitable cropping system are good management practices that help control erosion. Where small grains are grown in a sequence that includes corn, they should be seeded in the fall after the corn is harvested.

CAPABILITY UNIT IIe-13

This unit consists of soils of the Albrights, Buchanan, Cookport, Ernest, and Monongahela series. These soils are gently sloping, medium textured, and moderately well drained to somewhat poorly drained. The lower part of the subsoil contains a dense, tough fragipan that strongly restricts the vertical movement of moisture. In wet seasons the soil above this fragipan is frequently saturated with water. Runoff is rapid

enough on these soils that erosion is a hazard, and most areas are moderately eroded.

These soils are too wet during some periods and too dry during others. Excess water is a limitation, especially in spring, and planting dates are frequently delayed. Control of soil losses is generally more important, however, than drainage improvement. If erosion is controlled and drainage is improved, the soils are well suited to corn, some hay crops, late truck crops, and pasture plants. They are not well suited to crops that are subject to damage by frost heaving in winter and early in spring. Lime and a good supply of nutrients need to be applied according to soil tests in fields used for crops.

CAPABILITY UNIT IIc-14

Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this unit. It is medium textured and moderately well drained to somewhat poorly drained. The subsoil contains a fragipan that is slowly permeable. In wet seasons the soil material above the fragipan is frequently saturated with water. Runoff is rapid enough that further erosion is a hazard on this already moderately eroded soil.

This soil is alternately too wet or too dry. Wetness in spring frequently delays planting dates. Generally, however, control of erosion is a more important concern than drainage improvement. If erosion is controlled and drainage is improved, the soil is well suited to corn, some hay crops and truck crops, and pasture plants. It is not well suited to crops that are subject to damage by frost heaving. To grow most crops in this soil, less lime is needed than is needed for other moderately well drained to somewhat poorly drained soils in the county.

CAPABILITY UNIT IIc-20

Dekalb channery sandy loam, 0 to 12 percent slopes, moderately eroded, is the only soil in this unit. It is on higher uplands. This soil is moderately deep and well drained, and it has a moderately coarse textured surface layer and subsoil. Water moves into and through it readily. Because of slope, further erosion is a hazard on this already moderately eroded soil.

This soil is suited to orchards and to many of the crops commonly grown in the county. It has less moisture available for plants than some other similar soils in the county, however, and is generally no more than moderately productive. Contour tillage, contour strip-cropping, minimum tillage, use of crop residues, and use of a suitable cropping system are good management practices that help control erosion. Including legumes and green-manure crops in the cropping system, and then turning them under, help to increase the supply of moisture and nutrients for plants. Sod or other permanent ground cover is helpful for orchards.

CAPABILITY UNIT IIc-26

Elliber cherty silt loam, 5 to 12 percent slopes, moderately eroded, is the only soil in this unit. It is deep, well drained, and medium textured. It contains large amounts of gravel-sized chert fragments throughout

the profile. This soil is deeper to bedrock than most other soils of the uplands. It has a hazard of further erosion.

This soil is suited to most crops commonly grown in the county. It is intensively and extensively used for orchards. It has deep rooting space and excellent air drainage, qualities which are especially beneficial for orchards. Contour strip-cropping and contoured orchards are effective in erosion control. The chert in the surface layer is abrasive to implements, and this tends to discourage cultivation. This factor helps emphasize the need for minimum tillage and for sod or other permanent ground cover in orchards. The soil tends to warm early in spring, so some areas are used for truck crops.

CAPABILITY UNIT IIw-2

Landisburg cherty silt loam, 0 to 3 percent slopes, is the only soil in this unit. It is medium textured and moderately well drained to somewhat poorly drained. The subsoil contains a fragipan that is slowly permeable. In wet seasons the soil material above the fragipan is commonly saturated with water, and because the soil is nearly level, runoff is minimal.

Drainage improvement is the most important concern in use and management of this soil. If the soil is drained and otherwise well managed, it produces many of the crops commonly grown in the county. It is not well suited to crops that are subject to damage by frost heaving. Properly spaced tile lines or V-type ditches generally are adequate for removing excess water. Tile lines need to be placed above the fragipan and backfilled with porous material. Much of this Landisburg soil is used for improved pasture in the county. It has a higher content of natural lime than most soils of the county that need drainage improvement.

CAPABILITY UNIT IIw-3

This unit consists of soils of the Ernest and Monongahela series. These soils are nearly level, medium textured, and moderately well drained to somewhat poorly drained. They have a slowly permeable subsoil that contains a fragipan. Water enters and moves through them slowly.

These soils are fairly easy to work at the right moisture content, but they tend to be wet until rather late in spring. Drainage improvement is generally the most important management concern. If drainage is improved and other good management practices are followed, the soils are suited to many crops, including late truck crops and pasture plants. They are not well suited to crops that are subject to damage by frost heaving. Seasonal excess water can be removed by properly spaced tile lines or V-type ditches. Tile lines need to be placed above the fragipan and then backfilled with porous material. These soils are more strongly acid and not so well supplied with natural lime as some other similar soils in the survey area.

CAPABILITY UNIT IIw-7

This unit consists of soils of the Lindside and Philo series on flood plains in many parts of the county.

These soils are moderately well drained to somewhat poorly drained, nearly level, and medium textured. They have a seasonal high water table, and in many places they are subject to infrequent flooding.

If drainage is improved these soils are suited to many kinds of crops. Planting of some crops, however, is delayed in places by wetness or the possibility of spring floods. V-type ditches or tile lines can be used to improve drainage if adequate outlets are available. Runoff from adjacent higher areas needs to be intercepted and diverted. The main channels of streams need to be kept clean, and some of them need to be deepened and straightened. Much of the acreage of this unit is in pasture. Where the soils are frequently or severely flooded, generally because of channel obstructions, areas are mostly wooded.

CAPABILITY UNIT IIe-26

Elliber cherty silt loam, 0 to 5 percent slopes, is the only soil in this unit. It is deep, well drained, and medium textured, and it contains large amounts of gravel-sized chert fragments throughout the profile. This soil is deeper to bedrock than most other soils of the uplands. Chert fragments on the surface tend to slow runoff, so the hazard of erosion is minimal.

The chert fragments in the soil are abrasive to farm implements, and this tends to discourage cultivation. The soil is suited to most crops commonly grown in the county, however, and it is especially good for orchards. In places natural air drainage is not so good as it is in areas where soils are more strongly sloping, but generally the air drainage is adequate. This soil tends to warm early in spring, so some areas are used for truck crops, regardless of the cherty surface. Minimum tillage, the use of legumes and green-manure crops, and maintaining sod or other ground cover in orchards are good management practices that help keep this soil in excellent condition for farming.

CAPABILITY UNIT IIIe-1

Hagerstown silt loam, 8 to 20 percent slopes, moderately eroded, is the only soil in this unit. It formed in material weathered from limestone and is on uplands. This soil is deep, medium textured, well drained, and fertile. It has a naturally high content of lime and a high capacity to supply moisture to plants. The hazard of erosion is severe.

This soil is suited to most crops commonly grown in the county and to orchards. Erosion can be controlled by using a cropping system that includes hay or other close-growing vegetation much of the time, keeping tillage to a minimum, stripcropping on the contour, using buffer strips of sod, and constructing diversion terraces and well-sodded waterways that safely dispose of runoff. In orchards the trees need to be planted on the contour and the surface protected by sod or by cover crops or green-manure crops most of the time.

CAPABILITY UNIT IIIe-4

This unit consists of soils of the Allegheny, Laidig, Meckesville, and Shelocta series. These soils are deep, sloping, medium textured, and well drained. They are

moderately eroded and highly susceptible to further erosion.

These soils are suited to most crops commonly grown in the county. Minimum tillage, contour strip-cropping, orchard planting on the contour, the use of buffer strips, and the use of diversion terraces along with well-sodded waterways are good management practices that help control erosion. Also very helpful is a cropping system that includes legumes and other cover crops and green-manure crops. Such a system is especially effective when good management of crop residues is practiced. These soils differ from some similar soils in the survey area mainly in that they are more strongly acid and need larger additions of lime to maintain high fertility and productivity. These additions need to be based on the results of soil tests.

CAPABILITY UNIT IIIe-5

Allegheny fine sandy loam, 8 to 15 percent slopes, moderately eroded, is the only soil in this unit. It is more open and sandy, especially in the surface layer, and it is more easily worked than other deep, well-drained soils that have similar slopes. Also, it often can be worked earlier in the season. The hazard of further erosion is severe.

This soil is suited to nearly all crops, and is especially suited to truck crops, within limitations imposed by the erosion hazard. A cropping system that includes legumes and other cover crops and green-manure crops is effective in controlling erosion. Also helpful is the use of minimum tillage, contour strip-cropping, and well-sodded buffer strips and waterways. Use of crop residues also is highly beneficial and tends to increase the water holding capacity of the surface layer.

CAPABILITY UNIT IIIe-6

Huntington silt loam, local alluvium, 8 to 15 percent slopes, is the only soil in this unit. It is on foot slopes adjacent to soils that formed in material weathered from limestone. This soil is deep, well drained, and highly silty throughout. Erosion has not been particularly active in the past, but the hazard of erosion is severe if the soil is tilled.

This soil is one of the most naturally fertile in the county, and it is suited to all commonly grown crops. It is generally in small individual areas, however, where it is mostly managed in the same manner as the surrounding soils. Very often the surrounding soils need even more intensive good management than this soil, and this accounts in part for the soil not being affected by erosion to any great degree. Erosion can be controlled further by using a cropping system that includes hay or other close-growing vegetation much of the time, keeping tillage to a minimum, contour stripcropping, using buffer strips of sod, and constructing diversion terraces and well-sodded waterways that safely dispose of runoff.

CAPABILITY UNIT IIIe-10

This unit consists of soils of the Calvin, Gilpin, Lehew, and Weikert series on uplands. These soils are mostly moderately deep, well drained, and medium

textured. The Weikert soils are somewhat shallower to bedrock than the other soils in this unit, and they are somewhat excessively drained. In most areas the soils in this unit are moderately eroded. The hazard of further erosion is severe.

The soils of this unit are used for most cultivated crops and for pasture. They tend to be droughty during extended dry periods. If these soils are adequately limed and fertilized, however, they are well suited to clover, mixed hay, bluegrass, or mixed pasture plants. Contour stripcropping in suitable widths (fig. 16) and growing crops in a properly planned sequence are good management practices. The soils can absorb most of the runoff water if it is diverted to sodded strips, and well-sodded waterways leading to properly prepared outlets can adequately dispose of any excess water. Supplemental irrigation is helpful in dry periods. Careful regulation of grazing to keep it within the carrying capacity of pasture is necessary to prevent destruction of the protective sod.

CAPABILITY UNIT IIIe-11

This unit consists of soils of the Edom, Litz, and Westmoreland series on uplands. These soils are moderately deep and moderately sloping to strongly sloping. They are medium textured and well drained. They are moderately eroded, and the hazard of further erosion is severe.

These soils are used for most kinds of cultivated crops and for pasture. Crops need to be grown in a suitable sequence and planted in fairly narrow strips on the contour. If runoff is diverted to sodded strips, most of the water can be absorbed by the soils. Excess water can be disposed of through well-sodded waterways that lead to carefully prepared outlets. Although these soils tend to be droughty during extended dry periods, they are well suited to most forage and pasture plants. They need to be adequately fertilized according to results of soil tests, but they generally require less lime than many of the other soils in the



Figure 16.—Contour stripcropping (tomatoes) on Colliers Mountain. The soil is Gilpin channery silt loam, 10 to 20 percent slopes, moderately eroded, in capability unit IIIe-10.

county. Supplemental irrigation is helpful in dry periods. Destruction of protective sod can be prevented by carefully regulating grazing according to the carrying capacity of the pasture.

CAPABILITY UNIT IIIe-13

This unit consists of soils of the Albrights, Buchanan, Cookport, Ernest, and Monongahela series. These soils are medium textured, moderately sloping to strongly sloping, and moderately well drained to somewhat poorly drained. The lower part of the subsoil contains a tough, dense fragipan that strongly restricts the movement of moisture. In places in wet seasons the soil material above the fragipan is saturated with water. These soils are moderately eroded. The hazard of further erosion is severe, and it is intensified because runoff is greater on these soils than on others that have the same slope range but do not have a fragipan.

Controlling erosion is a much more important management concern than drainage improvement on these soils. In places the soils do not need drainage improvement for some crops, notably late-planted crops and forage and pasture plants. A cropping system is needed that includes contour strips and diversion of runoff water into well-sodded waterways leading to carefully prepared outlets. Spot drainage, by tile or by shallow ditches, can be useful locally. Tile, if used, needs to be placed above the fragipan in the subsoil. These soils are not well suited to crops that are subject to damage by frost heaving. Adequate amounts of lime and fertilizer, applied according to results of soil tests, are needed for crops and pasture plants.

CAPABILITY UNIT IIIe-14

Landisburg cherty silt loam, 8 to 15 percent slopes, moderately eroded, is the only soil in this unit. It is medium textured and moderately well drained to somewhat poorly drained. The subsoil contains a fragipan that is slowly permeable. The hazard of erosion is severe if the soil is tilled.

For the most part this soil only needs drainage improvement locally, for certain crops, especially forage and pasture plants and late-planted crops. Generally, controlling erosion is a much more important management concern than drainage improvement. A cropping system is needed that includes contour strips as well as runoff water intercepted and diverted into well-sodded waterways leading to carefully prepared outlets. Any necessary spot drainage can be provided by tile or by shallow ditches. Tile, if used, needs to be placed above the fragipan in the subsoil. This soil is not well suited to crops that are subject to damage by frost heaving. Adequate amounts of fertilizer for crops and pasture plants need to be applied according to results of soil tests, but generally little lime is needed.

CAPABILITY UNIT IIIe-20

Dekalb channery sandy loam, 12 to 25 percent slopes, moderately eroded, is the only soil in this unit. This soil is on some of the higher uplands in the county. It is moderately deep, well drained, and moderately coarse textured in the surface layer and sub-

soil, and water moves through it readily. This soil is moderately eroded, and the hazard of further erosion is severe if the soil is tilled.

This soil is suited to many of the crops commonly grown in the county and to orchards. Less moisture is available, however, than in most other similar soils in the county, so this soil is generally only moderately productive. Contour cropping in narrow strips, minimum tillage, the use of a suitable cropping system, and especially the use of crop residues are good management practices that help control erosion. The cropping system should include legumes and other cover and green-manure crops, which when turned under help increase the supply of moisture and nutrients available for plants.

CAPABILITY UNIT III₆-26

Elliber cherty silt loam, 12 to 25 percent slopes, moderately eroded, is the only soil in this unit. It is deep, well drained, medium textured, and contains large amounts of gravel-sized chert fragments throughout. The hazard of erosion is severe if the soil is tilled.

This soil is suited to most crops commonly grown in the county, but it is mostly used for orchards. It has deep rooting space and excellent air drainage, qualities that are especially beneficial for orchards. Orchards need to be planted on the contour, and all other crops need to be planted in contoured strips that are relatively narrow. Minimum tillage is a good management practice that is easy to adopt because the chert in the surface layer abrades farm implements. A cropping system that includes legumes and green-manure crops is helpful. Orchards need sod or other permanent ground cover.

CAPABILITY UNIT III₆-30

Opequon flaggy clay loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this unit. It is well drained. The average depth to hard but fissured limestone bedrock is less than 20 inches. This soil is so shallow to bedrock that it cannot tolerate much loss of soil material without irreparable damage resulting. This shallowness also accounts for the severely restricted available water capacity. Large flat fragments of limestone hinder but do not prevent cultivation.

This soil is fairly well suited to many crops, but it is used mostly for orchards and pasture. Fissures or cracks in the bedrock allow penetration of roots and furnish adequate anchorage for orchard trees. If grown, annual crops need to be planted in contour strips in a cropping system that makes frequent use of close-growing crops, including green-manure crops. Minimum tillage and the use of crop residues are also helpful in controlling further erosion. Orchards need to be under sod or other permanent protective vegetation.

CAPABILITY UNIT III₆-34

Cavode silt loam, 10 to 20 percent slopes, moderately eroded, is the only soil in this unit. It is moderately deep to bedrock and is somewhat poorly drained. This soil has a highly clayey, mottled, sticky subsoil

through which water moves very slowly. The hazard of erosion is severe if the soil is tilled.

This soil is very difficult to drain. V-type ditches, properly spaced and, especially, properly arranged in relation to slope, help remove excess water. Even after drainage has been improved, however, most crops need to be planted later, because the soil is slow to warm and is difficult to till if it is even slightly too wet. This soil is used mostly for hay crops and pasture, but under very good management, corn and some other crops can be grown. Row crops need to be planted and tilled on the contour to help control erosion.

CAPABILITY UNIT III_w-1

Loysville cherty silt loam, 0 to 8 percent slopes, is the only soil in this unit. It is poorly drained and has a dense fragipan through which water moves very slowly. The hazard of erosion generally is not significant.

This soil needs artificial improvement of drainage if it is used for cultivated crops. Shallow ditches or tile lines can be used to dispose of excess water if adequate outlets are available. Tile, if used, needs to be placed above the fragipan. After drainage is improved, the soil is suited to most general crops, but herbaceous perennials such as alfalfa are subject to severe damage by frost heaving in winter. In Allegany County this soil is used mostly for pasture. Some areas are under a cover of mixed wetland hardwoods.

CAPABILITY UNIT III_w-3

Melvin silt loam is the only soil in this unit. It is on flood plains and is nearly level, poorly drained, and subject to flooding.

Although this soil is nonacid and very fertile, its use for crops is severely limited unless artificial drainage is provided. Drainage can be improved by using tile or, more commonly, V-type ditches. In areas that are not frequently flooded, the soil is very well suited to corn and some other crops and to highly improved pasture plants, but it is seldom used for hay or small grains. Crops and pasture plants grow well in this soil. Where flooding is frequent or severe, however, areas are almost entirely wooded. In some areas stream channels need to be deepened or otherwise improved, and streambanks need to be stabilized.

CAPABILITY UNIT III_w-5

Cavode silt loam, 0 to 10 percent slopes, moderately eroded, is the only soil in this unit. It is moderately deep to bedrock, somewhat poorly drained, and has a highly clayey, mottled, sticky subsoil through which water moves very slowly. This soil is wet so much of the time that drainage improvement is by far the most important concern in use and management. The hazard of erosion is generally not significant.

This soil is very difficult to drain. A system of V-type ditches, properly designed, installed, and maintained, can remove much of the excess water. Tile drains frequently do not function properly in this kind of soil. Most crops must be planted late, even after drainage has been improved, because the soil is difficult to till if even a little too wet, and also because it is slow to warm in spring. The soil is used mostly for

corn, pasture, and some hay crops. It is poorly suited to alfalfa, overwintering small grains, or other plants that are subject to damage by frost heaving.

CAPABILITY UNIT IIIw-7

Atkins silt loam is the only soil in this unit. It is on flood plains and is subject to flooding (fig. 17). This soil is nearly level, poorly drained, medium textured, and strongly acid.

Drainage of this soil can be improved by using V-type ditches or tile lines, if adequate outlets are available. In areas that are not frequently flooded, the soil is suited to corn and pasture plants, but it is seldom used for hay or small grains. Generally, this soil is only moderately productive. Where flooding is frequent or severe, areas are almost entirely wooded. The hazard of flooding can be reduced in some areas by cleaning, deepening, and straightening stream channels. Also, streambanks need to be stabilized.

CAPABILITY UNIT IIIw-9

This unit consists of soils of the Tyler series. These soils are somewhat poorly drained. Water moves very

slowly through the fragipan in the lower part of the subsoil. These soils are wet so much of the time that drainage improvement is the most important concern in use and management. In the more sloping areas, erosion is a hazard in places, but generally not a significant one.

A system of V-type ditches can remove most of the excess water from these soils. Tile drains can also be used in places, but they do not function as well as ditches. If tile is used, it needs to be placed above the fragipan. Most crops need to be planted late, even after drainage improvement, because these soils are slow to warm. Some commonly grown crops are corn, especially for silage, other forage crops, and pasture plants. Crops that are subject to damage by frost heaving are not well adapted to these soils.

CAPABILITY UNIT IIIs-10

Weikert shaly silt loam, 0 to 10 percent slopes, moderately eroded, is the only soil in this unit. It is less than 20 inches deep to shale bedrock, is somewhat excessively drained, contains large amounts of shale



Figure 17.—Area of Atkins silt loam in capability unit IIIw-7. This poorly drained soil is on a flood plain. The area shown does not have artificial drainage.

fragments, and has a very low capacity to supply moisture to growing plants.

This soil is severely limited for farming by droughtiness. Crop growth is especially poor in seasons when rainfall is below normal or poorly distributed. Thus, this soil is poorly suited to cultivated crops. It also is not well suited to pasture, which is difficult and expensive to establish and maintain. Corn and other field crops are grown occasionally, and such grasses as native bluegrass, little bluestem, or other drought-resistant plants are used for grazing or forage. Conserving moisture is the major concern of management. Runoff needs to be controlled by contour furrows, sodded strips, and similar measures. Generally irrigation is not economically feasible. Unless specifically needed for some more intensive use, uncleared areas should remain wooded. In this state they furnish watershed protection, wildlife habitat, and some woodcrop products. Most areas of this soil in the county receive unusually low amounts of annual rainfall, and for this reason this soil is more severely limited for most uses here than it is in some other survey areas.

CAPABILITY UNIT IVe-1

This unit consists of soils of the Brooke, Hagerstown, and Opequon series. These soils formed in, or were strongly influenced by, material weathered from limestone. The Opequon soil is moderately sloping and shallow. The Brooke and Hagerstown soils are deeper. The Brooke soil is moderately sloping and severely eroded, and the Hagerstown soil is steep and moderately eroded. All of these soils are well drained and very fertile, but because of soil depth or slope and the consequent hazard of erosion, they are, at best, only marginally suitable for cultivated crops.

Tilled crops should be planted only occasionally, and then in a sequence with sod crops or other close-growing vegetation that remains for long periods. Any tillage, to be safe, needs to be in narrow strips on the contour. All other appropriate conservation measures need to be intensively applied and maintained. Much safer uses of these soils are for hay crops, pasture, and sodded orchards. These soils are the most fertile and productive of all class IV soils in Allegheny County.

CAPABILITY UNIT IVe-3

This unit consists of soils of the Allegheny, Laidig, Meckesville, and Shelocta series. These soils are strongly sloping, deep, well drained, and medium textured. Most of them are moderately eroded. The hazard of further erosion is very severe if the soils are tilled.

Because of slope and the consequent very severe hazard of erosion, these soils are, at best, only marginally suitable for cultivated crops. Cultivated crops should be grown infrequently, if at all, and then only in sequence with sod crops or other close-growing vegetation that remains for long periods. All other appropriate conservation measures need to be intensively applied and maintained, including contour stripcropping in very narrow strips. Safer uses for these soils are for hay crops, pasture, and sodded orchards.

CAPABILITY UNIT IVe-9

This unit consists of soils of the Ernest and Landisburg series. These soils are strongly sloping and moderately well drained. They have a slowly permeable fragipan in the lower part of the subsoil. They are moderately eroded, and the hazard of further erosion is very severe if the soils are tilled.

Control of erosion on these soils is a much more important management concern than drainage improvement. The soils are marginally suitable for tilled crops. Any cultivation needs to be on the contour and in narrow strips. Crops should be alternated in a sequence with sod or other close-growing vegetation that remains for long periods. Safer uses are for hay crops or pasture. The soils are not well suited to plants that are subject to damage by frost heaving, and they are seldom used for orchards. While drainage improvement is not always necessary for most uses, runoff and seepage water need to be intercepted and diverted into sodded channels that lead to adequate outlets.

CAPABILITY UNIT IVe-10

This unit consists of soils of the Calvin, Edom, Gilpin, Litz, Weikert, and Westmoreland series. These soils are mostly well drained, moderately deep, strongly sloping, and moderately eroded. Also in this unit are some areas of a shallower, somewhat excessively drained, more moderately sloping soil. The hazard of further erosion is very severe if the soils of this unit are tilled.

Occasionally, cultivated crops can be grown on these soils if they are planted in narrow strips on the contour and all other appropriate measures are used for controlling erosion. Safer uses are for hay, carefully managed pasture, or sodded orchards planted on the contour. Runoff is rapid on these soils, and at best they do not store very much moisture for plant use.

CAPABILITY UNIT IVw-2

This unit consists of soils of the Lickdale, Nolo, and Robertsville series. These soils are poorly drained to very poorly drained, and some of them have a slowly permeable fragipan. Some of these soils have gentle to moderate slopes, but only in minor areas have the soils been affected by erosion.

Drainage improvement is by far the most important management concern, and drainage is needed where these soils are tilled. Either ditches or tile lines can be used to drain these soils. The kind of drainage system depends largely upon the economic returns possible from proposed uses. Even with good artificial drainage, these soils are slow to dry and warm in spring, so the planting of crops is later than it is on most of the other soils in the county. Corn is the principal cultivated crop. The soils are not suited to plants that are subject to damage by frost heaving. Most cleared areas are used for hay or pasture, but some are idle. Many areas are in stands of water-tolerant trees and other plants. In addition to artificial drainage, these soils need protection from runoff from adjacent higher areas if they are put to more intensive uses than natural woodland.

CAPABILITY UNIT VIe-1

Opequon flaggy clay loam, 15 to 25 percent slopes, moderately eroded, is the only soil in this unit. This well-drained soil is so shallow to hard bedrock that it cannot tolerate further soil losses and should not be used for clean-tilled crops.

Under good management this soil is suitable for hay crops and for pasture if areas are protected from overgrazing. Another good use for this soil is contoured orchards along with complete and permanent, close-growing ground cover. The soil is extensively used for such orchards, but little of it is used for other purposes.

CAPABILITY UNIT VIe-3

This unit consists of soils of the Calvin, Dekalb, Edom, Elliber, Gilpin, Lehew, Weikert, and Westmoreland series. These soils are strongly sloping to steep, mostly moderately deep but shallow or deep in places, and well drained to somewhat excessively drained. They are eroded in areas that are cleared and used,

and in places they are severely eroded. The hazard of further erosion is too severe to justify clean tillage of any extent.

Cleared areas of these soils are generally in pasture, are idle, or are used for some nonfarm purpose. Areas of steeper and less eroded soils are wooded. They should be kept in this state unless they are specifically needed for some other more intensive use. The Elliber soil is suited to and extensively used for orchards. Pasture can be established that does not have a very great carrying capacity. Overgrazing (fig. 18) needs to be carefully avoided. Controlling weeds and brush in pasture is difficult in places, and in some steep and rough areas needs to be done manually or by chemicals. Terraces constructed in pastures help slow runoff and allow some surface water to penetrate into the soils. Areas that are not cleared and used are suitable for reforestation. In this state they provide watershed protection and wildlife habitat. Moderate returns can be expected from wood products.

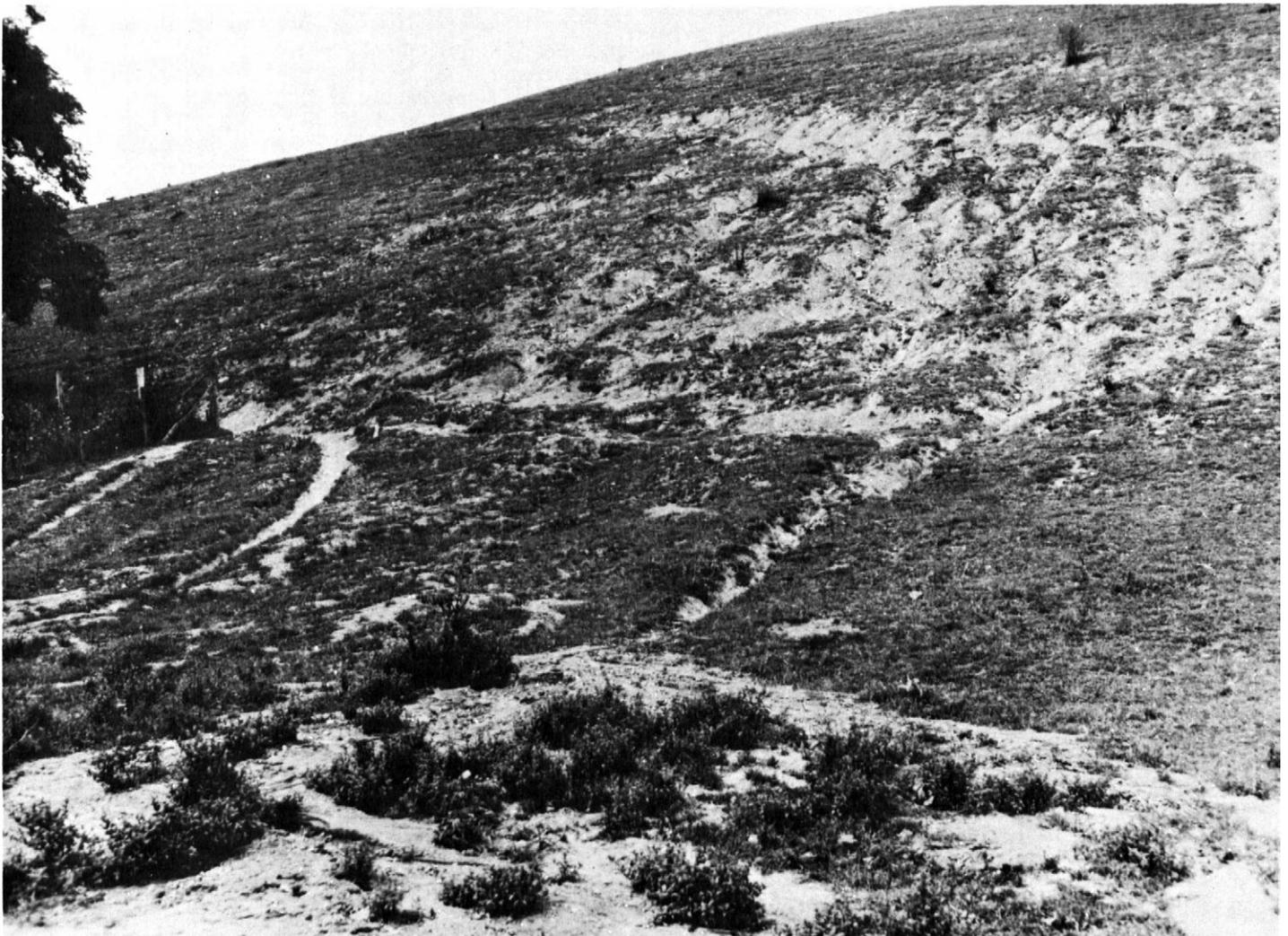


Figure 18.—Area of overgrazed pasture in capability unit VIe-3, near Dickerson Hollow. Overgrazing has resulted in destruction of the sod, rilling of the soil, and accumulation of erosional debris at the base of the slope.

CAPABILITY UNIT VI_w-1

Only Alluvial land is in this unit. It consists of unclassified soil material on flood plains of streams and rivers that is subject to fairly frequent and sometimes severe flooding. The soil material is highly variable in texture and origin, mostly poorly drained, and in places stony.

Cultivation is not feasible because of wetness and flooding. Many areas, however, are suitable for grazing at least on a seasonal basis, and grazing can be improved by seeding, judicious liming and fertilizing, and controlling weeds and brush. Alternatively, the most intensive suitable use is for wetland trees, especially in areas most highly subject to flooding. Some areas can be improved by cleaning, deepening, and straightening stream channels, if the foreseeable benefits justify costs.

CAPABILITY UNIT VI_s-2

This unit consists of very stony soils of the Elliber and Opequon series. These soils formed in limestone material. They are well drained and have slopes ranging to 25 percent. The Elliber soil is deep, and the Opequon soil is shallow. Both have many stones, 10 inches or more in diameter, that effectively prevent tillage by modern methods. Some outcroppings of hard limestone bedrock also are present.

These soils are very fertile, and crops that are suited to them grow well. Many areas, especially after some stone removal, are suitable for improved pasture if care is taken to prevent overgrazing. Pasture management, especially control of weeds and brush, is difficult in places, because stones hinder mowing. Some areas are suitable for sodded orchards, but management in these areas is difficult. Wooded areas need to be retained unless they are specifically needed for some other more intensive use.

CAPABILITY UNIT VI_s-3

This unit consists of very stony soils of the Albrights, Buchanan, Cavode, Cookport, Gilpin, Laidig, and Meckesville series. These soils are somewhat poorly drained to well drained, and the maximum slope is about 30 percent. They are not associated with limestone. Many stones more than 10 inches in diameter are on and in the soils. Most are of sandstone origin, but some other acid rock materials are included. These stones effectively prevent tillage that requires use of modern equipment.

These soils can be used for pasture or for limited production of hay, but such uses require that the soils are partly cleared of stones, limed and fertilized according to results of soil tests, and seeded with appropriate mixtures. After pasture is established, grazing needs to be carefully managed. Controlling weeds and brush is difficult in places because of stones. Selected areas can be used for sodded orchards. Wooded areas need to be kept in trees, and some other areas can be reforested. Moderate returns can be expected for wood crops taken from properly managed wooded areas.

CAPABILITY UNIT VI_s-4

This unit consists of very stony soils of the Dekalb, Leetonia, and Lehew series. These soils are well

drained and mostly very strongly acid. Maximum slope is about 30 percent. Many stones more than 10 inches in diameter are present. Most are acid, medium- and coarse-grained sandstone. These stones effectively prevent tillage that requires use of modern equipment.

These soils can be used for pasture or for limited hay production, but even under the best management they are generally not very productive. These soils are commonly used for partly improved pasture, generally without stone removal or very careful brush control. Wooded areas need to be kept in trees, and some other areas can be reforested. Such wooded areas furnish watershed protection, wildlife habitat, and some moderate returns from wood crops.

CAPABILITY UNIT VII_e-1

Opequon flaggy clay loam, 25 to 50 percent slopes, moderately eroded, is the only soil in this unit. It is shallow over bedrock and is highly susceptible to erosion.

Cultivation is not safe or feasible on this soil, and grazing is severely limited, even under the most intensive good management. Some grazing is possible in good seasons, because the soil is naturally fertile, but the risk of overgrazing is high. Small areas are used for orchards. Wooded areas need to be kept in trees, because this is probably the most intensive safe and economic use of this soil. Some areas need to be reforested. Wooded areas furnish watershed protection and wildlife habitat.

CAPABILITY UNIT VII_e-3

This unit consists of soils of the Calvin, Edom, Gilpin, Litz, and Weikert series. These soils are steep and very steep, and some of them are severely eroded. In most cleared areas a large amount of material has been washed away. The hazard of further erosion is so severe that cultivation is neither safe nor feasible.

Grazing is severely limited on these soils, even under the most intensive good management. The less eroded areas are mostly wooded. Much of the cleared acreage needs to be reforested. Wooded areas furnish watershed protection and wildlife habitat. Livestock need to be kept out of wooded or reforested areas, and great care needs to be taken to prevent fire.

CAPABILITY UNIT VII_s-2

This unit consists of very stony soils of the Belmont, Elliber, and Opequon series. These soils have slopes ranging from about 20 to 75 percent. Cultivation is not feasible, and grazing is very severely limited because of steepness and stoniness. Areas that are not wooded need to be reforested. These soils have good inherent fertility, so fairly good returns from wood crops can be expected. Wooded areas furnish good watershed protection and wildlife habitat.

CAPABILITY UNIT VII_s-3

This unit consists of very stony soils of the Dekalb, Gilpin, Lehew, and Weikert series, and Stony land, rolling. Slopes range from about 0 to 65 percent on the shallow Weikert soils and from about 25 to 75 per-

cent on the other soils. Cultivation is not feasible, and grazing, even under the best management, is very poor. The soils are suited to trees. Wooded areas furnish watershed protection, wildlife habitat, and some kinds of outdoor recreation. Returns from wood crops are generally poor to fair. Timber operations and tree farming are generally not feasible on the steeper slopes.

CAPABILITY UNIT VII_s-4

Nolo very stony silt loam, 0 to 20 percent slopes, is the only soil in this unit. Besides being very stony, this soil is poorly drained and is very wet much of the time. Artificial drainage is not feasible, so the soil is suited neither to cultivation nor to improved pasture. The most suitable use is for wetland forest, and fairly good returns from wood crops can be expected. Management and harvesting of wooded areas is difficult in most seasons. The wooded areas provide good habitat for certain kinds of wildlife.

CAPABILITY UNIT VII_s-5

Only Strip mines and Dumps are in this unit. Some of these areas have been smoothed and reclaimed, but others have not. Areas are not suitable for cultivation or most other farming uses. Some reclaimed areas furnish reasonably good grazing, and others can produce some wood crops after reforestation. Some areas, however, produce nothing at all. Onsite examination of individual areas is necessary for specific evaluations.

CAPABILITY UNIT VIII_s-1

Only Rock outcrop and Stony land, steep, are in this unit. Maximum slope is 75 percent or more. Areas are not suited to farming. Shrubs, small trees, and occasionally larger trees grow in areas of Stony land. Also, some minor vegetation is in fissures in areas of Rock outcrop. Some wood crops can be harvested, especially in less sloping areas, but generally woodland management and tree farming are not feasible. In places areas furnish extremely limited grazing or browsing. In general areas are most suitable for watershed protection, habitat for some kinds of wildlife, and some kinds of outdoor recreation.

CAPABILITY UNIT VIII_s-4

Only Gravel pits are in this unit. The areas are unsuited to farming. Some of the pits can be revegetated to enhance their appearance and provide habitat for some kinds of wildlife. Depending upon specific local conditions, some pits can be used for ponds.

General Management Requirements

In this section some of the management practices needed for good growth of crops and also for conservation of soil and water are summarized for all the soils of the county. These practices are mainly drainage of wet soils, irrigation of soils in dry periods, use of adequate soil amendments, and proper tillage.

Drainage

In Allegany County many farms are made up mostly or entirely of soils that do not need artificial

drainage. Drainage improvement for farming generally is needed on less than 10 percent of the acreage of soils in the county. It is the major concern of management on less than 5 percent.

Soils that do not need artificial drainage are those of the Allegheny, Belmont, Brooke, Calvin, Chavies, Dekalb, Edom, Elliber, Gilpin, Hagerstown, Huntington, Laidig, Leetonia, Lehew, Litz, Meckesville, Opequon, Pope, Shelocta, Weikert, and Westmoreland series. These soils make up about 80 percent of the total county area.

Soils that need moderate artificial drainage for farming are those of the Albrights, Buchanan, Cavode, Cookport, Ernest, Landisburg, Lindside, Monongahela, Philo, and Tyler series. These soils make up about 11 percent of the county. They include some very stony soils which generally are not drained because they are not used for crops.

Soils that need intensive artificial drainage are those of the Atkins, Loysville, Melvin, Nolo, and Robertsville series. These soils make up a little more than 1 percent of the county, and some of them also are very stony.

Only one soil in the county needs very intensive artificial drainage to be suitable for farming—Lickdale silt loam. Areas of this soil are of very minor extent in the county.

The rest of the county, approximately 8 percent, consists of Urban land in complexes and some areas of miscellaneous land types that are not used for farming and are not likely to be so used, regardless of drainage.

Kinds of drainage systems suitable for soils of the county and information on their design and installation are given in the "Drainage Guide for Maryland," obtainable from the Maryland Agricultural Extension Service or the Maryland Agricultural Experiment Station.

Atkins, Huntington, Lindside, Melvin, Pope, and Philo soils, and Alluvial land are on flood plains where the hazard of flooding varies in severity from place to place and is difficult to predict accurately. Records of flooding on individual reaches of streams are the best available guides to the need for flood protection.

Irrigation

The amount and distribution of rainfall generally are adequate at higher elevations in the western part of the county. The eastern part of the county, however, receives about one-fourth less rainfall on the average than the western part. Extended dry periods do occur in the county, particularly in the eastern part. Supplemental irrigation during such periods helps to sustain crop yields.

Features that affect the suitability of individual soils of the county for irrigation are given in table 6 of this survey. In addition, information about irrigation of various soils is given in the "Maryland Guide for Sprinkler Irrigation," obtainable from the Maryland Agricultural Extension Service or the Maryland Agricultural Experiment Station.

Lime and fertilizer

Because most of the soils in the county are acid and only a few are naturally high in plant nutrients, additions of lime and fertilizer are needed for most crops. The amount of lime and the kind and amount of fertilizer needed can be judged by learning how well crops have responded in the past, by determining the yield level the farmer desires, and by studying the records of previous management, especially the results of soil tests. Assistance in determining the specific requirement of each soil can be obtained from the county extension agent; who arranges to have soils tested at the Soil Testing Laboratory of the University of Maryland.

Lime is seldom needed, or is needed only in small amounts, on soils that are neutral or only slightly acid. In Allegany County such soils are in the Belmont, Brooke, Chavies, Edom, Elliber, Hagerstown, Huntington, Landisburg, Lindside, Loysville, Melvin, Opequon, and Westmoreland series.

Where lime is needed, applications are made about once every 3 years. Most such soils need 2 to 3 tons per acre, but wet soils that are very acid, such as the Atkins, Cavode, Lickdale, Nolo, Robertsville, and Tyler soils, may need up to 5 tons per acre.

Applying manure to soils provides them with large amounts of nitrogen and organic matter, and smaller amounts of other plant nutrients.

Tillage

On all soils of the county, tillage should be limited to only that amount needed for quick germination of seeds, adequate growth of seedlings, and the maturing of a normal crop. Keeping tillage to a minimum is an effective means of reducing erosion and the breakdown of soil structure. Plow or wheel-track planting helps reduce the number of trips made over a field by heavy machinery. Also, a trip can be eliminated if a harrow is placed between plow and seeder. Proper use of appropriate herbicides can eliminate still another cultivating trip. Nontill farming reduces soil and water losses.

Continued use of heavy machinery compacts many soils and makes them difficult to work. This damage is more likely to occur on soils that are not well drained and that are a little too wet when the machinery is used. It happens most frequently on Atkins, Cavode, Lickdale, Loysville, Melvin, Nolo, Robertsville, and Tyler soils. Compaction decreases the rate at which water penetrates into the soil and the degree of aeration. If a sloping soil is compacted, the amount and rate of runoff and the hazard of erosion are increased. In such a case, replenishing the organic matter and growing sod crops help to restore aeration and good structure.

Sloping soils that are cultivated intensively should be tilled and stripcropped on the contour. In a single field, growing crops in a suitable sequence is helpful if the crops making up the sequence are alternated or staggered on the various strips. The strips need to be narrower on steeper slopes than they are elsewhere. Assistance in planning and laying out cropping strips

is obtainable through the local office of the Allegany Soil Conservation District.

Estimated Yields

Table 2 shows estimated average yields per acre of specified crops grown on soils of the county under intensive good management, which means the best kinds of management available to commercial farmers of the county. Only the soils used for crops are listed. To obtain the yields listed in table 2, all or nearly all of the following measures should be taken:

1. Contour tillage, stripcropping, terracing, minimum tillage, and similar practices are used to control erosion on soils that are suitable for cultivation but susceptible to erosion. Such practices also automatically help conserve water.
2. Soils are drained as necessary, excess water is disposed of safely, and irrigation is supplied to soils and crops that need it.
3. Periods between crop rotations in the cropping sequence are of adequate length. The sequence generally consists of a tilled crop that helps control weeds, a deep-rooted crop that improves permeability of tight soils, legumes for one or more years to help maintain or improve fertility, and a close-growing crop or a green-manure crop. The latter help improve structure and tilth, supply organic matter, and help reduce erosion.
4. Manure and crop residues are turned under to supply organic matter, nitrogen, and other plant nutrients. This practice also improves tilth and helps control losses from erosion.
5. Fertilizer and lime are applied according to needs indicated by soil tests.
6. Suitable methods of plowing, preparing the seedbed, and cultivating are used, but tillage is kept to a minimum.
7. Planting, cultivating, and harvesting are done at the right time and in the right way.
8. Weeds, diseases, and insects are controlled.
9. Crop varieties suited to the area and to the soils are selected for planting.

The yields shown in table 2 are not the highest obtainable. They are an objective that is practical to reach under good management. Yields on the same soil can be expected to vary because of differences in management, weather, varieties of crops grown, and numbers and kinds of insects, diseases, and weeds. Such variations, however, under recommended management, should not be more than about 10 percent for cultivated crops and about 20 percent for hay crops and pasture.

Woodland ²

Just as soils are placed in capability classes, subclasses, and units according to their suitability for

² ROSS H. MELLINGER, woodland conservationist, Soil Conservation Service, helped prepare this section.

TABLE 2.—Estimated average yields per acre of principal crops under high-level management

[Absence of yield figure indicates crop is not adapted to the soil or is not commonly grown on it]

Soil	Corn		Oats	Wheat	Hay		Pasture	
	Grain	Silage			Alfalfa-grass	Clover-grass	Blue-grass	Tall grass
	Bu	Tons	Bu	Bu	Tons	Tons	Cow-acre-days ¹	Cow-acre-days ¹
Albrights silt loam, 0 to 8 percent slopes	100	20	70	40	3.5	3.0	135	200
Albrights silt loam, 8 to 15 percent slopes, moderately eroded	90	18	65	40	3.5	3.0	135	200
Albrights very stony silt loam, 3 to 25 percent slopes							100	
Allegheny fine sandy loam, 0 to 3 percent slopes	115	23	75	45	4.5	3.5	160	255
Allegheny fine sandy loam, 3 to 8 percent slopes, moderately eroded	115	23	75	45	4.5	3.5	160	255
Allegheny fine sandy loam, 8 to 15 percent slopes, moderately eroded	105	21	70	40	4.0	3.0	135	230
Allegheny silt loam, 0 to 3 percent slopes	120	24	75	45	4.5	3.5	160	255
Allegheny silt loam, 3 to 8 percent slopes, moderately eroded	120	24	75	45	4.5	3.5	160	255
Allegheny silt loam, 8 to 15 percent slopes, moderately eroded	110	22	70	40	4.0	3.0	135	230
Allegheny silt loam, 15 to 30 percent slopes	95	19	60	35	4.0	3.0	135	230
Alluvial land						2.0	90	130
Atkins silt loam	100	20	55			3.0	135	170
Belmont very stony silty clay loam, 20 to 50 percent slopes								
Brooke silty clay loam, 8 to 15 percent slopes, severely eroded	100	22	70	40	4.5	3.0	135	255
Buchanan gravelly loam, 0 to 8 percent slopes, moderately eroded	100	20	65	40	3.5	3.0	135	200
Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded	90	18	60	35	3.5	3.0	135	200
Buchanan very stony loam, 0 to 15 percent slopes							110	
Buchanan very stony loam, 15 to 25 percent slopes							90	
Calvin channery silt loam, 0 to 10 percent slopes	80	16	60	35	3.5	3.0	135	200
Calvin channery silt loam, 10 to 20 percent slopes	75	15	55	35	3.0	2.5	115	170
Calvin shaly silt loam, 0 to 10 percent slopes, moderately eroded	80	16	60	35	3.5	3.0	135	200
Calvin shaly silt loam, 10 to 20 percent slopes, moderately eroded	75	15	55	35	3.0	2.5	115	170
Calvin shaly silt loam, 20 to 30 percent slopes, moderately eroded	65	14	50	30	3.0	2.0	90	170
Calvin shaly silt loam, 30 to 45 percent slopes							80	
Calvin-Weikert shaly silt loams, 0 to 10 percent slopes, moderately eroded	75	15	55	30	3.0	2.5	100	150
Calvin-Weikert shaly silt loams, 10 to 20 percent slopes, moderately eroded	70	14	50	30	3.0	2.0	90	150
Calvin-Weikert shaly silt loams, 20 to 30 percent slopes, moderately eroded							75	
Calvin-Weikert shaly silt loams, 30 to 50 percent slopes								
Cavode silt loam, 0 to 10 percent slopes, moderately eroded	85	17	65	35		3.0	135	170
Cavode silt loam, 10 to 20 percent slopes, moderately eroded	80	16	60	30		3.0	135	170
Cavode very stony silt loam, 0 to 30 percent slopes							90	
Chavies loam, 0 to 3 percent slopes	125	25	75	45	4.5	3.5	160	255
Chavies loam, 3 to 8 percent slopes	125	25	75	45	4.5	3.5	160	255
Cookport silt loam, 0 to 10 percent slopes, moderately eroded	100	20	65	40	3.5	3.0	135	200
Cookport silt loam, 10 to 20 percent slopes, moderately eroded	90	18	60	35	3.5	3.0	135	200
Cookport very stony silt loam, 0 to 10 percent slopes							110	
Cookport very stony silt loam, 10 to 30 percent slopes							90	
Dekalb channery sandy loam, 0 to 12 percent slopes, moderately eroded	80	16	60	35	3.5	3.0	135	200
Dekalb channery sandy loam, 12 to 25 percent slopes, moderately eroded	75	15	55	35	3.0	2.5	115	170
Dekalb channery sandy loam, 25 to 45 percent slopes							90	170
Dekalb very stony sandy loam, 0 to 12 percent slopes							105	
Dekalb very stony sandy loam, 12 to 25 percent slopes							75	
Dekalb and Lehew very stony soils, 25 to 45 percent slopes								
Dekalb and Lehew very stony soils, 45 to 75 percent slopes								
Edom silt loam, 3 to 8 percent slopes, moderately eroded	100	20	70	40	4.0	3.0	135	230
Edom silt loam, 8 to 15 percent slopes, moderately eroded	90	18	65	35	3.5	3.0	135	200
Edom silt loam, 15 to 25 percent slopes, moderately eroded	80	16	60	35	3.0	2.5	115	170
Edom silt loam, 25 to 45 percent slopes, moderately eroded							90	
Edom silty clay loam, 25 to 45 percent slopes, severely eroded								
Elliber cherty silt loam, 0 to 5 percent slopes	110	22	70	40	4.0	3.0	135	230
Elliber cherty silt loam, 5 to 12 percent slopes, moderately eroded	110	22	70	40	4.0	3.0	135	230
Elliber cherty silt loam, 12 to 25 percent slopes, moderately eroded	95	20	65	40	3.5	2.5	115	200
Elliber cherty silt loam, 25 to 45 percent slopes							115	

See footnotes at end of table.

TABLE 2.—Estimated average yields per acre of principal crops under high-level management—Continued

Soil	Corn		Oats	Wheat	Hay		Pasture	
	Grain	Silage			Alfalfa-grass	Clover-grass	Blue-grass	Tall grass
	Bu	Tons	Bu	Bu	Tons	Tons	Cow-acres-days ¹	Cow-acres-days ¹
Elliber very stony silt loam, 0 to 25 percent slopes							100	
Elliber very stony silt loam, 25 to 45 percent slopes								
Elliber very stony silt loam, 45 to 75 percent slopes								
Ernest silt loam, 0 to 3 percent slopes	100	20	65	40	3.5	3.0	135	200
Ernest silt loam, 3 to 8 percent slopes, moderately eroded	100	20	65	40	3.5	3.0	135	200
Ernest silt loam, 8 to 15 percent slopes, moderately eroded	90	18	60	35	3.5	3.0	135	200
Ernest silt loam, 15 to 25 percent slopes, moderately eroded	80	16	55	35	3.0	2.5	115	170
Gilpin silt loam, 0 to 10 percent slopes, moderately eroded	95	19	65	40	3.5	3.0	135	200
Gilpin silt loam, 10 to 20 percent slopes, moderately eroded	85	17	60	35	3.5	3.0	135	200
Gilpin silt loam, 20 to 30 percent slopes, moderately eroded	75	16	55	30	3.0	2.5	115	170
Gilpin channery silt loam, 0 to 10 percent slopes, moderately eroded	95	19	65	40	3.5	3.0	135	200
Gilpin channery silt loam, 10 to 20 percent slopes, moderately eroded	85	17	60	35	3.5	3.0	135	200
Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded	75	16	55	30	3.0	2.5	115	170
Gilpin channery silt loam, 30 to 45 percent slopes							95	
Gilpin very stony silt loam, 0 to 10 percent slopes							110	
Gilpin very stony silt loam, 10 to 30 percent slopes							75	
Gilpin and Weikert very stony silt loams, 30 to 65 percent slopes								
Hagerstown silt loam, 8 to 20 percent slopes, moderately eroded	120	24	75	45	4.5	3.0	135	255
Hagerstown silt loam, 20 to 40 percent slopes, moderately eroded	100	20	70	40	4.5	3.0	135	255
Huntington silt loam	135	27	80	50	5.0	3.5	160	285
Huntington silt loam, local alluvium, 0 to 3 percent slopes	135	27	80	50	5.0	3.5	160	285
Huntington silt loam, local alluvium, 3 to 8 percent slopes	135	27	80	50	5.0	3.5	160	285
Huntington silt loam, local alluvium, 8 to 15 percent slopes	125	25	75	45	4.5	3.0	135	255
Laidig gravelly loam, 0 to 8 percent slopes, moderately eroded	115	23	65	40	4.0	3.0	135	230
Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded	105	21	65	40	4.0	3.0	135	230
Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded	95	19	60	35	3.5	2.5	115	200
Laidig very stony loam, 3 to 15 percent slopes							110	
Laidig very stony loam, 15 to 25 percent slopes							90	
Landisburg cherty silt loam, 0 to 3 percent slopes	105	21	70	40	3.5	3.0	135	200
Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded	105	21	70	40	3.5	3.0	135	200
Landisburg cherty silt loam, 8 to 15 percent slopes, moderately eroded	95	19	65	40	3.5	3.0	135	200
Landisburg cherty silt loam, 15 to 25 percent slopes, moderately eroded	85	17	60	35	3.0	2.5	115	170
Leetonia very stony sandy loam, 0 to 25 percent slopes							65	
Lehew channery loam, 3 to 10 percent slopes, moderately eroded	80	16	60	35	3.5	3.0	135	200
Lehew channery loam, 10 to 20 percent slopes, moderately eroded	75	15	55	35	3.0	2.5	115	170
Lehew channery loam, 20 to 45 percent slopes							90	
Lehew very stony loam, 0 to 10 percent slopes							105	
Lehew very stony loam, 10 to 30 percent slopes							75	
Lickdale silt loam	80	16	55			2.5	115	145
Lindsay silt loam	130	26	80	45	4.5	3.5	160	255
Litz shaly silt loam, 3 to 10 percent slopes, moderately eroded	80	16	60	35	3.5	3.0	135	200
Litz shaly silt loam, 10 to 20 percent slopes, moderately eroded	75	15	55	35	3.0	2.5	115	170
Litz shaly silt loam, 20 to 30 percent slopes, moderately eroded	70	14	50	30	3.0	2.0	90	170
Litz shaly silt loam, 30 to 45 percent slopes							80	
Loysville cherty silt loam, 0 to 8 percent slopes	90	18	60			2.5	115	145
Meckesville silt loam, 0 to 8 percent slopes, moderately eroded	100	25	70	40	4.0	3.0	135	230
Meckesville silt loam, 8 to 15 percent slopes, moderately eroded	95	19	65	35	4.0	3.0	135	230
Meckesville silt loam, 15 to 25 percent slopes, moderately eroded	85	17	60	30	3.5	2.5	115	200
Meckesville very stony silt loam, 0 to 15 percent slopes							110	
Meckesville very stony silt loam, 15 to 25 percent slopes							90	
Melvin silt loam	115	23	70			3.0	135	170
Monongahela silt loam, 0 to 3 percent slopes	100	20	65	40	3.5	3.0	135	200
Monongahela silt loam, 3 to 8 percent slopes, moderately eroded	100	20	65	40	3.5	3.0	135	200
Monongahela silt loam, 8 to 15 percent slopes, moderately eroded	90	18	60	35	3.0	3.0	135	170
Nolo silt loam, 0 to 3 percent slopes	80	16	60			2.5	115	145
Nolo silt loam, 3 to 10 percent slopes	80	16	60			2.5	115	145
Nolo silt loam, 10 to 20 percent slopes, moderately eroded	70	14	55			2.0	110	135
Nolo very stony silt loam, 0 to 20 percent slopes							100	
Opequon flaggy clay loam, 3 to 8 percent slopes, moderately eroded	95	19	55	35	3.0	2.5	115	170

See footnotes at end of table.

TABLE 2.—Estimated average yields per acre of principal crops under high-level management—Continued

Soil	Corn		Oats	Wheat	Hay		Pasture	
	Grain	Silage			Alfalfa-grass	Clover-grass	Blue-grass	Tall grass
	Bu	Tons	Bu	Bu	Tons	Tons	Cow-acre-days ¹	Cow-acre-days ¹
Opequon flaggy clay loam, 8 to 15 percent slopes, moderately eroded	85	17	55	35	3.0	2.5	115	170
Opequon flaggy clay loam, 15 to 25 percent slopes, moderately eroded					2.5	2.0	90	145
Opequon flaggy clay loam, 25 to 50 percent slopes, moderately eroded							90	
Opequon very stony clay loam, 3 to 25 percent slopes								
Opequon very stony clay loam, 25 to 50 percent slopes								
Philo silt loam	130	26	80	45	4.5	3.5	160	255
Pope fine sandy loam	135	27	80	50	5.0	3.5	160	285
Pope silt loam	135	27	80	50	5.0	3.5	160	285
Robertsville silt loam, 0 to 8 percent slopes	80	16	55			2.5	115	145
Shelocta shaly silt loam, 0 to 8 percent slopes, moderately eroded	120	24	75	45	4.5	3.5	160	255
Shelocta shaly silt loam, 8 to 15 percent slopes, moderately eroded	110	22	70	40	4.0	3.0	135	230
Shelocta shaly silt loam, 15 to 25 percent slopes, moderately eroded	95	19	60	35	4.0	3.0	135	230
Tyler silt loam, 0 to 3 percent slopes	95	19	60			3.0	135	170
Tyler silt loam, 3 to 8 percent slopes	95	19	60			3.0	135	170
Weikert shaly silt loam, 0 to 10 percent slopes, moderately eroded	60	12	50	25	1.6	2.0	90	115
Weikert shaly silt loam, 10 to 20 percent slopes, moderately eroded					1.5	2.0	90	115
Weikert shaly silt loam, 20 to 45 percent slopes								
Weikert very stony silt loam, 0 to 30 percent slopes								
Weikert and Gilpin channery silt loams, 45 to 65 percent slopes								
Westmoreland silt loam, 3 to 10 percent slopes, moderately eroded	120	24	75	45	4.5	3.5	160	255
Westmoreland silt loam, 10 to 20 percent slopes, moderately eroded	110	22	70	40	4.0	3.0	135	230
Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded	95	19	60	35	4.0	3.0	135	230
Westmoreland silt loam, 30 to 45 percent slopes							110	

¹ Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. For example, an acre of pasture that provides 115 days of grazing for two cows has a carrying capacity of 230 cow-acre-days.

crops and pasture, so also are they similarly grouped according to their suitability for trees. This classification is based on soil productivity for economic tree species and on degree and kind of limitations of soils for trees. In this system soils are grouped at three levels: the class, subclass, and suitability group.

WOODLAND CLASSES, the broadest categories, are designated by the Arabic numerals 1 through 6. The numerals indicate progressively less productivity for trees of the species adapted to the soils. Class 1 produces the highest yields and class 6 the lowest yields.

WOODLAND SUBCLASSES are groups of soils within a class. They are designated by adding *x*, *w*, *d*, *c*, *f*, *r*, or *o* to the class numeral, for example, 3*f*. These subclasses are based on soil properties that cause limitations in management.

The letter *x* indicates that soils have restrictions or limitations because of excessive stoniness; *w* indicates that soils have excessive wetness, either seasonally or year long, that causes significant limitations for use or management; *d* indicates that soils have restrictions or limitations due to restricted rooting depth; *c* indicates

that soils have restrictions or limitations because of the kind and amount of clay in the profile; *f* indicates that soils have restrictions or limitations because of the amount of fragments 2 millimeters to stone size in the profile; *r* indicates that soils have restrictions or limitations due solely to relief or steepness of slope; and *o* indicates that soils have no significant restrictions or limitations for woodland use or management.

If soils have more than one kind of limitation or restriction, they are given the first applicable subclass designation in the order shown above, which is one of priority. For example, an extremely stony soil is placed in subclass *x*, even though it may be excessively wet (*w*), clayey (*c*), or sloping (*r*). Thus, a soil is in subclass *r* only if it has no other kind of limitation than slope.

The woodland suitability groups are listed in this survey so that the subclasses within the classes appear in opposite order from that given above. This is done to indicate progressively greater limitations and thus less productivity, of the soils in succeeding groups for trees.

WOODLAND SUITABILITY GROUPS are groups of soils within the subclasses. The soils of one woodland suitability group are enough alike not only to have the same level of productivity (class) and the same kind of limitation (subclass), if any, but also to have about the same degree of limitation, to be suited to the same kinds of trees, and to require about the same kind of management for wood-crop production. Thus, soils of the same class and subclass that are suited to different kinds of trees are placed in separate woodland suitability groups; soils with different degrees of limitations are placed in separate groups; and soils with different combinations of limitations are placed in separate groups.

Productivity for forest trees is measured by site index (Table 3). The site index is the average height, in feet, of the dominant and codominant trees in the stand at 50 years of age. For example, if the site index for yellow-poplar is 82 on a given soil, this means that the dominant and codominant trees in a stand of yellow-poplar on that soil have an average height of 82 feet when they are 50 years old.

On the basis of ratings for yellow-poplar, class 1 soils have a site index greater than 95, class 2 soils have one between 85 and 95, and class 3 soils have a site index between 75 and 85. On this same basis, class 4 soils have a site index between 65 and 75, class 5

soils have one between 55 and 65, and class 6 soils have a site index of less than 55.

On the basis of ratings for oaks, Virginia pine, and black cherry, class 1 soils have a site index greater than 85, class 2 soils have a site index between 75 and 85, class 3 soils have a site index between 65 and 75, class 4 soils have a site index between 55 and 65, class 5 soils have a site index between 45 and 55, class 6 soils have one of less than 45.

Certain terms used in the discussions of woodland suitability groups are defined as follows:

Aspect refers to the direction that a slope faces. A slope facing the sun obtains more direct energy than one facing away from the sun, and has what is known as a "south" aspect. On a south aspect there is greater evaporation of moisture than on a north aspect, and there is less moisture for tree growth. Actual measurements have proven that trees grow more slowly on a south aspect than on a north aspect of exactly the same kind of soil, and that yields of woodland products are lower. The differential effects of aspect on tree growth are of little practical significance except on stronger slopes, and the effects are greater, of course, on relatively thin soils that do not have a high capacity for retaining moisture. Thus, in Allegany County, aspect is considered to be of significant importance only on certain soils that have slopes generally greater than about 15 percent. North aspects are defined as those that face in any compass direction clockwise from N. 45° W. to 45° E. South aspects are those that face in any compass direction clockwise from S. 45° to N. 45° W.

Plant competition is the invasion or growth of undesirable plants when openings are made in the canopy. In Allegany County plant competition is generally more severe for pines than for hardwoods. A rating of *slight* means that competition will not prevent adequate natural regeneration of desirable species, and a rating of *moderate* means that competition will delay but not prevent natural or artificial regeneration. A rating of *severe*, however, means that competition will prevent such regeneration without intensive site preparation and such maintenance treatments as weeding.

Seedling mortality refers to the expected degree of failure for natural seedlings or planting stock as influenced by kind of soil, degree of erosion, or other site factors. A rating of *slight* means that expected mortality is less than 25 percent, and a rating of *moderate* means that expected mortality is between 25 and 50 percent. A rating of *severe* means that expected mortality is greater than 50 percent.

Equipment limitation ratings reflect the conditions of the soil that restrict use of the equipment normally used in woodland management or in harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year. A rating of *moderate* indicates a short seasonal limitation or a need for some modification in methods of equipment. A rating of *severe* indicates a long seasonal limitation or a need for specialized equipment or operations.

Windthrow hazard is an evaluation of soil characteristics that control tree root development and thus

TABLE 3.—Relationship of site index and actual age to yields of natural, even-aged, fully stocked stands of selected trees

[Absence of entry indicates data not available or species not suitable]

Site index	Age	Upland oaks ¹		Yellow-poplar ²		Virginia pine ³
		Board feet	Cords	Board feet	Cords	
50	Years 30	300	6			13
	50	2,900	19			19
	70	7,400	30			
60	30	800	10	900	8	19
	50	5,700	26	5,100	21	31
	70	11,600	39			
70	30	1,600	15	2,400	15	33
	50	8,800	33	10,300	31	57
	70	16,000	47			
80	30	3,000	20	4,900	21	57
	50	12,400	41	16,000	41	93
	70	21,000	56			
90	30	4,600	24	7,800	27	
	50	16,000	48	22,100	52	
	70	26,200	65			
100	30			11,000	32	
	50			29,100	62	
	70					

¹ Schnur, G. Luther. Yield, stand, and volume tables for even-aged upland oak forests. U.S. Department of Agriculture Technical Bulletin 560, 88 pp., illus., 1937.

² McCarthy, E. F. Yellow poplar characteristics, growth, and management. U.S. Department of Agriculture Technical Bulletin 356, 58 pp., 1933.

³ Schnur, G. Luther. Yield of Virginia pine. Southeastern Forest Experiment Station Paper 124, 11 pp. 1961.

affect firmness of trees against winds. A rating of *slight* means that no special problems are recognized, a rating of *moderate* means that root development is adequate for stability except during periods of excessive soil wetness or periods of strong wind velocities, and a rating of *severe* means that depth of tree roots does not provide adequate stability and that individual trees may be blown over easily during periods of higher than average wind velocities.

Erosion hazard refers to potential soil erosion following cutting operations and where the soil is exposed along roads, skid trails, fire lanes, and log decking areas.

In the following pages the woodland suitability groups of Allegany County are described and their limitations are given along with suggestions for use and management. The groups are not numbered consecutively because they are part of a system for the entire general area. Also, not all of the groups in the system are represented in the county. To find the names of individual soils in any given woodland suitability group, refer to the soil in the section "Descriptions of the Soils" or in the "Guide to Mapping Units" at the back of this survey. Many site indices given for the groups are based on actual measurements in Allegany County and nearby areas. Other site indices, particularly some of those given for soils of minor extent, are based on estimates by experienced woodland conservationists and soil specialists.

Some soils and land types in Allegany County are not included in this system of woodland suitability classification because they are not suited to tree growth, they are used permanently for some other purpose, or site conditions are so variable that reasonably uniform woodland interpretations cannot be made.

WOODLAND SUITABILITY GROUP 1-3

This group consists of soils of the Huntington and Shelocta series. These soils are deep and well drained. Some of the Huntington soils are subject to very infrequent flooding. Some of the soils are nearly level, and others slope as much as about 15 percent.

Placement of these soils in woodland class 1 is based on their excellent productivity of yellow-poplar and upland oaks. The site index is greater than 95 for yellow-poplar and greater than 85 for oaks. Yellow-poplar, red oak, black walnut, or ash should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, and black walnut, as well as black locust.

Plant competition is severe on the Huntington soils, and it is severe for conifers and moderate for hardwoods on the Shelocta soils. Seedling mortality and equipment restrictions are slight. The hazards of windthrow and erosion also are slight.

The soils in this group are the only ones in the county that have excellent productivity for important woodland species. They have few or no limitations for woodland use and management.

WOODLAND SUITABILITY GROUP 1-4

Shelocta shaly silt loam, 15 to 25 percent slopes, moderately eroded, is the only soil in this group. This

soil is deep and well drained. Slope is the only limiting factor for woodland use.

Placement of this soil in woodland class 1 is based on its excellent productivity of yellow-poplar. The site index is about 100. Productivity for upland oaks is generally somewhat less than for yellow-poplar, but yellow-poplar is the most important tree for timber. Yellow-poplar, red oak, white oak, black walnut, and ash should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, black walnut, and black locust.

Plant competition is moderate for hardwoods and severe for pines. Seedling mortality is slight. Use of equipment is moderately restricted because of slope. The hazards of windthrow and erosion are slight.

WOODLAND SUITABILITY GROUP 1-5

Hagerstown silt loam, 8 to 20 percent slopes, moderately eroded, is the only soil in this group. It is deep and well drained. The subsoil has a high content of clay. This soil is highly fertile, and it has a naturally high content of lime.

Placement of this soil in woodland class 1 is based on its excellent productivity of yellow-poplar and upland oaks. The site index is about 100 for yellow-poplar and more than 85 for oaks. Yellow-poplar, red oak, white oak, and black walnut should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, black walnut, and black locust.

Plant competition is severe, but seedling mortality is only slight. Equipment restrictions are moderate because the clayey subsoil cannot support heavy equipment well when it is wet. The hazards of erosion and windthrow are slight.

WOODLAND SUITABILITY GROUP 1-6

Hagerstown silt loam, 20 to 40 percent slopes, moderately eroded, is the only soil in this group. It is deep and well drained. The subsoil is clayey. This soil is highly fertile and has a naturally high content of lime.

Placement of this soil in woodland class 1 is based on its excellent productivity of yellow-poplar and upland oaks. The site index is about 100 for yellow-poplar and more than 85 for oaks. Yellow-poplar, red oak, white oak, black walnut, and ash should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, black walnut, and black locust.

Plant competition is severe, but seedling mortality is only slight. Equipment restrictions are severe because of slope and a clayey subsoil that cannot support heavy equipment well when it is too moist. The hazard of windthrow is slight, but the hazard of erosion is moderate to severe because of slope.

WOODLAND SUITABILITY GROUP 1-7

This group consists of soils of the Lindside and Philo series. These soils are on flood plains. They are somewhat poorly drained to moderately well drained and are nearly level. These soils are subject to flooding, but flooding is seldom severe enough to adversely affect woodland production or management.

Placement of these soils in woodland class 1 is based on their excellent productivity of yellow-poplar and oaks. The site index is greater than 95 for yellow-poplar and greater than 85 for oaks. Yellow-poplar, black walnut, white pine, ash, black cherry, or sugar maple should be favored in existing stands. Species suitable for planting are white pine and yellow-poplar.

Plant competition is severe for conifers and moderate to severe for hardwoods. Seedling mortality is slight. Equipment restrictions are moderate because of seasonal wetness and the hazard of flooding. The hazards of windthrow and erosion are slight.

WOODLAND SUITABILITY GROUP 1w9

This group consists of soils of the Atkins, Lickdale, Melvin, and Robertsville series and the land type Alluvial land. The soils are poorly drained to very poorly drained. Except for minor areas of Lickdale and Robertsville soils, they are on flood plains and are subject to flooding.

Placement of these soils and land type in woodland class 1 is based on their excellent productivity of pin oak. The site index is estimated to be greater than 85. Red maple or sycamore should be favored in existing stands. Species suitable for planting are white pine, white spruce, and Norway spruce.

Plant competition and seedling mortality are severe. Equipment restrictions are also severe because of seasonal wetness, a high water table, and the hazard of flooding on some soils. The hazard of windthrow is slight, ranging toward moderate. The hazard of erosion is slight or nonexistent.

WOODLAND SUITABILITY GROUP 2o1

This group consists of soils of the Pope series. These soils are on flood plains. They are deep, well drained, and productive.

Placement of these soils in woodland class 2 is based on their very good productivity of yellow-poplar. The site index is between 85 and 95 but generally is nearly 95. These soils are also well suited to white pine and mixed oaks. Any of these species, and black walnut and ash, should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, and black walnut.

Plant competition is moderate for hardwoods but severe for pines. Seedling mortality is slight. Equipment restrictions are slight. The hazards of windthrow and erosion are also slight.

WOODLAND SUITABILITY GROUP 2o3

This group consists of soils of the Allegheny, Chavies, Edom, Meckesville, and Westmoreland series. These soils are on uplands and stream terraces. They are moderately deep to deep, well drained, and have moderate slopes.

Placement of these soils in woodland class 2 is based on their very good productivity of yellow-poplar and upland oaks. The site index is between 85 and 95 for yellow-poplar and between 75 and 85 for oaks. Yellow-poplar, white oak, red oak, black walnut, black cherry, or sugar maple should be favored in existing stands. Species suitable for planting are white pine,

Norway spruce, Japanese larch, yellow-poplar, black locust, black walnut, and Virginia pine. Red pine can be planted in places at elevations greater than 2,000 feet.

Plant competition is moderate for hardwoods but severe for conifers. Equipment restrictions, seedling mortality, and the hazards of windthrow and erosion are slight.

WOODLAND SUITABILITY GROUP 2r4

This group consists of soils of the Allegheny, Edom, and Meckesville series, and only the north aspects of some soils of the Gilpin and Westmoreland series. These soils are moderately deep to deep, well drained, and have slopes generally between about 15 and 30 percent.

Placement of these soils in woodland class 2 is based on their very good productivity of yellow-poplar and upland oaks. The site index is between 85 and 95 for yellow-poplar and between 75 and 85 for oaks. Yellow-poplar, white oak, red oak, black walnut, black cherry, or sugar maple should be favored in existing stands. Species suitable for planting are white pine, black walnut, red pine, Norway spruce, Japanese larch, and yellow-poplar.

Plant competition is moderate for hardwoods and severe for pines and other conifers. Equipment restrictions are moderate because of slope. Seedling mortality and the hazard of windthrow are slight. The hazard of erosion is moderate because of slope.

WOODLAND SUITABILITY GROUP 2r5

This group consists of soils of the Edom series and only the north aspects of some soils of the Belmont, Gilpin, Weikert, and Westmoreland series. These soils are mostly moderately deep to deep and well drained. Slopes range from about 30 to 60 percent. Also in this group are a few areas of shallower, more droughty soils and soils that have slopes of less than 30 percent.

Placement of these soils in woodland class 2 is based on their very good productivity of yellow-poplar and upland oaks. The site index is between 85 and 95 for yellow-poplar and between 75 and 85 for oaks. Productivity is somewhat lower, however, on some of the included shallower areas and on the Weikert soils. White oak, red oak, yellow-poplar, black walnut, black cherry, or sugar maple should be favored in existing stands. Species suitable for planting are white pine, red pine, Norway spruce, Japanese larch, yellow-poplar, black walnut, and black locust. Virginia pine is preferred for planting in some soils of the Weikert series.

Plant competition is moderate for hardwoods and mostly severe for pines and other conifers. Seedling mortality is slight. Equipment restrictions are severe because of slope. The hazard of erosion is also severe because of slope. The hazard of windthrow is slight.

WOODLAND SUITABILITY GROUP 2r4

This group consists of the north aspects of some soils of the Dekalb, Elliber, and Lehew series. These soils are on uplands. They are moderately deep to deep and are well drained. Slopes range from about 25 to 75 percent.

Placement of these soils in woodland class 2 is based on their very good productivity of upland oaks. The site index is between 75 and 85. The soils are also very good producers of yellow-poplar and black cherry in the western part of the county and oaks and Virginia pine in the eastern part. In addition to these species, white pine, ash, or sugar maple should be favored in existing stands, and black walnut should be favored in Elliber soils. Species suitable for planting are white pine, Virginia pine, Norway spruce, red pine, Japanese larch, and in Elliber soils, black walnut and black locust. Red pine is generally restricted to elevations above 2,000 feet.

Plant competition is moderate for hardwoods and severe for pines and other conifers. Seedling mortality is mostly slight. Equipment restrictions are moderate because of slope, but range to severe in some of the areas of steeper soils. The hazard of erosion is slight to moderate, also because of slope. The hazard of windthrow is slight.

WOODLAND SUITABILITY GROUP 2w3

This group consists of soils of the Cookport series. These soils are moderately deep and moderately well drained. They have a fragipan in the lower part of the subsoil. Maximum slope is about 30 percent.

Placement of these soils in woodland class 2 is based on their very good productivity of upland oaks and black cherry. The site index is between 75 and 85 for oaks and black cherry. Red oak, black cherry, yellow-poplar, ash, or sugar maple should be favored in existing stands. Species suitable for planting are yellow-poplar, white pine, Japanese larch, and Norway spruce.

Plant competition is moderate for hardwoods and severe for conifers. Seedling mortality is slight. Equipment restrictions are moderate because of a perched water table that makes these soils wet for a period late in winter and early in spring. The hazards of erosion and windthrow are mostly slight, but the hazard of erosion is moderate where slopes are greater than 15 percent.

WOODLAND SUITABILITY GROUP 2w6

This group consists of soils of the Cavode, Loysville, and Tyler series. These soils are somewhat poorly drained to poorly drained. They have a slowly permeable subsoil. Slopes are mostly gentle to moderate, but locally range up to about 30 percent.

Placement of these soils in woodland class 2 is based on their very good productivity of upland oaks and yellow-poplar. The site index is between 75 and 85 for oaks and between 85 and 95 for poplar. White pine, red oak, red maple, sugar maple, or ash should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, Norway spruce, and Japanese larch. Virginia pine is also good for planting in the Cavode soils.

Plant competition is severe for both hardwoods and conifers. Seedling mortality is variable but is mostly moderate. Equipment restrictions are moderate to severe because of seasonal wetness. The hazard of erosion is slight and the hazard of windthrow is slight to moderate.

WOODLAND SUITABILITY GROUP 3w3

This group consists of soils of the Buchanan, Gilpin, and Laidig series. These soils are well drained or moderately well drained. Maximum slope is 15 to 20 percent.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks. The site index is between 65 and 75. The site index for yellow-poplar is 75 to 85. Ash, sugar maple, black cherry, red oak, white oak, white pine, and Virginia pine should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, Japanese larch, Virginia pine.

Plant competition is slight for hardwoods and moderate for conifers. Seedling mortality is slight. Equipment restrictions and the hazards of erosion and windthrow are slight.

WOODLAND SUITABILITY GROUP 3w4

This group consists of soils of the Buchanan and Laidig series, and only the south aspects of some soils of the Gilpin and Westmoreland series. These soils are well drained or moderately well drained. Slopes are mostly between 15 and 30 percent.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks. The site index is between 65 and 75. Site index of yellow-poplar is 75 to 85. Ash, sugar maple, red oak, white oak, black cherry, white pine, and Virginia pine should be favored in existing stands. Also, black walnut should be favored in Westmoreland soils. Species suitable for planting are white pine, yellow-poplar, Japanese larch, Virginia pine, shortleaf pine, and Norway spruce. Black walnut and black locust are also suitable for planting on the Westmoreland soils.

Plant competition is slight for hardwoods and moderate for conifers. Seedling mortality is slight. Equipment restrictions are moderate because of slope. The hazards of windthrow and erosion are slight.

WOODLAND SUITABILITY GROUP 3w5

This group consists of the south aspects of some soils of the Belmont, Gilpin, Weikert, and Westmoreland series. These soils are shallow to moderately deep and well drained. Slopes range from about 20 to 65 percent.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks. The site index is between 65 and 75. Site index of yellow-poplar is 75 to 85. Weikert soils are less productive than other soils in this group. Ash, sugar maple, red oak, white oak, black cherry, white pine, and Virginia pine should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, Japanese larch, Virginia pine, and Norway spruce. Black walnut and black locust are also suitable for planting in the Belmont and Westmoreland soils.

Plant competition is slight for hardwoods and moderate for conifers. Equipment restrictions are severe because of slope. Seedling mortality and the hazard of windthrow are slight. The hazard of erosion is moderate.

WOODLAND SUITABILITY GROUP 3f3

This group consists of soils of the Dekalb and Elliber series. These soils are moderately deep and deep, and they are well drained. They contain large quantities of rock fragments. Maximum slope is about 25 percent.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks. The site index is between 65 and 75. Also, the Dekalb soils are good producers of black cherry in the western part of the county, and the Elliber soils are good producers of Virginia pine in the eastern part. In addition to these species, white pine and ash should be favored in existing stands. Species suitable for planting are white pine, Virginia pine, Japanese larch, Norway spruce, and in the Elliber soils, black locust. Red pine also is suitable for planting at elevations over about 2,000 feet.

Plant competition is slight for hardwoods and moderate for conifers. Seedling mortality is slight. Equipment restrictions are mostly slight but are moderate where slopes exceed about 15 percent. The hazards of windthrow and erosion are slight.

WOODLAND SUITABILITY GROUP 3f4

This group consists of the south aspects of some soils of the Dekalb, Lehew, and Elliber series and the north aspects of other soils of the Lehew series. These soils are moderately deep and deep, and they are well drained. They contain large quantities of rock fragments. Most slopes are between 25 and 45 percent.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks. The site index is between 65 and 75. Also, the Dekalb soils are good producers of black cherry in the western part of the county, and the Elliber soils are good producers of Virginia pine in the eastern part. In addition to these species, white pine, ash, red oak, and black oak should be favored in existing stands. Species suitable for planting are white pine, Virginia pine, Japanese larch, and Norway spruce. Red pine is suitable for planting at elevations above about 2,000 feet.

Plant competition is slight for hardwoods and slight to moderate for conifers. Seedling mortality is mostly moderate but ranges to severe on some south slopes. Equipment restrictions are severe because of slope. The hazard of windthrow is slight. The hazard of erosion is moderate where slopes are greater than about 35 percent.

WOODLAND SUITABILITY GROUP 3f5

This group consists of the south aspects of some soils of the Dekalb, Elliber, and Lehew series. These soils are moderately deep and deep, and they are well drained. They contain large quantities of rock fragments. Slopes range from about 45 to 75 percent.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks. The site index is between 65 and 75. Productivity is also good for Virginia pine in the eastern part of the county, and for black cherry in the western part. Black cherry, red oak, black oak, white pine, and Virginia pine should be favored in existing stands. Species suit-

able for planting are white pine, Virginia pine, Japanese larch, and red pine at high elevations.

Plant competition is slight for hardwoods and slight to moderate for conifers. Seedling mortality is moderate to severe because the soils tend to dry out quickly from the effects of more direct sunlight. Equipment restrictions are severe. The hazard of windthrow is slight, and the hazard of erosion is moderate.

WOODLAND SUITABILITY GROUP 3e1

This group consists of soils of the Opequon series. These soils are well drained. They are shallow over fissured limestone bedrock. Roots, however, grow into the fissures to firmly secure trees in the soil. The highly clayey surface layer and subsoil restrict the use of heavy equipment during wet seasons. Slopes range to about 15 percent.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks. The site index is between 65 and 75. Yellow-poplar, white pine, Virginia pine, black walnut, ash, or black cherry should be favored in existing stands. Species suitable for planting are white pine, Virginia pine, Japanese larch, and black locust.

Plant competition is moderate for hardwoods and severe for conifers. Seedling mortality is slight to moderate. It is moderate during especially dry seasons. Equipment restrictions are moderate because these highly clayey soils do not support heavy equipment well when they are wet. The hazard of windthrow is slight. The hazard of erosion is generally slight, but it ranges to moderate where slopes are much more than about 8 percent.

WOODLAND SUITABILITY GROUP 3e4

This group consists of the north aspects of some soils of the Opequon series. These soils are well drained and shallow over limestone bedrock, but the bedrock is fissured and provides good tree rooting. The highly clayey surface layer and subsoil restrict the use of heavy equipment during wet seasons. Most slopes are between 15 and 50 percent, but minor areas of very stony soils have slopes that are somewhat less steep.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks. The site index is between 65 and 75. Yellow-poplar, white pine, Virginia pine, black walnut, ash, or black cherry should be favored in existing stands. Species suitable for planting are white pine, yellow-poplar, Virginia pine, and black locust.

Plant competition is moderate for hardwoods and severe for conifers. Seedling mortality is slight to moderate, and is moderate during especially dry seasons. Equipment restrictions are severe because of the high clay content of these soils and their strongly sloping to steep slopes. The hazard of windthrow is slight, and the hazard of erosion is severe.

WOODLAND SUITABILITY GROUP 3w1

This group consists of soils of the Albrights, Ernest, and Landisburg series. These soils are moderately well drained, and they have a slowly permeable

fragipan in the lower part of the subsoil. Maximum slope is generally about 15 percent, but small areas are included where slope is somewhat greater.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks and yellow-poplar. The site index is between 65 and 75 for oaks and between 70 and 80 for yellow-poplar. Ash, black cherry, sugar maple, red oak, white oak, and white pine should be favored in existing stands. Species suitable for planting are yellow-poplar, white pine, Norway spruce, and Japanese larch, as well as black cherry and red pine at higher elevations in the western part of the county.

Plant competition is slight to moderate for hardwoods and moderate to severe for conifers. Seedling mortality is slight. Equipment restrictions are moderate because of wetness and a high water table later in winter and early in spring. The hazard of erosion is slight to moderate, and the hazard of windthrow is slight.

WOODLAND SUITABILITY GROUP 3w9

This group consists of soils of the Nolo series. These soils are poorly drained and have a slowly permeable fragipan in the lower part of the subsoil. Slopes range from about 0 to 20 percent.

Placement of these soils in woodland class 3 is based on their good productivity of upland oaks and black cherry. The site index for each species is between 65 and 75. Ash, red oak, and black cherry should be favored in existing stands. White pine is probably the best species for planting, though black cherry and Norway spruce are also good.

Plant competition is severe for hardwoods and conifers. Seedling mortality is generally severe because of wetness and the likelihood of frost heaving. Equipment restrictions are severe because of long periods of wetness when the water table is near the surface. The hazard of windthrow is moderate because of long periods when the soil is soft and wet, and also because of the moderately restricted rooting depth of some tree species. The hazard of erosion is slight.

WOODLAND SUITABILITY GROUP 4f3

This group consists of soils of the Calvin, Lehew, and Weikert series. These soils are mostly moderately deep and well drained, but the Weikert soils are shallower and are somewhat excessively drained. Slopes range to about 20 percent.

Placement of these soils in woodland class 4 is based on their fair productivity of upland oaks and Virginia pine. The site index for each species is between 55 and 65. On some of the better sites for the Calvin soils, the site index is about 70. White pine, pitch pine, Virginia pine, red oak, black oak, and white oak should be favored in existing stands. Species suitable for planting are white pine, Virginia pine, Japanese larch, and also red pine at elevations above about 2,000 feet.

Plant competition is slight for all species. Seedling mortality ranges from slight to moderate, but it is greater in places during especially dry seasons. Equipment restrictions are practically nonexistent. The hazards of windthrow and erosion are slight.

WOODLAND SUITABILITY GROUP 4f4

This group consists of the north aspects of some Calvin and Weikert soils. These soils are mostly moderately deep and well drained, but the Weikert soils are shallower and are somewhat excessively drained. Slopes range from about 20 to 50 percent.

Placement of these soils in woodland class 4 is based on their fair productivity of upland oaks and Virginia pine. The site index for each species is between 55 and 65. White pine, pitch pine, Virginia pine, red oak, black oak, white oak, and ash should be favored in existing stands. Species suitable for planting are white pine, Virginia pine, and Japanese larch.

Plant competition is slight for hardwoods and moderate for conifers. Seedling mortality is moderate. Equipment restrictions are mostly moderate, but they are severe on slopes that are more than about 35 percent. The hazard of windthrow is slight. The hazard of erosion is also mostly slight, but it is moderate on slopes of more than about 35 percent.

WOODLAND SUITABILITY GROUP 4e2

Brooke silty clay loam, 8 to 15 percent slopes, severely eroded, is the only soil in this group. This soil is deep and well drained. It has a highly clayey, plastic subsoil.

Placement of this soil in woodland class 4 is based on its fair productivity of upland oaks. The site index is between 55 and 65. Locally, on the best sites, the site index is somewhat higher. White pine, Virginia pine, red oak, black oak, and white oak should be favored in existing stands. Species suitable for planting are white pine, Virginia pine, and Japanese larch.

Plant competition is slight for all species. Seedling mortality is generally moderate. Equipment restrictions are moderate because the highly clayey subsoil does not support heavy equipment well when it is wet or even moderately moist. The hazard of windthrow is slight, and the hazard of erosion is moderate.

WOODLAND SUITABILITY GROUP 4e4

This group consists of the south aspects of some soils of the Opequon series. These soils are well drained and are shallow over limestone bedrock, but the bedrock is fissured and provides good tree rooting. The highly clayey surface layer and subsoil restrict the use of heavy equipment during wet seasons. Slopes are mostly between 15 and 50 percent, but some very stony areas are included where slopes are less than 15 percent.

Placement of these soils in woodland class 4 is based on their fair productivity for upland oaks. The site index is between 55 and 65. White pine, ash, red oak, Virginia pine, black oak, and white oak should be favored in existing stands. Species suitable for planting are white pine, Japanese larch, and Virginia pine.

Plant competition is slight for hardwoods and moderate for conifers. Seedling mortality is severe in places on these south slopes where shallow soils, fully exposed to the sun, dry out. Equipment restrictions are severe because of the high clay content of the soils and the strongly sloping to steep slopes. The hazard of windthrow is slight, and the hazard of erosion is severe.

WOODLAND SUITABILITY GROUP 4w1

This group consists of soils of the Monongahela series. These soils are moderately well drained and have a thick, slowly permeable fragipan. Maximum slope is about 15 percent.

Placement of these soils in woodland class 4 is based on their fair productivity of uplands oaks and Virginia pine. The site index for each of these species is between 55 and 65. Ash, white oak, black oak, red oak, and white pine should be favored in existing stands. Species suitable for planting are white pine, Virginia pine, Japanese larch, and Norway spruce.

Plant competition is slight for hardwoods and moderate for conifers. Seedling mortality is slight. Equipment restrictions are moderate because of seasonal wetness late in winter and early in spring. The hazard of windthrow is slight, and the hazard of erosion is moderate.

WOODLAND SUITABILITY GROUP 4x5

This group consists of the north aspects of Stony land, rolling. Areas are so stony that management is difficult. Comparatively little soil material is present between the stones. Maximum slope is about 45 percent.

Placement of this material in woodland class 4 is based on its fair productivity of upland oaks and Virginia pine. The site index for each species is between 55 and 65. Site quality is variable, however, and some areas have lower productivity. Virginia pine and oaks should be favored in existing stands. Planting is difficult and often impractical, but either white pine or Virginia pine is suitable if planting is done.

Plant competition is slight for hardwoods and moderate for conifers. Seedling mortality is moderate to severe. Equipment restrictions are severe because of extreme stoniness and roughness. The hazard of windthrow is slight or nonexistent. The hazard of erosion is generally slight, but it is moderate in some local areas.

WOODLAND SUITABILITY GROUP 5f3

This group consists of soils of the Leetonia and Litz series, and only the south aspects of some Calvin, Lelew, and Weikert soils. These soils contain large amounts of rock fragments and retain little moisture for growing trees. Maximum slope is about 50 percent.

Placement of these soils in woodland class 5 is based on their poor productivity of upland oaks and Virginia pine. The site index for each species is between 45 and 55. Any economic species, especially pines, should be favored in existing stands. Species suitable for planting are white pine, pitch pine, and Virginia pine.

Plant competition is slight for both hardwoods and conifers. Seedling mortality is mostly moderate, but it ranges to severe on some south slopes. Equipment restrictions increase with slope, and they range to moderate where slopes are about 15 to 20 percent and severe where they are about 35 percent. The hazard of windthrow is slight, and the hazard of erosion is slight to moderate.

WOODLAND SUITABILITY GROUP 5d3

This group consists of some soils of the Weikert series and only the north aspects of other Weikert and

some Gilpin soils. It is by far the most extensive woodland suitability group in the county. These soils are mostly less than 20 inches deep to fractured shale bedrock, and most contain large amounts of shale fragments. The soils are naturally droughty, and most of them are in the eastern part of the county where rainfall is low. Maximum slope is about 20 percent on neutral aspects and about 65 percent on north aspects.

Placement of these soils in woodland class 5 is based on their poor productivity of upland oaks and Virginia pine. The site index for each species is between 45 and 55. Any economic species, especially pines, should be favored in existing stands. White pine, pitch pine, and Virginia pine are suitable for planting.

Plant competition is slight for both hardwoods and conifers, but seedling mortality is severe on these droughty soils. Equipment restrictions increase with slope, and they range to moderate where slopes are about 15 to 20 percent and severe where slopes are about 35 percent. The hazard of windthrow is slight. The hazard of erosion is mostly slight, but it ranges to moderate where slopes are more than about 35 percent.

WOODLAND SUITABILITY GROUP 5x5

This group consists of the south aspects of Stony land, rolling, and the north aspects of Stony land, steep. Maximum slope of the south aspects of Stony land, rolling, is 45 percent, and the slope range of the north aspects of Stony land, steep, is 45 to 75 percent. This material is so extremely stony that management is difficult. Comparatively little soil material is present between the stones.

Placement of this material in woodland class 5 is based on its poor productivity of upland oaks and Virginia pine. The site index for each species is between 45 and 55. Any economic species should be favored in existing stands. White pine, pitch pine, and Virginia pine are suitable for planting, but planting generally is extremely difficult to accomplish.

Plant competition is slight for hardwoods and moderate for conifers. Seedling mortality is moderate, but it ranges to severe on some south slopes. Equipment restrictions are severe because of extreme stoniness and roughness and because of slope in most areas. The hazard of windthrow is slight, and the hazard of erosion is slight to moderate.

WOODLAND SUITABILITY GROUP 6d4

This group consists of the south aspects of some soils of the Gilpin and Weikert series. These soils are mainly in the eastern part of the county where rainfall is low, and they are naturally droughty. The soils are generally less than 20 inches deep to fractured shale bedrock, and in most places they contain a large amount of shale fragments. Slopes range mostly from 20 to 65 percent, but they are less than 20 percent in some minor areas.

Placement of these soils in woodland class 6 is based on their very poor productivity of upland oaks and Virginia pine. The site index for these species is less than 45, which indicates that growth averages less than 1 foot per year on the south-facing slopes of

these soils. Any economic species should be favored in existing stands. Planting for economic production of wood crops is generally not practical. Species suitable for planting for watershed protection, wildlife habitat, or esthetic value are white pine, pitch pine, and Virginia pine.

Plant competition is slight for all species. Seedling mortality is severe. Equipment restrictions are mostly severe, but they are moderate on some of the less sloping soils. The hazard of windthrow is slight. The hazard of erosion is mostly moderate, but in places it is slight on some of the less sloping soils.

WOODLAND SUITABILITY GROUP 6x5

This group consists of the south aspects of Stony land, steep. Slopes range from 45 to 75 percent or more. This material is so extremely stony, rough, and steep that management is difficult to accomplish. Comparatively little soil material is present between the stones.

Placement of this material in woodland class 6 is based on its very poor productivity of upland oaks and Virginia pine. The site index is less than 45, which indicates that growth averages less than one foot per year on these south-facing slopes. Any economic species should be favored in existing stands. Planting is generally not economically or physically feasible. If planting is done for watershed protection, wildlife habitat, or for esthetic reasons, however, white pine, pitch pine, or Virginia pine is suitable.

Plant competition is slight for any species. Seedling mortality is especially severe on these exposed slopes. Equipment restrictions are so severe that heavy equipment use is not practical. The hazard of windthrow is slight, and the hazard of erosion is moderate.

Wildlife ³

This part of the soil survey of Allegany County contains information on how soils and their characteristics relate to some important elements of habitat for native wildlife. The method of rating the soils is described and the uses and limitations of the information are discussed. The soil-habitat relationships are shown in table 4 along with notations of broad relationships with open-land, woodland, and wetland wildlife.

Soils and their properties directly affect wildlife habitat, whether the habitat is natural or is established and maintained by man. Thus, they are of interest to biologists, land-use planners, and others concerned with soil, water, plant, and wildlife resources.

The kinds and abundance of most wildlife species depend largely on availability and adequate distribution of food, water, and shelter. Different kinds of habitat elements are required to serve these needs. The absence of one or more of the necessary elements, even for relatively short periods, can result in scarcity or absence of some particular kind of wildlife.

³ PHILIP F. ALLAN, biologist, Soil Conservation Service, helped prepare this section.

Habitat needs of wildlife are provided by different kinds of plants and by available water. Soils influence adaptability, growth habits, and productivity of plants, and they also affect quality and distribution of water. Plant management for wildlife is achieved by plantings or by inducing or improving natural establishments. Water management involves creating or improving water supplies.

Soils are rated in table 4 for their suitability for the creation, improvement, or maintenance of several different habitat elements, and for their potential for three classes of wildlife. The ratings are based upon soil limitations. Soils that have a rating of *good* have few, if any, limitations for the particular habitat element or class of wildlife specified, and satisfactory results are generally assured. A rating of *fair* indicates moderate limitations, a rating of *poor* indicates severe limitations, and a rating of *unsuited* indicates limitations so severe that habitat development is not feasible or the particular class of wildlife is not adaptable.

The habitat elements are defined and described as follows:

Grain and seed crops.—These are planted seed-producing annuals such as corn, wheat, barley, oats, buckwheat, soybeans, sorghum, millet, cowpeas, and soybeans. Good soils for such plants are deep, nearly level, well drained, and free or nearly free of stones. They have a high available water capacity, are not frequently flooded, and can be planted to the same or similar crops each year. Other soils have one or more limitations in these important characteristics that vary in severity.

Domestic grasses and legumes.—These are planted species valued for food and cover, such as lespedeza, alfalfa, various clovers, tall fescue, bromegrass, bluegrass, orchardgrass, and timothy. Good soils for such plants are moderately deep to deep, have moderate or better available water capacity, and are not more than moderately eroded. Less desirable soils have one or more limitations in these characteristics that vary in severity.

Wild herbaceous upland plants.—These include panicgrass and other native grasses, partridgepea, beggarticks, various native lespedezas, and other native herbs. Such plants are best adapted to deep upland soils.

Hardwood woody plants.—Some hardwood trees and shrubs are valuable for wildlife because they grow vigorously and produce good crops of seed whether they are planted or grow naturally. These include persimmon, dogwood, sumac, shrub lespedeza, sassafras, hazelnut, multiflora rose, autumn-olive, wild cherry, various oaks and hickories, huckleberry, walnut, high-bush cranberry, blackhaw, and various hollies. These plants also are best adapted to deep soils.

Wetland food and cover plants.—Examples of these plants that provide food and cover for waterfowl and some fur-bearing animals are smartweed, wildrice, barnyardgrass, bulrush, pondweed, duckmillet, arrow-aram, pickerelweed, waterwillow, cattail, and various sedges. Such plants are best adapted to soils that have a high water table most of the year.

TABLE 4.—Suitability of soils for elements of wildlife habitat and kinds of wildlife—Continued

Soil series and map symbols	Elements of wildlife habitat						Kinds of wildlife		
	Grain and seed crops	Domestic grasses and legumes	Wild herba-ceous upland plants	Hardwood woody plants	Wetland food and cover plants	Shallow-water developments	Open-land	Woodland	Wetland
Dekalb:									
DeB2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
DeC2	Poor	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
DeD	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
DkB	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
DkC	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
DIE	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
DIF	Unsuited	Unsuited	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
Edom:									
EdB2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
EdC2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
EdD2	Poor	Fair	Good	Good	Unsuited	Unsuited	Fair	Good	Unsuited.
EdE2	Unsuited	Poor	Good	Good	Unsuited	Unsuited	Poor	Good	Unsuited.
EeE3	Unsuited	Poor	Good	Good	Unsuited	Unsuited	Poor	Good	Unsuited.
Elliber:									
EIA	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
EIB2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
EIC2	Poor	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
EID	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
EmC	Poor	Poor	Poor	Poor	Unsuited	Unsuited	Poor	Poor	Unsuited.
EmD	Unsuited	Unsuited	Poor	Poor	Unsuited	Unsuited	Unsuited	Poor	Unsuited.
EmF	Unsuited	Unsuited	Poor	Poor	Unsuited	Unsuited	Unsuited	Poor	Unsuited.
Ernest:									
ErA	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ErB2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
ErC2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
ErD2	Poor	Fair	Good	Good	Unsuited	Unsuited	Fair	Fair	Unsuited.
EuB, EuD. Interpreta-tions not made.									
Gilpin:									
GIB2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
GIC2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
GID2	Poor	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
GnB2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
GnC2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
GnD2	Poor	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
GnE	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
GsB	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
GsD	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
GuB, GuD. Interpreta-tions not made.									
GwF	Unsuited	Unsuited	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
Gravel pits: Gx. Interpreta-tions not made.									
Hagerstown:									
HeC2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
HeE2	Poor	Fair	Good	Good	Unsuited	Unsuited	Fair	Good	Unsuited.
Huntington:									
Hn	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
HxA	Good	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
HxB	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
HxC	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.

TABLE 4.—Suitability of soils for elements of wildlife habitat and kinds of wildlife—Continued

Soil series and map symbols	Elements of wildlife habitat						Kinds of wildlife		
	Grain and seed crops	Domestic grasses and legumes	Wild herba-ceous upland plants	Hardwood woody plants	Wetland food and cover plants	Shallow-water developments	Open-land	Woodland	Wetland
Laidig:									
LaB2	Good to fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
LaC2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
LaD2	Poor	Fair	Good	Good	Unsuited	Unsuited	Fair	Good	Unsuited.
LbC	Unsuited	Poor	Good	Good	Unsuited	Unsuited	Poor	Good	Unsuited.
LbD	Unsuited	Poor	Good	Good	Unsuited	Unsuited	Poor	Good	Unsuited.
Landisburg:									
LdA	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
LdB2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
LdC2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
LdD2	Poor	Fair	Good	Good	Unsuited	Unsuited	Fair	Good	Unsuited.
Leetonia: LgD	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
Lehew:									
LhB2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
LhC2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
LhE	Poor to unsuited.	Fair to poor.	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
LIB	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
LID	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
Lickdale: Lm	Unsuited	Poor	Poor	Good	Good	Good	Poor	Good	Good.
Lindside: Ln	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Litz:									
LsB2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
LsC2	Fair	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
LsD2	Poor	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
LsE	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
Loysville: LyB	Poor	Poor	Fair	Fair	Fair to poor.	Fair to unsuited.	Poor	Fair	Poor.
Meckesville:									
McB2	Good to fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
McC2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
McD2	Poor	Fair	Good	Good	Unsuited	Unsuited	Fair	Good	Unsuited.
MdC	Unsuited	Poor	Good	Good	Unsuited	Unsuited	Poor	Good	Unsuited.
MdD	Unsuited	Poor	Good	Good	Unsuited	Unsuited	Poor	Good	Unsuited.
Melvin: Me	Poor	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair.
Monongahela:									
MhA	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MhB2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
MhC2	Fair	Good	Good	Good	Unsuited	Unsuited	Good	Good	Unsuited.
Nolo:									
NoA	Poor	Poor	Fair	Fair	Good	Fair	Poor	Fair	Fair.
NoB	Poor	Poor	Fair	Fair	Poor	Unsuited	Poor	Fair	Unsuited.
NoC2	Poor	Poor	Fair	Fair	Poor	Unsuited	Poor	Fair	Unsuited.
NsC	Unsuited	Poor	Fair	Fair	Poor	Unsuited	Poor	Fair	Unsuited.
Opequon:									
OpB2	Fair	Good	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
OpC2	Poor	Fair	Fair	Fair	Unsuited	Unsuited	Fair	Fair	Unsuited.
OpD2	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
OpE2	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
OuD	Unsuited	Poor	Fair	Fair	Unsuited	Unsuited	Poor	Fair	Unsuited.
OuE	Unsuited	Unsuited	Fair	Fair	Unsuited	Unsuited	Poor	Poor	Unsuited.
Philo: Ph	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.

TABLE 4.—Suitability of soils for elements of wildlife habitat and kinds of wildlife—Continued

Soil series and map symbols	Elements of wildlife habitat						Kinds of wildlife		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Wetland food and cover plants	Shallow-water developments	Open-land	Woodland	Wetland
Pope: Pn..... Ps.....	Fair..... Fair.....	Good..... Good.....	Good..... Good.....	Good..... Good.....	Unsuited..... Unsuited.....	Unsuited..... Unsuited.....	Good..... Good.....	Good..... Good.....	Unsuited. Unsuited.
Robertsville: RbB.....	Poor.....	Poor.....	Fair.....	Fair.....	Fair.....	Poor.....	Poor.....	Poor.....	Poor.
Rock outcrop: Rc. Interpretations not made.									
Shelocta: ShB2..... ShC2..... ShD2.....	Good to fair..... Fair..... Poor.....	Good..... Good..... Fair.....	Good..... Good..... Good.....	Good..... Good..... Good.....	Unsuited..... Unsuited..... Unsuited.....	Unsuited..... Unsuited..... Unsuited.....	Good..... Good..... Fair.....	Good..... Good..... Good.....	Unsuited. Unsuited. Unsuited.
Stony land: SrC..... SrF.....	Unsuited..... Unsuited.....	Unsuited..... Unsuited.....	Fair..... Poor.....	Fair..... Poor.....	Unsuited..... Unsuited.....	Unsuited..... Unsuited.....	Poor..... Unsuited.....	Poor..... Poor.....	Unsuited. Unsuited.
Strip mines and Dumps: St. Interpretations not made.									
Tyler: TyA..... TyB.....	Fair..... Fair.....	Fair..... Fair.....	Good..... Good.....	Good..... Good.....	Fair..... Poor.....	Fair..... Unsuited.....	Fair..... Fair.....	Good..... Good.....	Fair. Unsuited.
Weikert: WeB2..... WeC2..... WeE..... WkD..... W1B, W1C, W1E. Interpretations not made. WnF.....	Poor..... Poor..... Unsuited..... Unsuited..... Unsuited.....	Poor..... Poor..... Poor..... Unsuited.....	Fair..... Fair..... Fair..... Fair.....	Fair..... Fair..... Fair..... Fair.....	Unsuited..... Unsuited..... Unsuited..... Unsuited.....	Unsuited..... Unsuited..... Unsuited..... Unsuited.....	Poor..... Poor..... Poor..... Poor.....	Fair..... Fair..... Fair..... Fair.....	Unsuited. Unsuited. Unsuited. Unsuited.
Westmoreland: WsB2..... WsC2..... WsD2..... WsE.....	Fair..... Fair..... Poor..... Unsuited.....	Fair..... Fair..... Fair..... Poor.....	Fair..... Fair..... Fair..... Fair.....	Fair..... Fair..... Fair..... Fair.....	Unsuited..... Unsuited..... Unsuited..... Unsuited.....	Unsuited..... Unsuited..... Unsuited..... Unsuited.....	Fair..... Fair..... Fair..... Poor.....	Fair..... Fair..... Fair..... Fair.....	Unsuited. Unsuited. Unsuited. Unsuited.

Shallow-water developments.—Good soils for shallow impoundments have a high water table much of the year and are in positions where the water level can be readily controlled and maintained within two feet above the soil surface.

Table 4 also shows the suitability of soils for major classes of wildlife: open-land, woodland, and wetland. The ratings are based on the ratings given in the table for the various habitat elements. Ratings for open-land wildlife are based on ratings for grain and seed crops, grasses and legumes, and wild herbaceous upland plants. Ratings for woodland wildlife are based on ratings for hardwood woody plants, wild herbaceous upland plants, and grasses and legumes. Ratings

for wetland wildlife are based on ratings for wetland food and cover plants and shallow-water developments.

The three major classes of wildlife in Allegany County are defined as follows:

Open-land wildlife consists of birds and animals that normally are found in such open situations as crop fields, meadows, pastures, and nonwooded overgrown lands. Examples are quail, doves, rabbits, meadowlarks, killdeer, pheasants, field sparrows, and various songbirds.

Woodland wildlife consists of birds and animals that normally are found in wooded types of habitat.

Examples are grouse, wild turkeys, deer, squirrels, raccoons, woodpeckers, and various songbirds.

Wetland wildlife consists of birds and animals that normally are found in wet areas such as ponds, marshes, and swamps. Examples are ducks, geese, herons, snipe, rails, and muskrats. Raccoons appear to be nearly as well adapted to wetland as to woodland, and where they have a choice, appear to prefer very wet woodland.

The soil-wildlife interpretations in this section are based upon the soil map of the county. They are only general guides, and for detailed planning and application need to be supplemented by onsite investigation. No attempt is made to relate individual kinds of wildlife to the soils. Not considered are present land use, existing vegetation, the relationships of one soil to another, and the mobile nature of wildlife. Some important habitat elements, such as impounded ponds, also are not considered because they cannot be appraised from the soil map. Information on soil characteristics as related to pond construction is given in another part of this survey.

Habitat needs of various wildlife species must be understood if soil interpretations for wildlife are to be effectively made and used. The information given in this section is applicable in—

1. Broad-scale planning of land use for wildlife refuges, parks, nature study areas, and recreational developments.
2. Selecting suitable soil areas for creating, improving, or maintaining the various kinds of wildlife habitat elements.
3. Determining the relative degree of management intensity required to attain satisfactory results.
4. Eliminating sites that are difficult or infeasible to develop for specific kinds of habitat.
5. Determining soil areas desirable for habitat preservation and wildlife use.

Engineering Uses of the Soils ⁴

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.

2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5 and 6, which show, respectively, several estimated soil properties significant to engineering and interpretations for various engineering uses.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 5 and 6, and it also can be used to make other useful maps.

This information, however, does not eliminate need for further investigation at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning to soil scientists that is not known to all engineers. The Glossary defines many of these terms commonly used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (7) used by SCS engineers, the Department of Defense, and others, and the AASHO system (1) adopted by the American Association of State Highway Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML-CL.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are

⁴ THEODORE IFFT, assistant State conservation engineer, Soil Conservation Service, helped prepare this section.

gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A-7, are clay soils that have low strength when wet and that are the poorest soils for subgrade.

The Unified and AASHO estimated classifications are given in table 5 for all soils mapped in the survey area.

Estimated engineering properties

Table 5 shows some estimated properties of soils in Allegany County that are important in engineering.

Depths given in the columns for depth to bedrock and depth to seasonal high water table coincide with the normal range for each soil series. Depth to seasonal high water table is the highest level at which ground water stands for a significant period of time.

Thickness as indicated in the depth from surface column and other properties given in the table cover the general range that is given in the soil profiles, including the specific example described in the section "Descriptions of the Soils." Some horizons, however, have been combined in table 5 so that thicknesses do not necessarily coincide with those given in the soil descriptions. In the table, thickness of the surface layer applies only to soils that are slightly or moderately eroded. The surface layer of severely eroded soils is thinner or may be completely gone, and the underlying horizons are closer to the surface than is indicated in the table.

USDA texture describes the soil material in the main horizons of the profiles by textural terms used by the U.S. Department of Agriculture. Estimated Unified (7) and AASHO (1) classifications for the soils are based on data obtained by mechanical analyses and by tests made to determine plastic properties of the soils.

Coarse fragments greater than 3 inches are that portion of the soil consisting of gravel greater than 3 inches in diameter or pieces of chert, shale, sandstone or limestone greater than 3 inches in length.

Percentages passing specified sieve sizes are based on that portion of the soil that excludes all fragments greater than 3 inches in diameter.

Permeability of a soil horizon is the rate at which water moves through undisturbed, saturated soil material. It depends largely on the texture and structure of the soil.

Available water capacity is approximately the water held in the range between field capacity and the wilting point. It is expressed in table 5 as inches of water per inch of soil.

Reaction refers to the acidity or alkalinity of the soil, expressed in terms of pH values. A pH of 7.0 is neutral; values of less than 7.0 indicate acidity, and values of more than 7.0 indicate alkalinity. The reactions given in table 5 are the normal ones for soils that are unlimed. In fields that have been limed, the pH value is higher, particularly in the surface layer and the layer just beneath it.

Shrink-swell potential is an indication of the volume change that can be expected with changes in moisture content. It depends largely on the amount and kind of clay in the soil. In general, soils classified as CH or

A-7 have high shrink-swell potential, and sands and gravels have low shrink-swell potential.

Engineering interpretations

Table 6 rates the soils of Allegany County according to their suitability as potential sources of topsoil, sand and gravel, and road fill.

No soils of the county are good sources of sand, and only the Allegheny soils in places are good sources of gravel. Some other soils, as shown in the table, are fair or poor sources of sand or gravel. Most of these, including Alluvial land, are soils of flood plains and terraces.

Also listed in table 6 are soil features that affect various kinds of engineering work. The features shown are those that affect the location of roads and highways and the location and construction of pipelines and underground cables; sites for ponds or reservoirs; the use of soil material for dams and other embankments; drainage systems; sprinkler irrigation practices; the construction and maintenance of terraces, diversions, and grassed waterways; and the grading of soil material under winter conditions. These interpretations are based on the information in table 5 and on the experience of engineers in Allegany County and other nearby counties.

Features that affect the location of roads or highways and laying pipelines or underground cables are soil texture, height of the water table, probable seepage, hazard of flooding, stoniness of the soil, slope, and depth to and kind of bedrock. For example, if the water table is high, laying a pipeline is difficult because ditchbanks are likely to collapse. An additional factor in road or highway location is the expected severity of frost heaving of subgrades.

The choice of a site for a pond or reservoir depends largely upon the amount or rate of seepage that can be expected, particularly at the bottom of the pond or reservoir. The amount of seepage depends upon the kind of material used for the bottom or floor. The most nearly ideal soil material is one that permits very little seepage and has a high water table. The material should be deep to any kind of bedrock that could allow additional water to seep away. Limestone is especially liable to have sinks, fissures, or solution channels that allow water to escape. Also desirable is a constant or reliable source of water from ground water, from impounded runoff, or from a stream (fig. 19).

Stability, permeability, and compaction characteristics affect the choice of soil material for building dams, dikes, levees, and other embankments. The density to which soil material can be compacted affects the strength and permeability of the structure, and soils that can be compacted to the greatest density have not only the least seepage loss but also the greatest strength and stability. Soils that are well-graded mixtures of gravel, sand, and fine material are most easily compacted to a high density. Some highly clayey materials have little strength, but because they may be very slowly permeable, they can be used for cores within dams of coarser material to prevent possible excessive water losses.

TABLE 5.—Estimated soil properties

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of more than one kind of soil. The soils in other series that are given in the first column of this table. The

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
Albrights: AbB, AbC ₂ , AgD.....	Feet >6	Feet 1-3	Inches 0-7 7-15 15-40 40-50	Silt loam..... Silty clay loam..... Silty clay loam..... Loam or silt loam.....	ML or CL ML or CL ML or CL GM or ML	A-4 A-4 or A-6 A-4 or A-6 A-2 or A-4
Allegheny: AhA, AhB ₂ , AhC ₂ , A1A, A1B ₂ , A1C ₂ , A1D, AnB, AnC. Properties not estimated for Urban land part of AnB and AnC.	>5	>4	0-12 12-40 40-84	Fine sandy loam or silt loam. Fine sandy loam and clay loam. Variable soil material....	SM or ML SM, ML or CL SM, SC, ML, CL, GM or GC	A-2 or A-4 A-4 or A-6 A-2, A-4 or A-6
Alluvial land: Au, Av..... Properties not estimated for Urban land part of Av.	>6	0-2	0-60	Variable soil material.....		
Atkins: Aw.....	>6	0	0-18 18-43 43-54	Silt loam..... Silty clay loam..... Gravelly sand.....	ML or CL ML or CL SM	A-4 or A-6 A-4 or A-6 A-2 or A-4
Belmont: BeE.....	4-10	>4	0-8 8-34 34-80	Silty clay loam..... Silty clay loam..... Clay loam.....	CL CL or CH SC or CL	A-6 or A-7 A-6 or A-7 A-6
Brooke: BkC ₃	4-8	>4	0-6 6-35 35-48 48-56 56	Silty clay loam..... Silty clay or clay..... Very shaly clay..... Silty clay loam..... Limestone and shale.	CL CH GC, CH or GP-GC CL or CH	A-6 A-7 A-2 or A-7 A-6 or A-7
Buchanan: BuB ₂ , BuC ₂ , BvC, BvD.....	>6	1½-3	0-7 7-25 25-60	Gravelly loam..... Gravelly clay loam..... Shaly loam.....	SM or ML SM, ML or CL SM or ML	A-2 or A-4 A-2, A-4 or A-6 A-2 or A-4
*Calvin: CaB, CaC, C1B ₂ , C1C ₂ , C1D ₂ , C1E, CnB ₂ , CnC ₂ , CnD ₂ , CnE. For properties of Weikert soils in CnB ₂ , CnC ₂ , CnD ₂ , and CnE, see Weikert series.	2-3½	>4	0-24 24-38 38	Shaly silt loam..... Shaly silt loam..... Shale.	SM, ML or CL SM, GM or GC	A-2 or A-4 A-1, A-2 or A-4
Cavode: CoB ₂ , CoC ₂ , CrD.....	3½-5	½-1½	0-7 7-40 40-50 50	Silt loam..... Silty clay loam..... Shaly silt loam..... Clay shale.	ML or CL CL GM, GC or ML	A-4 or A-6 A-6 or A-7 A-4 or A-6
Chavies: CsA, CsB.....	>6	>4	0-37 37-56	Loam or silt loam..... Sand and gravel.....	SM or ML SM or GM	A-2 or A-4 A-2 or A-4
Cookport: CtB ₂ , CtC ₂ , CuB, CuD.....	3-4	1½-3	0-11 11-35 35-40 40	Silt loam..... Silty clay loam..... Fine sandy loam..... Sandstone.	ML ML or CL SM or ML	A-4 A-4 or A-6 A-2 or A-4
Cut and fill land: Cv. Properties not estimated.						
*Dekalb: DeB ₂ , DeC ₂ , DeD, DkB, DkC, D1E, D1F. For properties of Lehew soils in D1E and D1F, see Lehew series.	1½-3½	>4	0-8 8-36 36	Sandy loam or loam..... Sandy loam or loam..... Sandstone or siltstone or both.	SM or ML SM, ML or GM	A-2 or A-4 A-2 or A-4

See footnotes at end of table.

significant in engineering

such mapping units may have different properties and limitations, and for this reason it is necessary to follow the instructions for referring to symbol > means more than and the symbol < means less than]

Coarse fragments greater than 3 inches	Percentage passing sieve				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
0-15	80-100	75-100	60-90	50-85	<i>Inches per hour</i> 0.6-6.0	<i>Inches per inch of soil</i> 0.16-0.20	<i>pH</i> 5.0-6.0	Low.
0-15	80-95	70-85	65-80	60-80	0.6-2.0	0.16-0.20	5.0-5.5	Low.
5-30	65-95	60-85	60-80	55-75	0.2-0.6	0.09-0.14	4.5-5.5	Low.
5-40	45-85	35-80	30-60	20-60	0.2-2.0	0.04-0.08	4.5-5.5	Low.
0-15	85-100	80-100	50-100	30-80	0.6-6.0	0.10-0.18	5.0-5.5	Low.
0-15	80-100	80-95	70-95	45-95	0.6-2.0	0.10-0.14	5.0-5.5	Low.
0-40	50-95	50-90	40-80	15-75	0.6-6.0	0.08-0.14	4.5-5.5	Low.

	90-100	90-100	85-100	60-95	0.6-2.0	0.18-0.22	4.5-5.5	Low.
	85-100	80-100	60-75	55-75	0.2-0.6	0.14-0.18	4.5-5.5	Low.
5-20	60-95	60-80	50-70	15-45	0.2-6.0	0.06-0.10	4.5-5.0	Low.
0-10	80-100	80-100	70-95	60-95	0.6-2.0	0.16-0.20	5.5-6.0	Low to moderate.
0-20	80-100	75-100	65-95	50-90	0.2-0.6	0.14-0.18	5.0-5.5	Moderate to high.
0-35	70-100	60-95	55-95	40-90	0.6-2.0	0.02-0.16	5.0-5.5	Low to moderate.
0-5	85-100	80-100	75-95	70-95	0.2-2.0	0.16-0.20	6.5-7.5	Low to moderate.
0-5	85-100	80-100	75-95	65-95	0.2-0.6	0.12-0.16	6.0-7.0	High.
1-10	45-80	35-70	25-70	10-60	0.2-0.6	0.05-0.10	6.5-7.5	Moderate to high.
	80-100	75-100	70-95	65-90	0.2-0.6	0.12-0.16	6.5-7.5	Moderate.
10-20	65-85	60-80	55-75	30-70	0.6-6.0	0.12-0.18	5.0-5.5	Low.
10-20	65-85	60-80	55-75	30-70	0.2-0.6	0.10-0.16	4.5-5.5	Low.
0-10	55-80	55-75	40-70	25-55	<0.6	0.06-0.10	4.5-5.5	Low.
	70-95	55-90	50-90	30-75	2.0-6.0	0.12-0.18	4.5-5.5	Low.
	35-70	35-60	15-45	15-40	2.0-6.0	0.06-0.10	4.5-5.5	Low.
0-5	90-100	90-100	85-95	80-90	0.6-2.0	0.14-0.18	4.0-5.0	Low.
0-5	80-95	75-95	70-90	60-90	<0.2	0.08-0.14	4.0-5.0	Moderate.
0-10	65-90	60-85	50-80	40-75	<0.2	0.06-0.12	4.0-5.0	Moderate.
	90-100	65-100	60-100	25-60	2.0-6.0	0.10-0.18	5.0-6.0	Low.
10-20	50-80	40-70	35-65	20-55	>2.0	0.08-0.14	5.0-6.0	Low.
0-10	80-95	70-90	60-80	55-70	0.6-2.0	0.14-0.18	4.5-5.5	Low.
0-15	75-95	75-95	60-90	55-75	0.6-2.0	0.12-0.16	4.5-5.5	Low.
0-15	70-90	60-85	50-80	30-55	<0.6	0.08-0.12	4.0-5.0	Low.
0-20	60-85	50-75	40-65	15-55	2.0-6.0	0.08-0.12	4.5-5.0	Low.
30-40	40-85	35-80	25-75	15-55	>2.0	0.06-0.12	4.0-5.0	Low.

TABLE 5.—Estimated soil properties

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
Edom: EdB2, EdC2, EdD2, EdE2, EeE3-----	Feet 2-3½	Feet >4	Inches 0-7	Silt loam or silty clay loam.	ML or CL	A-4 or A-6
			7-24	Silty clay or silty clay loam.	CL or CH	A-4, A-6 or A-7
			24	Limestone.		
Elliber: EIA, EIB2, EIC2, EID, EmC, EmD, EmF.	4-30	>5	0-13	Cherty silt loam-----	ML or GM	A-2 or A-4
			13-50	Very cherty loam-----	GM or GC	A-1, A-2 or A-4
			50	Cherty limestone.		
*Ernest: ErA, ErB2, ErC2, ErD2, EuB, EuD. For properties of Landisburg soils in EuB and EuD, see Landisburg series. Properties not estimated for Urban land part of EuB and EuD.	>6	1½-3	0-8	Silt loam-----	ML or CL	A-4 or A-6
			8-24	Silty clay loam-----	ML, MH or CL	A-4, A-6 or A-7
			24-60	Silty clay loam-----	ML or CL	A-4 or A-6
*Gilpin: GIB2, GIC2, GID2, GNB2, GNC2, GND2, GNE, GSB, GSD, GUB, GUD, GWF. Properties not estimated for Urban land part of GUB and GUD. For properties of Weikert soils in GWF, see Weikert series.	2-3½	>4	0-14	Silt loam-----	ML	A-4
			14-21	Silty clay loam-----	ML or CL	A-4 or A-6
			21-26	Channery silt loam-----	ML or GM	A-2 or A-4
			26	Shale, siltstone.		
Gravel pits: Gx. Properties not estimated.						
Hagerstown: HeC2, HeE2-----	5-10	>5	0-13	Silt loam-----	ML or CL	A-4 or A-6
			13-69 69	Silty clay loam to clay Limestone.	MH, CL or CH	A-6 or A-7
Huntington: Hn-----	>6	1 >4	0-31	Silt loam-----	ML or CL	A-4 or A-6
			31-60	Stratified soil material-----	SM, SC or ML	A-2 or A-4
HxA, HxB, HxC-----	>6	2 >4	0-31 31-60	Silt loam Highly variable soil material.	ML or CL	A-4 or A-6
Laidig: LaB2, LaC2, LaD2, LbC, LbD-----	>5	>4	0-11	Gravelly loam-----	SM or GM	A-2 or A-4
			11-38	Sandy clay loam or clay loam.	SM or SC	A-2 or A-4
			38-78 78	Sandy clay loam or sandy clay. Shale.	SM or SC	A-2 or A-4
Landisburg: LdA, LdB2, LdC2, LdD2-----	>5	1½-3	0-9	Cherty silt loam-----	ML	A-4
			9-22	Silty clay loam-----	ML or CL	A-4 or A-6
			22-44	Silty clay loam or silt silt loam.	ML or CL	A-4 or A-6
			44	Cherty limestone.		
Leetonia: LgD-----	1½-3½	>5	0-20	Sandy loam-----	SM	A-2 or A-4
			20-30 30	Channery sandy loam Sandstone.	GM	A-1 or A-3
Lehew: LhB2, LhC2, LhE, LIB, LID-----	1½-3½	>4	0-9	Loam or sandy loam-----	SM or ML	A-2 or A-4
			9-36	Gravelly sandy loam to loam.	SM or GM	A-2 or A-4
			36	Sandstone.		
Lickdale: Lm-----	3½-6	0	0-10	Silt loam-----	ML or CL	A-4 or A-5
			10-33	Silty clay loam-----	CL	A-6 or A-7
			33-42	Gravelly sandy loam-----	SM or SC	A-2 or A-4
			42	Sandstone.		

See footnotes at end of table.

significant in engineering—Continued

Coarse fragments greater than 3 inches	Percentage passing sieve				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
0-10	85-100	80-100	75-95	65-85	<i>Inches per hour</i> 0.6-6.0	<i>Inches per inch of soil</i> 0.14-0.20	pH 5.5-7.0	Low.
10-30	70-95	65-90	65-85	55-85	0.6-2.0	0.10-0.14	5.5-7.5	Moderate to high.
15-30	30-70	30-65	25-60	20-55	2.0-6.0	0.04-0.12	5.0-6.0	Low.
50-90	30-55	30-55	25-45	15-40	2.0-6.0	0.04-0.08	4.5-5.5	Low.
0-15	75-100	70-100	70-95	60-95	0.6-2.0	0.14-0.20	5.0-5.5	Low.
0-15	75-100	75-100	70-95	65-95	0.6-2.0	0.12-0.16	4.5-5.5	Low to moderate.
5-25	70-95	65-95	60-95	55-95	0.2-0.6	0.08-0.12	4.5-5.5	Low.
10-20	85-100	80-90	70-85	60-85	0.6-2.0	0.16-0.20	4.5-5.5	Low.
15-25	75-90	70-85	60-75	55-70	0.6-2.0	0.08-0.14	4.5-5.5	Low.
50-75	40-70	35-60	25-55	15-60	0.6-2.0	0.06-0.10	4.5-5.5	Low.
0-5	90-100	90-100	80-100	75-95	0.6-2.0	0.16-0.20	5.5-6.5	Low.
0-5	85-100	80-100	75-100	70-95	0.6-2.0	0.10-0.14	5.0-6.5	Moderate.
0-10	95-100	90-100	85-100	70-100	0.6-2.0	0.16-0.20	5.5-6.5	Low.
15-30	85-95	60-80	50-70	15-60	2.0-6.0	0.10-0.14	5.5-7.0	Low.
0-10	95-100	90-100	85-100	70-100	0.6-2.0	0.16-0.20	5.5-6.5	Low.
10-15	55-75	50-70	40-55	20-45	0.6-6.0	0.10-0.14	4.5-5.5	Low.
5-10	65-75	60-70	40-55	20-45	0.6-2.0	0.08-0.12	4.0-5.5	Low.
0-10	70-90	50-70	40-55	15-40	<0.6	0.06-0.10	4.0-5.0	Low.
10-25	80-95	65-90	60-80	55-75	0.6-2.0	0.14-0.18	6.0-7.0	Low.
5-20	80-95	65-90	60-85	55-80	0.6-2.0	0.12-0.16	5.5-6.5	Low.
5-20	75-95	65-95	60-85	55-80	<0.2	0.08-0.12	5.5-7.0	Low.
0-10	75-95	65-85	35-60	25-45	>6.0	0.06-0.10	4.0-5.0	Low.
60-75	25-40	25-35	20-35	15-25	>6.0	0.02-0.06	4.0-5.0	Low.
5-40	70-85	60-80	40-75	30-55	2.0-6.0	0.08-0.12	5.0-6.0	Low.
20-50	45-85	35-75	30-60	15-45	2.0-6.0	0.06-0.10	4.5-5.0	Low.
-----	90-100	85-100	70-95	65-90	0.6-2.0	0.18-0.24	4.0-5.0	Moderate.
0-5	70-100	70-100	60-90	55-85	<0.2	0.10-0.14	4.0-5.0	Moderate.
0-20	65-95	55-80	40-60	30-50	0.6-2.0	0.06-0.10	4.0-5.0	Low.

TABLE 5.—Estimated soil properties

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
Lindside: Ln.....	Feet >6	Feet 1½-3	Inches 0-31	Silt loam or silty clay loam.	ML or CL	A-4 or A-6
			31-70	Silty clay.....	CL	A-6 or A-7
Litz: LsB2, LsC2, LsD2, LsE.....	1½-3	>4	0-8	Silt loam.....	ML	A-4
			8-12	Silty clay loam.....	ML or CL	A-4 or A-6
			12-24	Shaly silt loam.....	GM	A-1 or A-2
			24	Shale.		
Loysville: LyB.....	>5	0-½	0-8	Cherty silt loam.....	ML	A-4
			8-24	Cherty silty clay loam.....	ML or CL	A-4 or A-6
			24-56	Silty clay loam or clay loam.	GM, ML or CL	A-2, A-4 or A-6
Meckesville: McB2, McC2, McD2, MdC, MdD.	>4	>3	0-9	Silt loam.....	ML	A-4
			9-31	Silty clay loam.....	ML or CL	A-4 or A-6
			31-40	Silty clay loam.....	ML or CL	A-4 or A-6
			40-60	Loam or silt loam.....	GM or GC	A-2 or A-4
Melvin: Me.....	>4	0	0-46	Silt loam to light clay loam.	ML or CL	A-4 or A-6
			46-48	Gravelly sand.....	SM or SP-SM	A-2
Monongahela: MhA, MhB2, MhC2.....	>6	1½-3	0-10	Silt loam.....	ML	A-4
			10-28	Silty clay loam.....	ML or CL	A-4 or A-6
			28-52	Silt loam.....	ML	A-4
			52-72	Loam.....	SM, SC or ML	A-4
Nolo: NoA, NoB, NoC2, NsC.....	3½-6	0-½	0-12	Silt loam or loam.....	ML	A-4
			12-23	Clay loam.....	ML or CL	A-4 or A-6
			23-36	Clay loam.....	SC, ML or CL	A-4 or A-6
			36-60	Channery loam.....	SM or SC	A-2 or A-4
Opequon: OpB2, OpC2, OpD2, OpE2, OuD, OuE.	1-1½	>5	0-5	Clay loam.....	CL or MH	A-6 or A-7
			5-17	Silty clay loam to silty clay.	CL, CH or MH	A-6 or A-7
			17	Limestone.		
Philo: Ph.....	>6	1½-3	0-31	Silt loam.....	ML	A-4
			31-56	Loam or silt loam.....	SM or ML	A-2 or A-4
Pope: Pn, Ps.....	>6	>3	0-48	Fine sandy loam or silt loam.	SM or ML	A-4
			48-60	Gravelly sand to sandy loam.	SM	A-2 or A-4
Robertsville: RbB.....	>6	0	0-11	Silt loam.....	ML	A-4
			11-28	Silty clay loam.....	CL	A-6 or A-7
			28-60	Silty clay loam or silt loam.	ML or CL	A-4, A-6 or A-7
Rock outcrop: Rc. Properties not estimated.						
Shelocta: ShB2, ShC2, ShD2.....	>4	>4	0-8	Shaly silt loam.....	ML	A-4
			8-48	Shaly silty clay loam.....	ML or CL	A-4 or A-6
			48-54	Weathered shale.....	GM or GP-GM	A-1 or A-2
Stony land: SrC, SrF. Properties not estimated.						
Strip mines and Dumps: St. Properties not estimated.						

See footnotes at end of table.

significant in engineering—Continued

Coarse fragments greater than 3 inches	Percentage passing sieve				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
0-5	95-100	95-100	90-100	70-90	<i>Inches per hour</i> 0.2-2.0	<i>Inches per inch of soil</i> 0.18-0.24	pH 5.5-7.5	Low.
0-5	85-100	80-100	75-95	70-90	0.2-0.6	0.14-0.20	5.5-7.5	Moderate.
0-5	65-85	60-80	55-75	50-70	2.0-6.0	0.08-0.12	4.5-5.5	Low.
0-5	70-85	65-80	60-80	55-75	0.6-6.0	0.08-0.12	4.5-5.5	Low.
0-10	30-65	25-55	20-45	15-35	2.0-6.0	0.05-0.10	4.0-5.0	Low.
10-20	60-85	60-80	55-70	50-70	0.6-2.0	0.12-0.16	6.0-7.5	Low.
10-30	65-85	65-85	60-80	55-75	0.2-2.0	0.10-0.14	6.0-7.5	Low.
20-30	40-60	35-60	30-55	20-55	<0.2	0.06-0.10	6.5-7.5	Low.
0-10	80-100	70-90	65-85	55-70	0.6-2.0	0.14-0.18	4.5-5.5	Low.
10-30	80-100	70-90	65-85	55-70	0.6-2.0	0.12-0.16	4.5-6.0	Low.
10-50	70-95	65-85	60-80	50-65	0.2-0.6	0.08-0.12	4.5-5.5	Low.
20-70	40-60	30-60	30-55	20-45	0.2-2.0	0.08-0.12	4.5-5.5	Low.
0-5	90-100	90-100	90-100	65-90	0.2-0.6	0.18-0.22	5.5-7.5	Moderate.
15-30	75-100	65-90	40-75	10-20	>2.0	0.02-0.06	5.5-7.5	Low.
0-10	90-100	85-100	80-100	70-100	0.6-2.0	0.18-0.24	4.5-5.5	Low.
0-10	90-100	90-100	80-100	70-100	0.2-6.0	0.14-0.18	4.5-5.5	Low.
0-10	90-100	85-100	75-100	65-100	<0.2	0.10-0.14	4.5-5.5	Low.
10-30	70-90	65-85	55-70	40-60	0.2-0.6	0.10-0.14	4.5-5.5	Low.
0-10	90-100	90-100	85-95	55-85	0.2-2.0	0.14-0.18	4.0-5.5	Low.
0-20	90-100	90-100	85-95	55-85	0.2-0.6	0.08-0.12	4.0-5.5	Low to moderate.
0-20	70-100	60-90	55-85	40-70	<0.2	0.06-0.10	4.0-5.5	Low.
10-30	70-100	60-90	50-80	25-45	<0.2	0.05-0.08	4.0-5.0	Low.
0-5	85-100	80-100	80-100	75-90	0.6-2.0	0.16-0.20	6.0-7.5	Moderate.
0-10	80-100	80-100	75-100	70-95	0.2-2.0	0.12-0.16	6.0-7.5	Moderate to high.
0-5	95-100	90-100	70-90	55-80	0.2-2.0	0.14-0.18	4.5-5.5	Low.
0-30	90-100	80-100	60-85	30-60	2.0-6.0	0.06-0.10	4.5-5.5	Low.
0-5	75-100	70-100	55-85	40-65	0.6-6.0	0.10-0.18	4.5-6.0	Low.
10-30	70-90	65-85	40-55	20-45	2.0-6.0	0.06-0.10	4.0-5.0	Low.
0-5	95-100	90-100	90-100	90-100	0.2-0.6	0.18-0.24	4.5-5.5	Low.
0-10	95-100	90-100	85-100	75-95	<0.2	0.12-0.18	4.5-5.5	Moderate.
0-10	95-100	90-100	85-95	70-95	<0.2	0.10-0.16	4.5-5.5	Low to moderate.
-----	65-95	60-90	55-85	50-80	0.6-2.0	0.14-0.18	4.5-5.5	Low.
0-5	65-95	60-90	55-85	50-80	0.6-2.0	0.10-0.14	4.5-5.5	Low.
0-5	30-60	20-40	20-40	10-30	0.6-2.0	0.06-0.10	4.5-5.5	Low.

TABLE 5.—Estimated soil properties

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
Tyler: TyA, TyB.....	Feet >6	Feet 1/2-1 1/2	Inches 0-6 6-29 29-54	Silt loam..... Silty clay loam to silty clay. Sandy clay loam.....	ML CL or CH SC or CL	A-4 A-6 or A-7 A-4 or A-6
*Weikert: WeB2, WeC2, WeE, WkD, WIB, WIC, WIE, WnF. Properties not estimated for Urban land part of WIB, WIC, and WIE. For properties of Gilpin soils in WnF, see Gilpin series.	1-1 1/2	>3	0-4 4-16 16-19 19	Shaly silt loam..... Very shaly silt loam..... Fractured shale..... Shale.	ML GM or GP-GM GP-GM	A-4 A-1 or A-2 A-1
Westmoreland: WsB2, WsC2, WsD2, WsE..	3 1/2-6	>4	0-12 12-36 36-49 49	Silt loam..... Shaly silt loam to silty clay loam. Very shaly loam..... Shale.	ML or CL ML or CL GM	A-4 or A-6 A-4 or A-6 A-1 or A-2

¹ Subject to periodic flooding.

TABLE 6.—Engineering

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of more than one kind of soil. The soils in other series that are given in

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil ¹	Sand and gravel	Road fill	Roads, highways, pipelines, cables ²	Ponds
					Reservoir area
Albrights: AbB, AbC2.....	Fair to plow depth.	Unsuitable.....	Fair to good: A-2 to A-6.	Seasonal high water table; seepage; high frost heave potential.	Possible pervious layer in substratum.
AgD.....	Poor: stony.....	Unsuitable.....	Fair to good: A-2 to A-6.	Seasonal high water table; seepage; high frost heave potential; stoniness.	Possible pervious layer in substratum.
Allegheny: AhA, AhB2, AhC2, A1A, A1B2, A1C2, A1D, AnB, AnC. Interpretations not made for Urban land part of AnB and AnC.	Good to plow depth; fair to depth of 2 feet.	Unsuitable for sand; locally good for gravel.	Fair to good: A-2 to A-6.	Moderate frost heave potential.	Possible pervious layers in substratum.
Alluvial land: Au, Av..... Interpretations not made for Urban, land part of Av.	Poor to unsuitable.	Locally fair to good.	Variable; mostly fair to good.	High water table; hazard of flooding; high frost heave potential.	High water table; hazard of flooding; variable material.
Atkins: Aw.....	Fair to depth of 40 inches.	Unsuitable.....	Fair to good: A-2 to A-6.	High water table; hazard of flooding; high frost heave potential.	High water table; hazard of flooding; possible pervious layer in substratum.

See footnote at end of table.

significant in engineering—Continued

Coarse fragments greater than 3 inches	Percentage passing sieve				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
-----	95-100	90-100	90-100	85-100	<i>Inches per hour</i> 0.6-2.0	<i>Inches per inch of soil</i> 0.18-0.22	<i>pH</i> 4.5-5.5	Low.
-----	95-100	90-100	85-100	75-90	<0.2	0.10-0.14	4.5-5.5	Moderate.
-----	90-100	85-100	70-90	40-75	<0.6	0.10-0.14	4.5-5.5	Low to moderate.
0-10	60-80	60-70	55-65	50-60	2.0-6.0	0.08-0.14	4.0-5.5	Low.
0-20	25-55	20-40	10-35	5-25	2.0-6.0	0.04-0.08	4.0-5.5	Low.
0-20	15-30	10-20	10-20	5-10	>2.0	0.02-0.05	-----	Low.
0-5	85-100	75-95	70-95	60-85	0.6-2.0	0.16-0.20	4.5-5.5	Low.
0-5	80-95	65-85	60-85	55-85	0.6-2.0	0.12-0.18	5.0-6.0	Low to moderate.
5-20	25-55	20-40	15-40	15-30	0.6-2.0	0.06-0.10	5.5-6.5	Low.

² Huntington soils on flood plains are subject to flooding; however, the local alluvium phases, not on flood plains, normally are not flooded.

interpretations

such mapping units may have different properties and limitations, and for this reason it is necessary to follow the directions for referring to the first column of this table]

Soil features affecting—					
Ponds—Continued	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading
Embankments ³					
Fair to good compaction; fair stability and resistance to piping.	Seasonal high water table; moderately slow permeability.	Drainage needed; moderately slow permeability; high available water capacity.	Seasonal high water table; seepage.	High available water capacity; seepage.	Seasonal high water table; hard freezing.
Fair to good compaction; fair stability and resistance to piping.	Seasonal high water table; moderately slow permeability; stoniness.	Drainage needed; moderately slow permeability; high available water capacity; stoniness.	Seasonal high water table; seepage; stoniness.	High available water capacity; seepage; stoniness.	Seasonal high water table; hard freezing.
Good compaction, stability, and resistance to piping.	Drainage not needed.	Features generally favorable.	Features generally favorable.	Features generally favorable.	Features generally favorable.
Variable material-----	High water table; variable material.	Variable material-----	No applicable features.	High water table; hazard of flooding.	High water table; hazard of flooding; hard freezing.
Poor compaction, stability, and resistance to piping.	High water table; moderately slow permeability; hazard of flooding; outlet problems.	Drainage needed; moderately slow permeability; hazard of flooding.	No applicable features.	High water table; hazard of flooding.	High water table; hazard of flooding; hard freezing.

TABLE 6.—Engineering

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil ¹	Sand and gravel	Road fill	Roads, highways, pipelines, cables ²	Ponds
					Reservoir area
Belmont: BeE.....	Poor.....	Unsuitable.....	Poor: A-6 to A-7.	Plastic subsoil; bedrock below depth of 4 feet; moderate frost heave potential; stoniness.	Pervious bedrock below depth of 4 feet; possible sinks and solution channels.
Brooke: BkC3.....	Fair to plow depth.	Unsuitable.....	Poor: A-6 to A-7.	Plastic subsoil; bedrock below depth of 4 feet; moderate frost heave potential.	Pervious bedrock below depth of 4 feet; possible sinks and solution channels.
Buchanan: BuB2, BuC2.....	Fair to plow depth.	Unsuitable for sand; locally fair for gravel.	Fair: A-2 to A-4.	Seasonal high water table; seepage; high frost heave potential.	Possible pervious layer in substratum.
BvC, BvD.....	Poor: stony.....	Unsuitable for sand; locally fair for gravel.	Fair: A-2 to A-4.	Seasonal high water table; seepage; high frost heave potential; stoniness.	Possible pervious layer in substratum.
*Calvin: CaB, CaC, ClB2, ClC2, ClD2, ClE, CnB2, CnC2, CnD2, CnE. For Weikert part of CnB2, CnC2, CnD2, and CnE see Weikert series.	Fair to poor: shaly.	Unsuitable.....	Fair to good: amounts limited; A-2 to A-4.	Bedrock at depth of 2 to 3½ feet; moderate frost heave potential.	Pervious bedrock at depth of 2 to 3½ feet.
Cavode: CoB2, CoC2.....	Fair.....	Unsuitable.....	Poor: A-4 to A-6 or A-7.	Plastic subsoil; seasonal high water table; high frost heave potential.	Bedrock at depth of 3½ to 5 feet.
CrD.....	Poor: stony.....	Unsuitable.....	Poor: A-6 to A-7.	Plastic subsoil; seasonal high water table; high frost heave potential; stoniness.	Bedrock at depth of 3½ to 5 feet.
Chavies: CsA, CsB.....	Good.....	Fair to poor.....	Good: A-2 to A-4.	Features generally favorable. ⁴	Pervious substratum. ⁴
Cookport: CtB2, CtC2.....	Fair.....	Unsuitable.....	Fair to good: A-2 to A-6.	Seasonal high water table; bedrock at depth of 3 to 4 feet; high frost heave potential.	Bedrock at depth of 3 to 4 feet.
CuB, CuD.....	Poor: stony.....	Unsuitable.....	Fair to good: A-2 to A-6.	Seasonal high water table; bedrock at depth of 3 to 4 feet; high frost heave potential; stoniness.	Bedrock at depth of 3 to 4 feet.
Cut and fill land: Cv. Too variable for valid interpretations.					

See footnote at end of table.

interpretations—Continued

Soil features affecting—					
Ponds—Continued	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading
Embankment ³					
Poor compaction and stability; good for cores.	Drainage not needed.	Moderately slow intake and permeability; stoniness.	Possible rock ledges; stoniness.	Possible rock ledges; stoniness.	Poor trafficability; clayey; possible rock ledges.
Poor compaction and stability; good for cores.	Drainage not needed.	Moderately slow intake and permeability.	Possible rock ledges.	Possible rock ledges.	Poor trafficability; clayey; possible rock ledges.
Good compaction; fair stability and resistance to piping.	Seasonal high water table; slow permeability.	Drainage needed; slow permeability; moderate available water capacity.	Seasonal high water table; seepage.	Moderate available water capacity; seepage.	Seasonal high water table; hard freezing.
Good compaction; fair stability and resistance to piping.	Seasonal high water table; slow permeability; stoniness.	Drainage needed; slow permeability; moderate available water capacity; stoniness.	Seasonal high water table; seepage; stoniness.	Moderate available water capacity; seepage; stoniness.	Seasonal high water table; hard freezing.
Good compaction; fair to good stability; amounts of borrow material limited.	Drainage not needed.	Moderately rapid intake and permeability; moderate available water capacity.	Bedrock at depth of 2 to 3½ feet.	Bedrock at depth of 2 to 3½ feet; moderate available water capacity.	Features generally favorable.
Poor compaction and stability; good for cores.	Seasonal high water table; slow permeability.	Drainage needed; slow permeability; high available water capacity.	Seasonal high water table.	High available water capacity.	Poor trafficability; seasonal high water table; hard freezing.
Poor compaction and stability; good for cores.	Seasonal high water table; slow permeability; stoniness.	Drainage needed; slow permeability; high available water capacity; stoniness.	Seasonal high water table; stoniness.	High available water capacity; stoniness.	Poor trafficability; seasonal high water table; hard freezing.
Fair compaction and stability; subject to piping.	Drainage not needed.	Features generally favorable.	Features generally favorable.	Features generally favorable.	Features generally favorable. ⁴
Good compaction; fair stability.	Seasonal high water table; slow permeability.	Drainage needed; slow permeability; moderate available water capacity.	Seasonal high water table; seepage.	Moderate available water capacity; seepage.	Seasonal high water table; hard freezing.
Good compaction; fair stability.	Seasonal high water table; slow permeability; stoniness.	Drainage needed; slow permeability; moderate available water capacity; stoniness.	Seasonal high water table; seepage; stoniness.	Moderate available water capacity; seepage; stoniness.	Seasonal high water table; hard freezing.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil ¹	Sand and gravel	Road fill	Roads, highways, pipelines, cables ²	Ponds
					Reservoir area
Dekalb: DeB2, DeC2, DeD-----	Poor-----	Poor to unsuitable.	Good: A-2 to A-4.	Bedrock at depth of 1½ to 3½ feet.	Pervious substratum; bedrock at depth of 1½ to 3½ feet.
*DkB, DkC, DIE, DIF----- For Lehigh part of DIE and DIF, see Lehigh series.	Poor: stony-----	Poor to unsuitable.	Good: A-2 to A-4.	Bedrock at depth of 1½ to 3½ feet; stoniness.	Pervious substratum; bedrock at depth of 1½ to 3½ feet.
Edom: EdB2, EdC2, EdD2, EdE2, EeE3.	Good to plow depth; poor below.	Unsuitable-----	Poor to fair: A-4 to A-7.	Plastic subsoil; bedrock at depth of 2 to 3½ feet; moderate frost heave potential.	Pervious bedrock at depth of 2 to 3½ feet; possible sinks and solution channels.
Elliber: EIA, EIB2, EIC2, EID-----	Poor: cherty-----	Unsuitable for sand; fair for cherty gravel.	Good: A-1 to A-4.	Bedrock below depth of 4 feet.	Pervious bedrock below depth of 4 feet; possible sinks and solution channels.
EmC, EmD, EmF-----	Poor: cherty; stony.	Unsuitable for sand; fair for cherty gravel.	Good: A-1 to A-4.	Bedrock below depth of 4 feet; stoniness.	Pervious bedrock below depth of 4 feet; possible sinks and solution channels.
*Ernest: ErA, ErB2, ErC2, ErD2, EuB, EuD. For Landisburg part of EuB and EuD, see Landisburg series. Interpretations not made for Urban land part of EuB and EuD.	Fair to plow depth.	Unsuitable-----	Poor to fair: A-4 to A-7.	Seasonal high water table; seepage; high frost heave potential.	Possible pervious layers in substratum.
Gilpin: GIB2, GIC2, GID2, GnB2, GnC2, GnD2, GnE, GuB, GuD. Interpretations not made for Urban land part of GuB and GuD.	Fair to poor where channery.	Unsuitable-----	Fair to good: amounts limited; A-2 to A-6.	Bedrock at depth of 2 to 3½ feet; moderate frost heave potential.	Pervious bedrock at depth of 2 to 3½ feet.
*GsB, GsD, GwF----- For Weikert part of GwF, see Weikert series.	Poor: stony-----	Unsuitable-----	Fair to good: amounts limited; A-2 to A-6.	Bedrock at depth of 2 to 3½ feet; moderate frost heave potential; stoniness.	Pervious bedrock at depth of 2 to 3½ feet.
Gravel pits: Gx. Too variable for valid interpretations.					
Hagerstown: HeC2, HeE2---	Good to plow depth; poor below.	Unsuitable-----	Poor to fair: A-4 to A-7.	Bedrock below depth of 5 feet; possible rock ledges; moderate frost heave potential.	Pervious bedrock below depth of 5 feet; possible sinks and solution channels.

See footnote at end of table.

interpretations—Continued

Soil features affecting—					
Ponds—Continued	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading
Embankments ^a					
Good compaction and stability.	Drainage not needed.	Low available water capacity.	Bedrock at depth of 1½ to 3½ feet.	Bedrock at depth of 1½ to 3½ feet; low available water capacity.	Features generally favorable.
Good compaction and stability.	Drainage not needed.	Low available water capacity; stoniness.	Bedrock at depth of 1½ to 3½ feet; stoniness.	Bedrock at depth of 1½ to 3½ feet; low available water capacity; stoniness.	Features generally favorable.
Poor compaction and stability; good for cores.	Drainage not needed.	Moderate available water capacity	Bedrock at depth of 2 to 3½ feet; possible rock ledges.	Bedrock at depth of 2 to 3½ feet; moderate available water capacity.	Poor trafficability; clayey; possible rock ledges.
Fair compaction stability, and resistance to piping.	Drainage not needed.	Moderate available water capacity.	Possible rock ledges.	Possible rock ledges; moderate available water capacity.	Possible rock ledges.
Fair compaction, stability, and resistance to piping.	Drainage not needed.	Moderate available water capacity; stoniness.	Possible rock ledges; stoniness.	Possible rock ledges; moderate available water capacity; stoniness.	Possible rock ledges.
Fair compaction, stability, and resistance to piping.	Seasonal high water table; moderately slow permeability.	Drainage needed; moderately slow permeability; moderate available water capacity.	Seasonal high water table; seepage.	Moderate available water capacity; seepage.	Seasonal high water table; hard freezing.
Good compaction; fair stability; amounts of borrow material limited.	Drainage not needed.	Moderate available water capacity.	Bedrock at depth of 2 to 3½ feet.	Bedrock at depth of 2 to 3½ feet; moderate available water capacity.	Features generally favorable.
Good compaction; fair stability; amounts of borrow material limited.	Drainage not needed.	Moderate available water capacity; stoniness.	Bedrock at depth of 2 to 3½ feet; stoniness.	Bedrock at depth of 2 to 3½ feet; moderate available water capacity; stoniness.	Features generally favorable.
Poor compaction; fair stability; good for cores.	Drainage not needed.	Features generally favorable.	Possible rock ledges.	Possible rock ledges.	Poor trafficability; possible rock ledges.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil ¹	Sand and gravel	Road fill	Roads, highways, pipelines, cables ²	Ponds
					Reservoir area
Huntington: Hn-----	Good to depth of 2½ feet.	Unsuitable-----	Poor to fair: A-2 to A-6.	Hazard of flooding; moderate frost heave potential.	Hazard of flooding; pervious substratum.
HxA, HxB, HxC-----	Good to depth of 2½ feet.	Unsuitable-----	Poor to fair: A-4 to A-6.	Moderate frost heave potential.	Pervious substratum.
Laidig: LaB2, LaC2, LaD2-----	Poor to fair-----	Unsuitable-----	Good: A-2 to A-4.	Seepage; moderate frost heave potential.	Features generally favorable.
LbC, LbD-----	Poor: stony-----	Unsuitable-----	Good: A-2, A-4.	Seepage; moderate frost heave potential; stoniness.	Features generally favorable.
Landisburg: LdA, LdB2, LdC2, LdD2.	Poor-----	Unsuitable-----	Fair: A-4, A-6.	Seasonal high water table; seepage; high frost heave potential.	Possible pervious layers in substratum.
Leetonia: LgD-----	Poor: stony-----	Fair to good-----	Good: A-1, A-4.	Bedrock at depth of 1½ to 3½ feet; stoniness.	Pervious substratum; bedrock at depth of 1½ to 3½ feet.
Lehew: LhB2, LhC2, LhE-----	Poor-----	Poor to unsuitable.	Good: A-2 to A-4.	Bedrock at depth of 1½ to 3½ feet.	Pervious substratum; bedrock at depth of 1½ to 3½ feet.
LIB, LID-----	Poor: stony-----	Poor to unsuitable.	Good: A-2 to A-4.	Bedrock at depth of 1½ to 3½ feet; stoniness.	Pervious substratum; bedrock at depth of 1½ to 3½ feet.
Lickdale: Lm-----	Fair to plow depth.	Unsuitable-----	Very poor: A-4 to A-7; organic.	High water table; bedrock at depth of 3½ to 6 feet; high frost heave potential.	Possible pervious layer in substratum.
Lindsay: Ln-----	Good to plow depth; fair to depth of 2 feet.	Unsuitable-----	Poor to fair: A-4 to A-7.	Seasonal high water table; hazard of flooding; high frost heave potential.	Flooding-----
Litz: LsB2, LsC2, LsD2, LsE--	Fair to poor: shaly.	Unsuitable-----	Good: amounts limited; A-1 to A-6.	Bedrock at depth of 1½ to 3 feet.	Pervious bedrock at depth of 1½ to 3 feet.
Loysville: LyB-----	Poor-----	Unsuitable-----	Poor to fair: A-4 to A-6.	High water table; high frost heave potential.	Possible sinks and solution channels.

See footnote at end of table.

interpretations—Continued

Soil features affecting—					
Ponds—Continued	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading
Embankments ³					
Fair compaction and stability; subject to piping.	Drainage not needed.	Features generally favorable.	No applicable features.	Features generally favorable.	Hazard of flooding.
Fair compaction and stability; subject to piping.	Drainage not needed.	Features generally favorable.	Features generally favorable.	Features generally favorable.	Features generally favorable.
Good compaction and stability.	Drainage not needed.	Moderately slow permeability.	Seepage-----	Seepage-----	Seepage.
Good compaction and stability.	Drainage not needed.	Moderately slow permeability; stoniness.	Seepage; stoniness---	Seepage; stoniness---	Seepage.
Good compaction; fair stability and resistance to piping.	Seasonal high water table; slow permeability.	Drainage needed; slow permeability; moderate available water capacity.	Seasonal high water table; seepage.	Moderate available water capacity; seepage.	Seasonal high water table; hard freezing.
Good compaction and stability.	Drainage not needed.	Low available water capacity; stoniness.	Bedrock at depth of 1½ to 3½ feet; stoniness.	Bedrock at depth of 1½ to 3½ feet; low available water capacity; stoniness.	Features generally favorable.
Good compaction and stability.	Drainage not needed.	Low available water capacity.	Bedrock at depth of 1½ to 3½ feet.	Bedrock at depth of 1½ to 3½ feet; low available water capacity.	Features generally favorable.
Good compaction and stability.	Drainage not needed.	Low available water capacity; stoniness.	Bedrock at depth of 1½ to 3½ feet; stoniness.	Bedrock at depth of 1½ to 3½ feet; low available water capacity; stoniness.	Features generally favorable.
Poor compaction and stability.	High water table; slow permeability.	Drainage needed; slow permeability; high available water capacity.	High water table----	High water table----	Poor trafficability; high water table; hard freezing.
Poor to fair compaction, stability, and resistance to piping.	Seasonal high water table; moderately slow permeability; hazard of flooding.	Drainage needed; moderately slow permeability; hazard of flooding.	No applicable features.	Flooding-----	Seasonal high water table; hazard of flooding; hard freezing.
Good compaction; fair stability; amounts of borrow material limited.	Drainage not needed.	Low available water capacity.	Bedrock at depth of 1½ to 3 feet.	Bedrock at depth of 1½ to 3 feet; low available water capacity.	Features generally favorable.
Fair compaction and stability.	High water table; slow permeability.	Drainage needed; slow permeability; moderate available water capacity.	High water table; seepage.	Moderate available water capacity; seepage.	High water table; hard freezing.

TABLE 6.—Engineering

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil ¹	Sand and gravel	Road fill	Roads, highways, pipelines, cables ²	Ponds
					Reservoir area
Meckesville: McB2, McC2, McD2-----	Good to plow depth; fair to depth of 2½ feet.	Unsuitable-----	Fair to good: A-2 to A-6.	Seepage; moderate frost heave potential.	Features generally favorable.
MdC, MdD-----	Poor: stony-----	Unsuitable-----	Fair to good: A-2 to A-6.	Seepage; moderate frost heave potential; stoniness.	Features generally favorable.
Melvin: Me-----	Good to plow depth; fair below.	Unsuitable-----	Poor to fair: A-4 to A-6.	High water table; hazard of flooding; high frost heave potential.	High water table; hazard of flooding; possible pervious layers in substratum.
Monongahela: MhA, MhB2, MhC2.	Good to plow depth.	Unsuitable-----	Poor to fair: A-4 to A-6.	Seasonal high water table; seepage; high frost heave potential.	Possible pervious layer in substratum.
Nolo: NoA, NoB, NoC2-----	Fair to plow depth.	Unsuitable-----	Poor to fair: A-2 to A-6.	High water table; bedrock at depth of 3½ to 6 feet; high frost heave potential.	Possible pervious layer in substratum.
NsC-----	Poor-----	Unsuitable-----	Poor to fair: A-2 to A-6.	High water table; bedrock at depth of 3½ to 6 feet; high frost heave potential; stoniness.	Possible pervious layer in substratum.
Opequon: OpB2, OpC2, OpD2, OpE2.	Fair-----	Unsuitable-----	Poor: plastic; amounts limited; A-6 to A-7.	Plastic subsoil; bedrock at depth of 1 to 1½ feet; moderate frost heave potential.	Pervious bedrock at depth of 1 to 1½ feet; sinks and solution channels.
OuD, OuE-----	Poor: stony-----	Unsuitable-----	Poor: amounts limited; A-6 to A-7.	Plastic subsoil; bedrock at depth of 1 to 1½ feet; moderate frost heave potential; stoniness.	Pervious bedrock at depth of 1 to 1½ feet; sinks and solution channels.
Philo: Ph-----	Good to plow depth; fair below.	Poor to unsuitable.	Fair to good: A-2 to A-4.	Seasonal high water table; hazard of flooding; high frost heave potential.	Hazard of flooding; possible pervious layers in substratum.
Pope: Pn, Ps-----	Good to depth of 3½ feet.	Poor-----	Fair to good: A-2 to A-4.	Hazard of flooding; moderate frost heave potential.	Hazard of flooding; pervious substratum.
Robertsville: RbB-----	Fair to plow depth.	Unsuitable-----	Poor: A-4 to A-7.	High water table; high frost heave potential.	Features generally favorable.

See footnote at end of table.

interpretations—Continued

Soil features affecting—					
Ponds—Continued	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading
Embankments ³					
Fair to good compaction and stability; hazard of piping.	Drainage not needed.	Moderately slow permeability.	Seepage-----	Seepage-----	Seepage.
Fair to good compaction and stability; hazard of piping.	Drainage not needed.	Moderately slow permeability; stoniness.	Seepage; stoniness---	Seepage; stoniness---	Seepage.
Poor compaction, stability, and resistance to piping.	High water table; moderately slow permeability; hazard of flooding; outlet problems.	Drainage needed; moderately slow permeability; hazard of flooding.	No applicable features.	High water table; hazard of flooding.	High water table; hazard of flooding; hard freezing.
Fair compaction and stability; hazard of piping.	Seasonal high water table; slow permeability.	Drainage needed; slow permeability; moderate available water capacity.	Seasonal high water table; seepage.	Moderate available water capacity; seepage.	Seasonal high water table; hard freezing.
Poor to fair compaction, stability, and resistance to piping.	High water table; slow permeability.	Drainage needed; slow permeability; moderate available water capacity.	High water table; seepage.	Moderate available water capacity; seepage.	Poor trafficability; high water table; hard freezing.
Poor to fair compaction, stability, and resistance to piping.	High water table; slow permeability; stoniness.	Drainage needed; slow permeability; moderate available water capacity; stoniness.	High water table; seepage; stoniness.	Moderate available water capacity; seepage; stoniness.	Poor trafficability; high water table; hard freezing.
Poor compaction and stability; good for cores; amounts of borrow material limited.	Drainage not needed.	Low available water capacity.	Probable rock ledges; flaggy.	Probable rock ledges; flaggy.	Probable rock ledges; bedrock at depth of 1 to 1½ feet; clayey.
Poor compaction and stability; good for cores; amounts of borrow material limited.	Drainage not needed.	Low available water capacity; stoniness.	Probable rock ledges; flaggy; stoniness.	Probable rock ledges; flaggy; stoniness.	Probable rock ledges; bedrock at depth of 1 to 1½ feet; clayey.
Poor to fair compaction, stability, and resistance to piping.	Seasonal high water table; moderately slow permeability; hazard of flooding.	Drainage needed; moderately slow permeability; hazard of flooding.	No applicable features.	Hazard of flooding---	Seasonal high water table; hazard of flooding; hard freezing.
Fair compaction and stability; subject to piping.	Drainage not needed.	Features generally favorable.	No applicable features.	Features generally favorable.	Hazard of flooding.
Poor to fair compaction, stability, and resistance to piping.	High water table; slow permeability.	Drainage needed; slow permeability; moderate available water capacity.	High water table; seepage.	Moderate available water capacity; seepage.	Poor trafficability; high water table; hard freezing.

TABLE 6.—Engineering

Soil series and map symbols	Suitability as source of—			Soil features affecting—	
	Topsoil ¹	Sand and gravel	Road fill	Roads, highways, pipelines, cables ²	Ponds
					Reservoir area
Rock outcrop: Rc. Too variable for valid interpretations.					
Shelocta: ShB2, ShC2, ShD2	Fair: shaly-----	Unsuitable-----	Fair to good: A-1 to A-6.	Moderate frost heave potential.	Bedrock below depth of 4 feet.
Stony land: SrC, SrF. Too variable for valid interpretations.					
Strip mines and Dumps: St. Too variable for valid interpretations.					
Tyler: TyA, TyB-----	Fair to plow depth.	Unsuitable-----	Poor: A-4 to A-7.	Seasonal high water table; seepage; high frost heave potential.	Features generally favorable.
*Weikert: WeB2, WeC2, WeE, WIB, WIC, WIE, WnF. Interpretations not made for Urban land part of WIB, WIC, and WIE. For Gilpin part of WnF, see Gilpin series.	Poor-----	Unsuitable-----	Good: amounts limited; A-1 to A-4.	Bedrock at depth of 1 to 1½ feet.	Pervious bedrock at depth of 1 to 1½ feet.
WkD-----	Poor: stony-----	Unsuitable-----	Good: amounts limited; A-1 to A-4.	Bedrock at depth of 1 to 1½ feet; stoniness.	Pervious bedrock at depth of 1 to 1½ feet.
Westmoreland: WsB2, WsC2, WsD2, WsE.	Good to depth of 1 foot.	Unsuitable-----	Poor to fair: A-2 to A-6.	Bedrock at depth of 3½ to 6 feet; subject to land slips; moderate frost heave potential.	Pervious bedrock at depth of 3½ to 6 feet; sinks and solution channels.

¹ Severely eroded soils are very poor to unsuitable for topsoil. Plow depth in this column refers to approximately 6 to 10 inches of the surface layer.

² Frost heave potential in this column applies only to roads and highways; it is not an important factor for buried pipelines and underground cables. On all sloping soils, cuts and fills are needed in some degree, and are not referred to in this table.

The ease or difficulty with which a soil can be drained artificially is determined mainly by the least permeable layer and by the height and fluctuation of the water table. Stoniness in wet soils also hinders the installation of ditches and tile systems.

Features that affect the design of a sprinkler irrigation system are the rate at which water can move into and through the soil, capacity of the soil to retain moisture, and need of the soil for drainage improvement. Other features that can affect irrigation are stoniness and the hazard of flooding.

In planning and designing terraces and diversions, the features of special concern are height of the water table, seepage, stoniness and the presence of rock ledges, and depth to and kind of bedrock.

The features in the foregoing paragraph and, also, the water-holding capacity of the soil and the hazard of flooding strongly affect the design of constructed grassed waterways and the kinds of vegetation needed for stabilizing them.

Winter grading is affected by wetness and depth and severity of freezing, and by the trafficability of the soil, or the ease or difficulty of moving grading equipment over the surface. Grading in any season is influenced by the depth to and kind of bedrock and by the presence of rock ledges.

Again it is emphasized that the interpretations in table 6 are not a substitute for onsite investigation. They are intended as a guide to what can be reasonably expected within any delineation on the soil map.

interpretations—Continued

Soil features affecting—					
Ponds—Continued	Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading
Embankments ³					
Good compaction; fair to good stability.	Drainage not needed.	Features generally favorable.	Features generally favorable.	Features generally favorable.	Features generally favorable.
Poor to fair compaction, stability, and resistance to piping.	Seasonal high water table; slow permeability.	Drainage needed; slow permeability; moderate available water capacity.	Seasonal high water table; seepage.	Moderate available water capacity; seepage.	Seasonal high water table; hard freezing.
Fair to good compaction and stability; amounts of borrow material limited.	Drainage not needed.	Moderately rapid intake and permeability; low available water capacity.	Bedrock at depth of 1 to 1½ feet.	Bedrock at depth of 1 to 1½ feet; low available water capacity.	Rippable bedrock at depth of 1 to 1½ feet; other features generally favorable.
Fair to good compaction and stability; amounts of borrow material limited.	Drainage not needed.	Moderately rapid intake and permeability; low available water capacity; stoniness.	Bedrock at depth of 1 to 1½ feet; stoniness.	Bedrock at depth of 1 to 1½ feet; low available water capacity; stoniness.	Rippable bedrock at depth of 1 to 1½ feet; other features generally favorable.
Fair compaction, stability, and resistance to piping.	Drainage not needed.	Features generally favorable.	Subject to land slips.	Features generally favorable.	Features generally favorable.

³ Includes earthen dams, dikes, and levees.

⁴ Chavies soils are on second bottoms or low alluvial terraces, and thus are subject to flooding at long, unpredictable intervals.

Town and Country Planning

Except for Cumberland and a few other communities, Allegany County is still largely a rural area. Residential and other nonfarm uses of the land are on the increase, however, and these increases will probably continue.

Accompanying the spread of residential, commercial, and industrial development is a growing need for information about soil conditions that affect nonfarm uses. The most common need is for information about limitations of soils for disposing of sewage effluent from septic tanks. Also important is information about soil conditions affecting building foundations, streets and parking lots, and some kinds of outdoor recreation.

Table 7 shows limitations of the soils of the county for selected nonfarm uses, and table 8 has limitations for specified recreational uses. In these tables the limitations for each soil of the county are rated as *slight*, *moderate*, or *severe*, according to the degree to which the soil is limited for a specific use.

The ratings are based on the degree of the greatest limitation. For example, steep slope or shallow depth to bedrock severely limits the use of a soil that might otherwise be only slightly or moderately limited for the same use by some other factor, such as stoniness or seasonal wetness.

Also, the limitation of a soil property can have different effects for different uses. For example, of the uses listed in table 7, slow permeability severely limits a soil for filter fields but imposes no limitation, and in

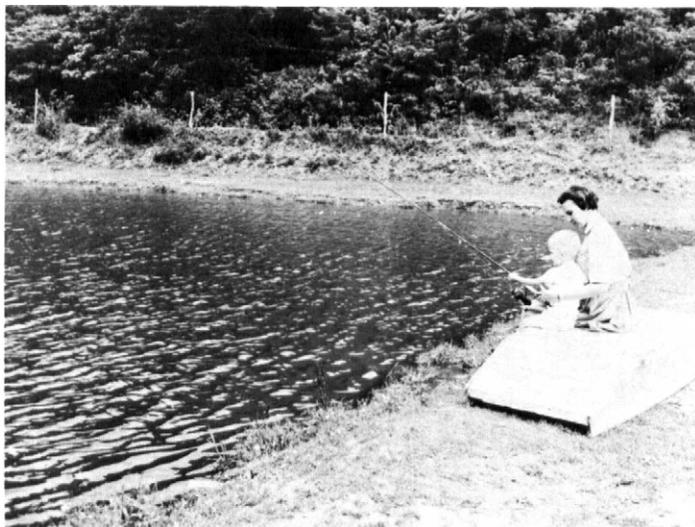


Figure 19.—Impounded pond on Ernest silt loam, near Flintstone, supplied mostly by runoff from surrounding areas.

fact is a desirable characteristics, for sewage lagoons. Of the uses listed in tables 7 and 8, slope most strongly affects streets and parking lots, and playgrounds, and least strongly affects paths and trails.

A rating of slight may indicate that a soil has no limitation at all, although most soils are at least slightly limited in use.

A rating of moderate means that the limitation can be tolerated or can be corrected in a practical or economical way. For example, a moderate limitation for lawns and landscaping because of a seasonal high water table, as on Tyler silt loam, though not desirable, can be tolerated. Or again, a moderate limitation for playgrounds because of slope can be overcome or eliminated by land leveling operations.

A rating of severe for a particular use does not necessarily mean that a soil so rated cannot be put to that use. For example, a soil having a high water table can be severely limited in its use for cemeteries and still be used for them if measures are taken to improve drainage and to lower the water table. Likewise, a soil that is shallow to bedrock can be used as a site for a home with a basement, if the expense can be justified.

Following are the chief properties that limit the soils of the county in their suitability for each non-farm use shown in table 7.

Filter fields for sewage disposal are affected by permeability of the soil, depth to a seasonal high water table, depth to bedrock, slope, and the hazard of flooding.

Lagoons for sewage disposal are affected by soil permeability, depth to bedrock, slope, and the hazard of flooding.

Sites for homes of three stories or less are affected by depth to water table, depth to bedrock (assuming a 5-foot excavation if there is to be a basement), kind or hardness of bedrock, stoniness, slope, and the hazard of flooding. Depths to water table and to bedrock will be less critical for homes without basements than for

those with basements. Foundation conditions should always be investigated at each site.

Streets and parking lots are affected by wetness and depth to water table, depth to and kind of bedrock, slope, and the hazard of flooding.

Landfill areas are affected by depth to water table, depth to hard bedrock, stoniness, permeability, slope, and the hazard of flooding.

Recreation

Following are the main properties that limit the soils of the county in their suitability for each recreational use listed in table 8.

Lawns, fairways, and landscaping are affected by slope, stoniness, depth to water table and to bedrock, surface soil texture, degree of erosion, slope, and the hazard of flooding.

Camp areas are affected by depth to water table, soil permeability, surface soil texture, slope, stoniness, and the hazard of flooding.

Playgrounds are affected by depth to water table, soil permeability, surface soil texture, depth to bedrock, slope, stoniness, and the hazard of flooding.

Picnic areas and paths and trails are affected by depth to water table, slope, surface soil texture, stoniness, and the hazard of flooding.

Formation and Classification of the Soils

This section consists of three parts. In the first part the factors of soil formation are discussed as they relate to the soils of Allegany County. In the second part the morphology or anatomy of soils is explained. In the third part each soil series in the county is placed in its respective family, subgroup, and order of the current system for classifying soils (6) and also in the appropriate great soil group and order of the classification system established in 1938 (2).

Factors of Soil Formation

Soils are the products of soil-forming processes acting upon material deposited or altered by geologic forces. The five major factors in the formation of soils are climate, living organisms, parent material, relief, and time. Climate and living organisms, particularly vegetation, are the active forces. Their effect on parent material is modified by relief and by the length of time the parent material has been in place. The relative importance of each factor varies from place to place. In some places one factor is dominant and most effective in fixing the properties of the soil. Generally, however, interaction of all five factors determines the kind of soil that develops in any given place.

Climate

Climate is important in the formation of soils mostly because it influences the weathering of rocks and minerals. Such weathering is more rapid in a warm, humid climate than in a cold or dry one. In addition, the kinds and abundance of vegetation in an

area are influenced by the amount and distribution of precipitation and by the length of the growing season. Precipitation also affects the translocation and leaching of some products of weathering. Hard rains, frequent showers, and rapid melting of snow and ice can cause excessive erosion.

Allegheny County has a temperate, continental type of climate that ranges from humid to subhumid. The western part of the county receives about 25 percent more annual precipitation than the eastern part, and it has a lower average annual temperature. These differences, however, do not affect the kinds of soils, at least at the order level, as much as they affect the degree of development of some soils. In general, all the soils of the county are strongly weathered, and most of them are leached, acid, and comparatively low in natural content of plant nutrients. The only soils that have a greater natural supply of nutrients are those that developed in parent material exceptionally high in content of such basic elements as calcium. Thus, it is not simply a coincidence that most of the high-lime soils in the county are in the area that has the least average annual precipitation. Climate data for the county is given in greater detail in the section "Climate."

Living organisms

Plants are a major influence on the development of soils. In Allegheny County the native vegetation is mostly hardwood forests and some local conifers.

Most hardwoods use a large amount of calcium and other bases if these elements are available. Hardwood trees and other plants take up minerals from the soil and store them in their roots, stems, and leaves. When deciduous trees shed their leaves or when plants die and decay, the plant nutrients are returned to the soil and are used by other plants. If undisturbed, this cycle is continuous.

Soil development is also affected by plant roots that penetrate soil material to various depths, generally increase porosity, and in places, break coarse fragments such as stones or even fracture the surface of bedrock. Organic acids produced by plants and their decay react on basic minerals in the parent material. Minerals taken into solution or suspension can be absorbed by plants, translocated within the soil, or leached entirely out of the soil.

Insects, worms, rodents, and other burrowing animals contribute to soil formation. Except for the actions of man, however, there is little evidence that animals have caused important differences in the soils of the county. Man has cleared forests, introduced new plants, and drained and cultivated soils. Such use has accelerated loss of soil through erosion, and it has thinned or otherwise changed some soils. Material washed from uplands has been deposited in depressions and on flood plains where it has become the parent material of certain young or immature soils.

Parent material

The soils of Allegheny County formed in two general kinds of parent material. By far the most extensive of these is residuum derived from the weathering of

rocks in place. The other kind is fine material and rock fragments transported and deposited by water, wind, and gravity.

Material weathered in place is from several kinds of sedimentary rocks. Dekalb, Cookport, Leetonia, Lehigh, Lickdale, and Nolo soils formed in residuum derived mainly from sandstone. Calvin, Cavode, Gilpin, Litz, Shelocta, and Weikert soils formed in residuum derived from shale and from shale and sandstone in places. Belmont, Brooke, EDOM, Elliber, Hagerstown, Opequon, and Westmoreland soils formed in residuum derived from limestone of different degrees of purity.

Transported material has formed the basis for the other soils of the county. Atkins, Huntington, Lindsides, Melvin, Philo, and Pope soils are on recent alluvium. Allegheny, Chavies, Monongahela, Tyler, and Robertsville soils are an older alluvium. Albrights, Buchanan, Ernest, Laidig, and Meckesville soils are on acid colluvium, and Landisburg and Loysville soils are on nonacid colluvium. Local alluvium is the basic source for some of the Huntington soils and has influenced the surface horizon of the Lickdale soils.

Relief

The soils of Allegheny County range from nearly level to very steep. Differences in slope, especially when combined with differences in position on the landscape, can have a significant influence on the kind of soil that develops from a given parent material. This influence can be illustrated by comparing different soils that formed mainly in residuum derived from hard acid sandstone. The Dekalb and Leetonia soils are only moderately deep and are well drained, and most of them are very stony. They formed in areas where the landscape is mostly strongly sloping to steep. The Cookport soils are less strongly sloping than the Dekalb soils, and they are only moderately well drained. The Nolo soils are mostly gently sloping and are poorly drained, while the Lickdale soils are nearly level and are very poorly drained.

Time

The parent material of the soils in Allegheny County ranges from very young to very old. The youngest parent material is the alluvium deposited on flood plains during our present, or Holocene, geologic epoch. These deposits can receive new material annually from floodwaters. Somewhat older material is on terraces along some of the major streams. This material was deposited during the Pleistocene epoch. Deposits of colluvium are mostly Pleistocene or older. Weathered bedrock in which residual soils formed is much older than Pleistocene.

Soils that formed in the same kind of parent material but in areas of different relief do not necessarily mature in the same length of time. In some steep areas, for example, only very weak horizons have had time to develop, partly because soil has been removed by natural erosion almost as rapidly as it has formed. In less sloping areas, and on the same kind of parent material, there has been time for stronger horizonation of soils because of less loss by natural erosion.

TABLE 7.—Soil limitations for

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Albrights: AbB-----	Severe: seasonal perched water table; moderately slow permeability.	Slight to moderate: slope-----
AbC2-----	Severe: seasonal perched water table; moderately slow permeability; slope.	Severe: slope-----
AgD-----	Severe: seasonal perched water table; moderately slow permeability; slope.	Moderate to severe: slope-----
Allegheny: AhA, AIA-----	Slight ¹ -----	Moderate: moderate permeability ¹ -----
AhB2, AIB2-----	Slight ¹ -----	Moderate: moderate permeability; slope ¹ -----
AhC2, AIC2-----	Moderate: slope ¹ -----	Severe: slope ¹ -----
AID-----	Severe: slope ¹ -----	Severe: slope ¹ -----
AnB-----	Slight ¹ -----	Moderate: moderate permeability; slope ¹ -----
Interpretations not made for Urban land part.		
AnC-----	Moderate to severe: slope ¹ -----	Severe: slope ¹ -----
Interpretations not made for Urban land part.		
Alluvial land: Au, Av-----	Severe: high water table; hazard of flooding. ¹	Severe: hazard of flooding ¹ -----
Interpretations not made for Urban land part of Av.		
Atkins: Aw-----	Severe: high water table; moderately slow permeability; hazard of flooding. ¹	Severe: hazard of flooding ¹ -----
Belmont: BeE-----	Severe: slope ² -----	Severe: slope ² -----
Brooke: BkC3-----	Severe: slow permeability ² -----	Severe: slope ² -----
Buchanan: BuB2-----	Severe: seasonal perched water table; slow permeability.	Slight to moderate: slope-----
BuC2-----	Severe: seasonal perched water table; slow permeability; slope.	Severe: slope-----
BvC-----	Severe: seasonal perched water table; slow permeability; slope.	Slight to severe: slope-----
BvD-----	Severe: seasonal perched water table; slow permeability; slope.	Severe: slope-----
Calvin: CaB, CIB2-----	Severe: bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet; moderately rapid permeability.
CaC, CIC2-----	Severe: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; moderately rapid permeability; slope.
CID2-----	Severe: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; moderately rapid permeability; slope.
CIE-----	Severe: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; moderately rapid permeability; slope.
Calvin-Weikert: CnB2-----	Severe: bedrock at depth of 1 to 3½ feet.	Severe: bedrock at depth of 1 to 3½ feet; moderately rapid permeability.
CnC2-----	Severe: bedrock at depth of 1 to 3½ feet; slope.	Severe: bedrock at depth of 1 to 3½ feet; moderately rapid permeability; slope.
CnD2-----	Severe: bedrock at depth of 1 to 3½ feet; slope.	Severe: bedrock at depth of 1 to 3½ feet; moderately rapid permeability; slope.
CnE-----	Severe: bedrock at depth of 1 to 3½ feet; slope.	Severe: bedrock at depth of 1 to 3½ feet; moderately rapid permeability; slope.
Cavode: CoB2-----	Severe: seasonal high water table; slow permeability.	Slight to moderate: slope-----
CoC2-----	Severe: seasonal high water table; slow permeability; slope.	Severe: slope-----

See footnote at end of table.

town and country planning

Sites for homes (three stories or less)		Streets and parking lots	Landfill
With basements	Without basements		
Moderate: seasonal perched water table. Moderate: seasonal perched water table; slope. Moderate to severe: seasonal perched water table; stoniness; slope.	Slight..... Moderate: slope..... Moderate to severe: stoniness; slope.	Moderate: seasonal perched water table; slope. Severe: slope; seasonal perched water table. Moderate to severe: seasonal perched water table; slope.	Moderate: seasonal perched water table; clayey subsoil. Moderate: seasonal perched water table; clayey subsoil. Moderate: seasonal perched water table; stoniness; slope; clayey subsoil.
Slight..... Slight..... Moderate: slope..... Severe: slope..... Slight.....	Slight..... Slight..... Moderate: slope..... Severe: slope..... Slight.....	Slight..... Moderate: slope..... Severe: slope..... Severe: slope..... Slight to moderate: slope.....	Slight. ¹ Slight. ¹ Slight. ¹ Moderate to severe: slope. ¹ Slight. ¹
Moderate to severe: slope.....	Moderate to severe: slope.....	Severe: slope.....	Slight. ¹
Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding. ¹
Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding. ¹
Severe: slope; stoniness.....	Severe: slope.....	Severe: slope.....	Severe: clayey subsoil; slope; stoniness. ²
Moderate: slope.....	Moderate: slope.....	Severe: slope.....	Moderate to severe: clayey subsoil; bedrock at depth of 4 to 8 feet. ²
Moderate: seasonal perched water table. Moderate: seasonal perched water table; slope. Moderate: seasonal perched water table; stoniness; slope. Severe: seasonal perched water table; slope.	Slight..... Moderate: slope..... Moderate: stoniness; slope..... Severe: slope.....	Moderate: seasonal perched water table; slope. Severe: slope; seasonal perched water table. Moderate to severe: seasonal perched water table; slope. Severe: slope; seasonal perched water table.	Moderate: seasonal perched water table. Moderate: seasonal perched water table. Moderate: seasonal perched water table; stoniness. Moderate: seasonal perched water table; stoniness; slope.
Moderate: bedrock at depth of 2 to 3½ feet. Moderate to severe: bedrock at depth of 2 to 3½ feet; slope. Severe: slope.....	Slight..... Moderate to severe: slope..... Severe: slope.....	Moderate: bedrock at depth of 2 to 3½ feet; slope. Severe: slope; bedrock at depth of 2 to 3½ feet. Severe: slope; bedrock at depth of 2 to 3½ feet. Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet. Severe: bedrock at depth of 2 to 3½ feet. Severe: bedrock at depth of 2 to 3½ feet; slope. Severe: bedrock at depth of 2 to 3½ feet; slope.
Moderate: bedrock at depth of 1 to 3½ feet. Moderate to severe: bedrock at depth of 1 to 3½ feet; slope. Severe: slope.....	Slight..... Moderate to severe: slope..... Severe: slope.....	Moderate: bedrock at depth of 1 to 3½ feet; slope. Severe: slope; bedrock at depth of 1 to 3½ feet. Severe: slope; bedrock at depth of 1 to 3½ feet. Severe: slope; bedrock at depth of 1 to 3½ feet.	Severe: bedrock at depth of 1 to 3½ feet. Severe: bedrock at depth of 1 to 3½ feet. Severe: bedrock at depth of 2 to 3½ feet; slope. Severe: bedrock at depth of 1 to 3½ feet; slope.
Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 1 to 3½ feet. Severe: bedrock at depth of 1 to 3½ feet. Severe: bedrock at depth of 2 to 3½ feet; slope. Severe: bedrock at depth of 1 to 3½ feet; slope.
Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Severe: seasonal high water table; bedrock at depth of 3½ to 5 feet; clayey and plastic.
Severe: seasonal high water table; slope.	Moderate to severe: seasonal high water table; slope.	Severe: slope; seasonal high water table.	Severe: seasonal high water table; bedrock at depth of 3½ to 5 feet; clayey and plastic.

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Cavode—Con. CrD-----	Severe: seasonal high water table; slow permeability; slope.	Slight to severe: slope-----
Chavies: CsA-----	Slight ¹ -----	Severe: moderately rapid permeability ¹ ---
CsB-----	Slight ¹ -----	Severe: moderately rapid permeability ¹ ---
Cookport: CtB2-----	Severe: slow permeability; seasonal perched water table.	Moderate: bedrock at depth of 3 to 4 feet; slope.
CtC2-----	Severe: slow permeability; slope; seasonal perched water table.	Severe: slope; bedrock at depth of 3 to 4 feet.
CuB-----	Severe: slow permeability; seasonal perched water table.	Moderate: bedrock at depth of 3 to 4 feet; slope.
CuD-----	Severe: slow permeability; slope; seasonal perched water table.	Severe: slope; bedrock at depth of 3 to 4 feet.
Cut and fill land: Cv. Too variable for valid interpretations.		
Dekalb: DeB2-----	Severe: bedrock at depth of 1½ to 3½ feet.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet.
DeC2-----	Severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet; slope.
DeD-----	Severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet; slope
DkB-----	Severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet.
DkC-----	Severe: 1½ to 3½ feet to bedrock; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet; slope.
Dekalb and Lehw: DIE, DIF-----	Severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet; slope.
Edom: EbB2-----	Severe: bedrock at depth of 2 to 3½ feet; slope. ²	Severe: bedrock at depth of 2 to 3½ feet. ²
EdC2-----	Severe: bedrock at depth of 2 to 3½ feet. ²	Severe: bedrock at depth of 2 to 3½ feet; slope. ²
EdD2, EdE2, EeE3-----	Severe: bedrock at depth of 2 to 3½ feet; slope. ²	Severe: bedrock at depth of 2 to 3½ feet; slope. ²
Elliber: EiA-----	Slight ² -----	Severe: moderately rapid permeability ² ---
EiB2-----	Slight to moderate: slope ² -----	Severe: moderately rapid permeability; slope. ²
EiC2-----	Moderate to severe: slope ² -----	Severe: moderately rapid permeability; slope. ²

See footnote at end of table.

town and country planning—Continued

Sites for homes (three stories or less)		Streets and parking lots	Landfill
With basements	Without basements		
Severe: seasonal high water table; slope.	Moderate to severe: seasonal high water table; stoniness; slope.	Moderate to severe: seasonal high water table; slope.	Severe: seasonal high water table; bedrock at depth of 3½ to 5 feet; stoniness; clayey and plastic.
Slight.....	Slight.....	Slight.....	Severe: moderately rapid permeability. ¹
Slight.....	Slight.....	Moderate: slope.....	Severe: moderately rapid permeability. ¹
Moderate: bedrock at depth of 3 to 4 feet; seasonal perched water table.	Slight.....	Moderate: seasonal perched water table; bedrock at depth of 3 to 4 feet; slope.	Severe: seasonal perched water table; bedrock at depth of 3 to 4 feet; clayey and plastic.
Moderate to severe: perched water table; bedrock at depth of 3 to 4 feet; slope.	Moderate to severe: slope.....	Severe: slope; seasonal perched water table; bedrock at depth of 3 to 4 feet.	Severe: seasonal perched water table; bedrock at depth of 3 to 4 feet; clayey and plastic.
Moderate: seasonal perched water table; bedrock at depth of 3 to 4 feet; stoniness; slope.	Moderate: stoniness; slope.....	Moderate: seasonal perched water table; bedrock at depth of 3 to 4 feet; slope.	Severe: seasonal perched water table; bedrock at depth of 3 to 4 feet; stoniness; clayey and plastic.
Moderate to severe: seasonal perched water table; bedrock at depth of 3 to 4 feet; stoniness; slope.	Moderate to severe: stoniness; slope.	Severe: slope; seasonal perched water table; bedrock at depth of 3 to 4 feet.	Severe: seasonal perched water table; bedrock at depth of 3 to 4 feet; stoniness; slope; clayey and plastic.
Moderate: bedrock at depth of 1½ to 3½ feet; slope.	Slight to moderate: slope.....	Moderate to severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: bedrock at depth of 1½ to 3½ feet; moderately rapid permeability.
Moderate to severe: bedrock at depth of 1½ to 3½ feet; slope.	Moderate to severe: slope.....	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: bedrock at depth of 1½ to 3½ feet; moderately rapid permeability.
Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: slope.....	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: bedrock at depth of 1½ to 3½ feet; slope; moderately rapid permeability.
Moderate: bedrock at depth of 1½ to 3½ feet; stoniness; slope.	Moderate: stoniness; slope.....	Moderate to severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: bedrock at depth of 1½ to 3½ feet; stoniness; moderately rapid permeability.
Moderate to severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope.	Moderate to severe: stoniness; slope.	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: bedrock at depth of 1½ to 3½ feet; stoniness; moderately rapid permeability.
Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope; moderately rapid permeability.
Moderate: bedrock at depth of 2 to 3½ feet.	Slight.....	Moderate: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet. ²
Moderate: bedrock at depth of 2 to 3½ feet; slope.	Moderate: slope.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet; clayey and plastic. ²
Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet; slope; clayey and plastic. ²
Slight.....	Slight.....	Slight to moderate: slope.....	Slight to severe: bedrock at depth of 4 to 30 feet. ²
Slight to moderate: slope.....	Slight to moderate: slope.....	Moderate to severe: slope.....	Slight to severe: bedrock at depth of 4 to 30 feet; slope. ²
Moderate to severe: slope.....	Moderate to severe: slope.....	Severe: slope.....	Slight to severe: bedrock at depth of 4 to 30 feet; slope; stoniness. ²

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Elliber—Con.		
EID.....	Severe: slope ²	Severe: moderately rapid permeability; slope. ²
EmC.....	Slight to severe: slope ²	Severe: moderately rapid permeability; slope. ²
EmD, EmF.....	Severe: slope ²	Severe: moderately rapid permeability; slope. ²
Ernest:		
ErA.....	Severe: moderately slow permeability; seasonal perched water table.	Slight.....
ErB ₂	Severe: moderately slow permeability; seasonal perched water table.	Moderate: slope.....
ErC ₂	Severe: moderately slow permeability; seasonal perched water table; slope.	Severe: slope.....
ErD ₂	Severe: moderately slow permeability; slope; seasonal perched water table.	Severe: slope.....
Ernest-Landisburg-Urban land:		
EuB..... Interpretations not made for Urban land part.	Severe: moderately slow to slow permeability; seasonal perched water table.	Slight to moderate: slope.....
EuD..... Interpretations not made for Urban land part.	Severe: moderately slow to slow permeability; slope; seasonal perched water table.	Severe: slope.....
Gilpin:		
GIB ₂ , GnB ₂ , GuB..... Interpretations not made for Urban land part of GuB.	Severe: bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet.
GIC ₂ , GnC ₂	Severe: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; slope.
GID ₂ , GnD ₂	Severe: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; slope.
GnE.....	Severe: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; slope.
GsB.....	Severe: bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet.
GsD.....	Severe: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; slope.
GuD..... Interpretations not made for Urban land part.	Severe: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; slope.
Gilpin and Weikert: GwF.....	Severe: bedrock at depth of 1 to 3½ feet; slope.	Severe: bedrock at depth of 1 to 3½ feet; slope.
Gravel pits: Gx. Too variable for valid interpretations.		
Hagerstown:		
HeC ₂	Moderate to severe: slope ²	Severe: slope ²
HeE ₂	Severe: slope ²	Severe: slope ²
Huntington:		
Hn.....	Severe: hazard of flooding ¹	Severe: moderate permeability; hazard of flooding. ¹
HxA.....	Slight.....	Moderate: moderate permeability.....
HxB.....	Slight.....	Moderate: moderate permeability; slope.....
HxC.....	Moderate: slope.....	Severe: slope.....
Laidig:		
LaB ₂	Severe: moderately slow permeability.....	Moderate: high gravel content; slope.....
LaC ₂	Severe: moderately slow permeability.....	Severe: slope; high gravel content.....
LaD ₂	Severe: moderately slow permeability; slope.	Severe: slope; high gravel content.....
LbC.....	Severe: moderately slow permeability.....	Moderate to severe: high gravel content; slope.
LbD.....	Severe: moderately slow permeability; slope.	Severe: slope; high gravel content.....

See footnote at end of table.

town and country planning—Continued

Sites for homes (three stories or less)		Streets and parking lots	Landfill
With basements	Without basements		
Severe: slope.....	Severe: slope.....	Severe: slope.....	Severe: slope; bedrock at depth of 4 to 30 feet. ²
Moderate to severe: stoniness; slope.	Moderate to severe: stoniness; slope.	Slight to severe: slope.....	Slight to severe: bedrock at depth of 4 to 30 feet; slope; stoniness. ²
Severe: slope; stoniness.....	Severe: slope; stoniness.....	Severe: slope.....	Severe: slope; bedrock at depth of 4 to 30 feet; stoniness. ²
Moderate: seasonal perched water table.	Slight.....	Moderate: seasonal perched water table.	Moderate: seasonal perched water table; clayey and plastic.
Moderate: seasonal perched water table.	Slight.....	Moderate: seasonal perched water table; slope.	Moderate: seasonal perched water table; clayey and plastic.
Moderate: seasonal perched water table; slope.	Moderate: slope.....	Severe: slope; seasonal perched water table.	Moderate: seasonal perched water table; clayey and plastic.
Severe: slope.....	Severe: slope.....	Severe: slope; seasonal perched water table.	Moderate: seasonal perched water table; clayey and plastic.
Moderate: seasonal perched water table.	Slight.....	Moderate: seasonal perched water table; slope.	Moderate: seasonal perched water table; clayey and plastic.
Moderate to severe: seasonal perched water table; slope.	Moderate to severe: slope.....	Moderate to severe: seasonal perched water table; slope.	Moderate: seasonal perched water table; slope; clayey and plastic.
Moderate: bedrock at depth of 2 to 3½ feet.	Slight.....	Moderate: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet.
Moderate to severe: bedrock at depth of 2 to 3½ feet; slope.	Moderate to severe: slope.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet.
Severe: slope.....	Severe: slope.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet; slope.
Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet; slope.
Moderate: bedrock at depth of 2 to 3½ feet; stoniness.	Moderate: stoniness.....	Moderate: bedrock at depth of 2 to 3½ feet; slope.	Severe: bedrock at depth of 2 to 3½ feet; stoniness.
Moderate to severe: bedrock at depth of 2 to 3½ feet; stoniness slope.	Moderate to severe: stoniness; slope.	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet; stoniness; slope.
Moderate to severe: bedrock at depth of 2 to 3½ feet; slope.	Moderate to severe: slope.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: bedrock at depth of 2 to 3½ feet; slope.
Severe: slope; bedrock at depth of 1 to 3½ feet.	Severe: slope.....	Severe: slope; bedrock at depth of 1 to 3½ feet.	Severe: bedrock at depth of 1 to 3½ feet; slope.
Moderate to severe: slope.....	Moderate to severe: slope.....	Severe: slope.....	Moderate: clayey and plastic. ²
Severe: slope.....	Severe: slope.....	Severe: slope.....	Moderate to severe: slope; clayey and plastic. ²
Severe: hazard of flooding.....	Severe: hazard of flooding.....	Severe: hazard of flooding.....	Severe: hazard of flooding. ¹
Slight ³	Slight ³	Slight.....	Slight.
Slight ³	Slight ³	Moderate: slope.....	Slight.
Moderate: slope ³	Moderate: slope ³	Severe: slope.....	Slight.
Slight.....	Slight.....	Slight to moderate: slope.....	Slight.
Moderate: slope.....	Moderate: slope.....	Severe: slope.....	Slight.
Severe: slope.....	Severe: slope.....	Severe: slope.....	Slight.
Moderate: stoniness; slope.....	Moderate: stoniness; slope.....	Moderate to severe: slope.....	Severe: stoniness.
Severe: slope.....	Severe: slope.....	Severe: slope.....	Severe: stoniness.

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Landisburg:		
LdA.....	Severe: slow permeability; seasonal perched water table.	Slight.....
LdB2.....	Severe: slow permeability; seasonal perched water table.	Moderate: slope.....
LdC2.....	Severe: slow permeability; seasonal perched water table.	Severe: slope.....
LdD2.....	Severe: slow permeability; slope; seasonal perched water table.	Severe: slope.....
Leetonia: LgD.....	Severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: bedrock at depth of 1½ to 3½ feet; rapid permeability; slope.
Lehew:		
LhB2.....	Severe: bedrock at depth of 1½ to 3½ feet.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet.
LhC2.....	Severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet; slope.
LhE.....	Severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet; slope.
LIB.....	Severe: bedrock at depth of 1½ to 3½ feet.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet.
LID.....	Severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3½ feet; slope.
Lickdale: Lm.....	Severe: high water table; slow permeability.	Slight.....
Lindsay: Ln.....	Severe: seasonal high water table; hazard of flooding. ¹	Severe: hazard of flooding ¹
Litz:		
LsB2.....	Severe: bedrock at depth of 1½ to 3 feet.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3 feet.
LsC2.....	Severe: bedrock at depth of 1½ to 3 feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3 feet; slope.
LsD2.....	Severe: bedrock at depth of 1½ to 3 feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3 feet; slope.
LsE.....	Severe: bedrock at depth of 1½ to 3 feet; slope.	Severe: moderately rapid permeability; bedrock at depth of 1½ to 3 feet; slope.
Loysville: LyB.....	Severe: high water table; slow permeability. ²	Slight to moderate: slope ²
Meckesville:		
McB2.....	Severe: moderately slow permeability.....	Slight to moderate: slope.....
McC2.....	Severe: moderately slow permeability.....	Severe: slope.....
McD2.....	Severe: moderately slow permeability; slope.	Severe: slope.....
MdC.....	Severe: moderately slow permeability.	Slight to severe: slope.....
MdD.....	Severe: moderately slow permeability; slope.	Severe: slope.....

See footnote at end of table.

town and country planning—Continued

Sites for homes (three stories or less)		Streets and parking lots	Landfill
With basements	Without basements		
Moderate: seasonal perched water table. Moderate: seasonal perched water table. Moderate: seasonal perched water table; slope. Severe: seasonal perched water table; slope.	Slight..... Slight..... Moderate: slope..... Severe: slope.....	Moderate: seasonal perched water table. Moderate: seasonal perched water table; slope. Severe: slope; seasonal perched water table. Severe: slope; seasonal perched water table.	Moderate: clayey and plastic; seasonal perched water table. Moderate: clayey and plastic; seasonal perched water table. Moderate: clayey and plastic; seasonal perched water table. Moderate: clayey and plastic; seasonal perched water table; slope.
Severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope.	Moderate to severe: stoniness; slope.	Moderate to severe: bedrock at depth of 1½ to 3½ feet; slope.	Severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope.
Severe: bedrock at depth of 1½ to 3½ feet.	Moderate: bedrock at depth of 1½ to 3½ feet.	Moderate: bedrock at depth of 1½ to 3½ feet; slope.	Severe: bedrock at depth of 1½ to 3½ feet; moderately rapid permeability.
Severe: bedrock at depth of 1½ to 3½ feet; slope.	Moderate to severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: bedrock at depth of 1½ to 3½ feet; moderately rapid permeability.
Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: bedrock at depth of 1½ to 3½ feet; slope; moderately rapid permeability.
Severe: bedrock at depth of 1½ to 3½ feet; stoniness.	Moderate: stoniness; bedrock at depth of 1½ to 3½ feet.	Moderate: bedrock at depth of 1½ to 3½ feet; slope.	Severe: bedrock at depth of 1½ to 3½ feet; stoniness; moderately rapid permeability.
Severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope.	Moderate to severe: stoniness; slope; bedrock at depth of 1½ to 3½ feet.	Severe: slope; bedrock at depth of 1½ to 3½ feet.	Severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope; moderately rapid permeability.
Severe: high water table.....	Severe: high water table.....	Severe: high water table.....	Severe: high water table; very poor natural drainage.
Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding.....	Severe: hazard of flooding.....	Severe: seasonal high water table; hazard of flooding. ¹
Moderate: bedrock at depth of 1½ to 3 feet.	Slight.....	Moderate: bedrock at depth of 1½ to 3 feet; slope.	Severe: bedrock at depth of 1½ to 3 feet; moderately rapid permeability.
Moderate to severe: bedrock at depth of 1½ to 3 feet; slope.	Moderate to severe: slope.....	Severe: slope; bedrock at depth of 1½ to 3 feet.	Severe: bedrock at depth of 1½ to 3 feet; moderately rapid permeability.
Severe: slope.....	Severe: slope.....	Severe: slope; bedrock at depth of 1½ to 3 feet.	Severe: bedrock at depth of 1½ to 3 feet; slope; moderately rapid permeability.
Severe: bedrock at depth of 1½ to 3 feet.	Severe: slope.....	Severe: slope; bedrock at depth of 1½ to 3 feet.	Severe: bedrock at depth of 1½ to 3 feet; slope; moderately rapid permeability.
Severe: high water table.....	Severe: high water table.....	Moderate: high water table; slope.	Severe: poor natural drainage; high water table. ²
Slight.....	Slight.....	Slight to moderate: slope.....	Moderate: clayey and plastic subsoil.
Severe: slope.....	Severe: slope.....	Severe: slope.....	Moderate: clayey and plastic subsoil.
Severe: slope.....	Severe: slope.....	Severe: slope.....	Moderate: clayey and plastic subsoil.
Moderate: stoniness; slope.....	Moderate: stoniness; slope.....	Slight to severe: slope.....	Severe: stoniness; clayey and plastic subsoil.
Severe: slope.....	Severe: slope.....	Severe: slope.....	Severe: stoniness; clayey and plastic subsoil.

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Melvin: Me.....	Severe: high water table; hazard of flooding. ¹	Severe: hazard of flooding ¹
Monongahela: MhA.....	Severe: slow permeability; seasonal perched water table. ¹	Slight ¹
MhB ₂	Severe: slow permeability; seasonal perched water table. ¹	Moderate: slope ¹
MhC ₂	Severe: slow permeability; seasonal perched water table. ¹	Severe: slope ¹
Nolo: NoA.....	Severe: high water table; slow permeability.	Slight.....
NoB.....	Severe: high water table; slow permeability.	Moderate: slope.....
NoC ₂	Severe: high water table; slow permeability; slope.	Severe: slope.....
NsC.....	Severe: high water table; slow permeability; slope.	Slight to severe: slope.....
Opequon: OpB ₂	Severe: bedrock at depth of 1 to 1½ feet. ²	Severe: bedrock at depth of 1 to 1½ feet. ²
OpC ₂	Severe: bedrock at depth of 1 to 1½ feet. ²	Severe: bedrock at depth of 1 to 1½ feet; slope. ²
OpD ₂	Severe: bedrock at depth of 1 to 1½ feet; slope. ²	Severe: bedrock at depth of 1 to 1½ feet; slope. ²
OpE ₂	Severe: bedrock at depth of 1 to 1½ feet; slope. ²	Severe: bedrock at depth of 1 to 1½ feet; slope. ²
OuD.....	Severe: bedrock at depth of 1 to 1½ feet; slope. ²	Severe: bedrock at depth of 1 to 1½ feet; slope. ²
OuE.....	Severe: bedrock at depth of 1 to 1½ feet; slope. ²	Severe: bedrock at depth of 1 to 1½ feet; slope. ²
Philo: Ph.....	Severe: seasonal high water table; moderately slow permeability; hazard of flooding. ¹	Severe: hazard of flooding ¹
Pope: Pn, Ps.....	Severe: hazard of flooding ¹	Severe: hazard of flooding ¹
Robertsville: RbB.....	Severe: high water table; slow permeability. ¹	Slight to moderate: slope ¹
Rock outcrop: Rc. Too variable for valid interpretations.		
Shelocta: ShB ₂	Slight.....	Moderate: moderate permeability; slope.....
ShC ₂	Moderate: slope.....	Severe: slope.....
ShD ₂	Severe: slope.....	Severe: slope.....
Stony land: SrC, SrF.....	Severe: extremely stony; slope.....	Severe: extremely stony; slope.....
Strip mines and Dumps: St. Too variable for valid interpretations.		
Tyler: TyA.....	Severe: seasonal perched water table; slow permeability. ¹	Slight ¹
TyB.....	Severe: seasonal perched water table; slow permeability. ¹	Moderate: slope ¹
Weikert: WeB ₂ , WIB..... Interpretations not made for Urban land part of WIB.	Severe: bedrock at depth of 1 to 1½ feet.	Severe: bedrock at depth of 1 to 1½ feet; moderately rapid permeability; slope.

See footnote at end of table.

town and country planning—Continued

Sites for homes (three stories or less)		Streets and parking lots	Landfill
With basements	Without basements		
Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding. ¹
Moderate: seasonal perched water table.	Slight.....	Moderate: seasonal perched water table.	Moderate: seasonal perched water table. ¹
Moderate: seasonal perched water table.	Slight.....	Moderate: seasonal perched water table; slope.	Moderate: seasonal perched water table. ¹
Moderate: seasonal perched water table; slope.	Moderate: slope.....	Severe: slope; seasonal perched water table.	Moderate: seasonal perched water table. ¹
Severe: high water table.....	Severe: high water table.....	Severe: high water table.....	Severe: high water table; poor natural drainage.
Severe: high water table.....	Severe: high water table.....	Severe: high water table; slope.	Severe: high water table; poor natural drainage.
Severe: high water table; slope.....	Severe: high water table; slope.	Severe: high water table; slope.	Severe: high water table; poor natural drainage.
Severe: high water table; slope.....	Severe: high water table; slope.	Severe: high water table; slope.	Severe: high water table; poor natural drainage.
Severe: bedrock at depth of 1 to 1½ feet.	Severe: bedrock at depth of 1 to 1½ feet.	Severe: bedrock at depth of 1 to 1½ feet.	Severe: bedrock at depth of 1 to 1½ feet. ²
Severe: bedrock at depth of 1 to 1½ feet.	Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: bedrock at depth of 1 to 1½ feet. ²
Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: slope.....	Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: bedrock at depth of 1 to 1½ feet. ²
Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: slope; bedrock at depth of 1 to 1½ feet.	Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: bedrock at depth of 1 to 1½ feet; slope. ²
Severe: bedrock at depth of 1 to 1½ feet.	Severe: bedrock at depth of 1 to 1½ feet; stoniness; slope.	Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: bedrock at depth of 1 to 1½ feet. ²
Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: slope; bedrock at depth of 1 to 1½ feet.	Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: bedrock at depth of 1 to 1½ feet; slope. ²
Severe: hazard of flooding; seasonal high water table.	Severe: hazard of flooding.....	Severe: hazard of flooding.....	Severe: seasonal high water table; hazard of flooding. ¹
Severe: hazard of flooding.....	Severe: hazard of flooding.....	Severe: hazard of flooding.....	Severe: hazard of flooding. ¹
Severe: high water table.....	Severe: high water table.....	Severe: high water table.....	Severe: high water table; poor natural drainage. ¹
Slight.....	Slight.....	Slight to moderate: slope.....	Slight to severe: bedrock at depth of 4 to 15 feet.
Moderate: slope.....	Moderate: slope.....	Severe: slope.....	Slight to severe: bedrock at depth of 4 to 15 feet.
Severe: slope.....	Severe: slope.....	Severe: slope.....	Slight to severe: bedrock at depth of 4 to 15 feet.
Severe: extremely stony; slope.....	Severe: extremely stony; slope.....	Severe: extremely stony; slope.....	Severe: extremely stony; slope.
Severe: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: seasonal perched water table; clayey subsoil. ¹
Severe: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: seasonal perched water table; slope.	Moderate: seasonal perched water table; clayey subsoil. ¹
Moderate: rippable bedrock at depth of 1 to 1½ feet.	Slight.....	Moderate: rippable bedrock at depth of 1 to 1½ feet; slope.	Severe: rippable bedrock at depth of 1 to 1½ feet.

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal	
	Filter fields	Lagoons
Weikert—Con. WeC2, WIC..... Interpretations not made for Urban land part of WIC. WeE, WIE..... Interpretations not made for Urban land part of WIE. WkD.....	Severe: bedrock at depth of 1 to 1½ feet; slope. Severe: bedrock at depth of 1 to 1½ feet; slope. Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: bedrock at depth of 1 to 1½ feet; moderately rapid permeability; slope. Severe: bedrock at depth of 1 to 1½ feet; moderately rapid permeability; slope. Severe: bedrock at depth of 1 to 1½ feet; moderately rapid permeability; slope.
Weikert and Gilpin: WnF.....	Severe: bedrock at depth of 1 to 3½ feet; slope.	Severe: bedrock at depth of 1 to 3½ feet; slope.
Westmoreland: WsB2.....	Slight to severe: bedrock at depth of 3½ to 6 feet. ²	Moderate: moderate permeability; slope. ²
WsC2.....	Moderate to severe: slope; bedrock at depth of 3½ to 6 feet. ²	Severe: slope; moderate permeability ² ---
WsD2.....	Severe: slope; bedrock at depth of 3½ to 6 feet. ²	Severe: slope; moderate permeability ² ---
WsE.....	Severe: slope; bedrock at depth of 3½ to 6 feet. ²	Severe: slope; moderate permeability ² ---

¹ These Allegheny, Atkins, Chavies, Huntington, Lindside, Melvin, Monongahela, Philo, Pope, Robertsville, and Tyler soils, and Alluvial land, are on flood plains or terraces of streams where effluent from septic-tank filter fields, sewage lagoons, and sanitary landfills could readily become a source of pollution to waterways. The possibility is greatest for soils on flood plains that are more frequently flooded than soils on terraces. Other soils may be adjacent to water but are not characteristically so, and this hazard of pollution therefore cannot be specifically assigned to them.

TABLE 8.—*Soil limitations for*

Soil series and map symbols	Lawns, fairways, landscaping	Camp areas
Albrights: AbB.....	Slight.....	Moderate: seasonal perched water table; moderately slow permeability.
AbC2.....	Moderate: slope.....	Moderate: seasonal perched water table; moderately slow permeability; slope.
AgD.....	Moderate to severe: stoniness; slope.....	Moderate to severe: seasonal perched water table; moderately slow permea- bility; stoniness; slope.
Allegheny: AhA, AIA.....	Slight.....	Slight.....
AhB2, AIB2.....	Slight.....	Slight.....
AhC2, AIC2.....	Moderate: slope.....	Moderate: slope.....
AID.....	Severe: slope.....	Severe: slope.....
AnB..... Interpretations not made for Urban land part.	Slight.....	Slight.....
AnC..... Interpretations not made for Urban land part.	Moderate to severe: slope.....	Moderate to severe: slope.....
Alluvial land: Au, Av..... Interpretations not made for Urban land part of Av.	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.
Atkins: Aw.....	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.
Belmont: BeE.....	Severe: slope; stoniness.....	Severe: slope; stoniness; silty clay loam surface layer.

town and country planning—Continued

Sites for homes (three stories or less)		Streets and parking lots	Landfill
With basements	Without basements		
Moderate: rippable bedrock at depth of 1 to 1½ feet; slope.	Moderate to severe: slope.....	Severe: slope; rippable bedrock at depth of 1 to 1½ feet.	Severe: rippable bedrock at depth of 1 to 1½ feet.
Severe: slope.....	Severe: slope; rippable bedrock at depth of 1 to 1½ feet.	Severe: slope; rippable bedrock at depth of 1 to 1½ feet.	Severe: slope; rippable bedrock at depth of 1 to 1½ feet.
Severe: rippable bedrock at depth of 1 to 1½ feet; stoniness; slope.	Moderate to severe: stoniness; slope; rippable bedrock at depth of 1 to 1½ feet.	Moderate to severe: rippable bedrock at depth of 1 to 1½ feet; slope.	Severe: stoniness; slope; rippable bedrock at depth of 1 to 1½ feet.
Severe: slope; bedrock at depth of 1 to 3½ feet.	Severe: slope; bedrock at depth of 1 to 3½ feet.	Severe: slope; bedrock at depth of 1 to 3½ feet.	Severe: slope; bedrock at depth of 1 to 3½ feet.
Slight to moderate: bedrock at depth of 3½ to 6 feet.	Slight.....	Slight to moderate: bedrock at depth of 3½ to 6 feet; slope.	Severe: bedrock at depth of 3½ to 6 feet. ²
Moderate to severe: bedrock at depth of 3½ to 6 feet; slope.	Moderate to severe: slope.....	Severe: slope; bedrock at depth of 3½ to 6 feet.	Severe: bedrock at depth of 3½ to 6 feet. ²
Severe: slope.....	Severe: slope.....	Severe: slope; bedrock at depth of 3½ to 6 feet.	Severe: slope; bedrock at depth of 3½ to 6 feet. ²
Severe: slope; bedrock at depth of 3½ to 6 feet.	Severe: slope.....	Severe: slope; bedrock at depth of 3½ to 6 feet.	Severe: slope; bedrock at depth of 3½ to 6 feet. ²

² Underground water is subject to a hazard of pollution by effluent from filter fields, sewage lagoons, and sanitary landfills on soils of the Belmont, Brooke, Edom, Elliber, Hagerstown, Loysville, Opequon, and Westmoreland series. Limestone underlying these soils may have sinks, fissures, and solution channels through which such effluents are directly conducted into the ground water supply.

³ This soil is rarely if ever subject to stream flooding. Each site, however, should be thoroughly investigated for a hazard of flooding before buildings are constructed.

specified recreational uses

Playgrounds	Picnic areas	Paths and trails
Moderate: seasonal perched water table; moderately slow permeability; slope.	Moderate: seasonal perched water table...	Slight.
Severe: slope; seasonal perched water table; moderately slow permeability.	Moderate: seasonal perched water table; slope.	Slight.
Moderate to severe: seasonal perched water table; moderately slow permeability; stoniness; slope.	Moderate to severe: seasonal perched water table; slope.	Moderate: stoniness; slope.
Slight.....	Slight.....	Slight.
Moderate: slope.....	Slight.....	Slight.
Severe: slope.....	Moderate: slope.....	Slight.
Severe: slope.....	Severe: slope.....	Moderate to severe: slope.
Slight to moderate: slope.....	Slight.....	Slight.
Severe: slope.....	Moderate to severe: slope.....	Slight to moderate: slope.
Severe: high water table; hazard of flooding...	Severe: high water table; hazard of flooding...	Severe: high water table; hazard of flooding.
Severe: high water table; hazard of flooding...	Severe: high water table; hazard of flooding...	Severe: high water table; hazard of flooding.
Severe: slope; stoniness; silty clay loam surface layer.	Severe: slope; stoniness; silty clay loam surface layer.	Moderate to severe: stoniness; slope; silty clay loam surface layer.

TABLE 8.—*Soil limitations for*

Soil series and map symbols	Lawns, fairways, landscaping	Camp areas
Brooke: BkC3.....	Severe: severely eroded; sticky surface layer.	Moderate: moderately slow permeability; sticky surface layer; slope.
Buchanan:		
BuB2.....	Slight.....	Moderate: seasonal perched water table; slow permeability.
BuC2.....	Moderate: slope.....	Moderate: seasonal perched water table; slow permeability; slope.
BvC.....	Moderate: stoniness; slope.....	Moderate: seasonal perched water table; slow permeability; stoniness; slope.
BvD.....	Severe: slope.....	Severe: slope; seasonal perched water table; slow permeability; stoniness.
Calvin:		
CaB, ClB2.....	Moderate: bedrock at depth of 2 to 3½ feet.	Slight.....
CaC, ClC2.....	Moderate to severe: bedrock at depth of 2 to 3½ feet; slope.	Moderate to severe: slope.....
ClD2.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....
ClE.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....
Calvin-Weikert:		
CnB2.....	Moderate: rippable bedrock at depth of 1 to 3½ feet.	Moderate: coarse fragments.....
CnC2.....	Moderate to severe: rippable bedrock at depth of 1 to 3½ feet; slope.	Moderate to severe: coarse fragments; slope.
CnD2.....	Severe: slope; rippable bedrock at depth of 1 to 3½ feet.	Severe: slope; coarse fragments.....
CnE.....	Severe: slope; rippable bedrock at depth of 1 to 3½ feet.	Severe: slope; coarse fragments.....
Cavode:		
CoB2.....	Moderate: seasonal high water table.....	Severe: seasonal high water table; slow permeability.
CoC2.....	Moderate to severe: seasonal high water table; slope.	Severe: seasonal high water table; slope; slow permeability.
CrD.....	Moderate to severe: seasonal high water table; stoniness; slope.	Severe: seasonal high water table; slope; slow permeability.
Chavies:		
CsA.....	Slight.....	Slight.....
CsB.....	Slight.....	Slight.....
Cookport:		
CtB2.....	Moderate: bedrock at depth of 3 to 4 feet.....	Moderate: seasonal perched water table; slow permeability.
CtC2.....	Moderate to severe: bedrock at depth of 3 to 4 feet; slope.	Moderate to severe: seasonal perched water table; slow permeability; slope.
CuB.....	Moderate: bedrock at depth of 3 to 4 feet; stoniness.	Moderate: seasonal perched water table; slow permeability; stoniness.
CuD.....	Moderate to severe: bedrock at depth of 3 to 4 feet; slope.	Moderate to severe: seasonal perched water table; slow permeability; stoniness; slope.
Cut and fill land: Cv.		
Too variable for valid interpretations.		
DeKalb:		
DeB2.....	Moderate: bedrock at depth of 1½ to 3½ feet; sandy surface layer; slope.	Slight to moderate: slope.....
DeC2.....	Moderate to severe: bedrock at depth of 1½ to 3½ feet; sandy surface layer; slope.	Moderate to severe: slope.....
DeD.....	Severe: slope; bedrock at depth of 1½ to 3½ feet; sandy surface layer.	Severe: slope.....
DkB.....	Moderate: bedrock at depth of 1½ to 3½ feet; sandy surface layer; stoniness; slope.	Moderate: stoniness; slope.....
DkC.....	Moderate to severe: bedrock at depth of 1½ to 3½ feet; sandy surface layer; stoniness; slope.	Moderate to severe: stoniness; slope.....

specified recreational uses—Continued

Playgrounds	Picnic areas	Paths and trails
Severe: slope; silty clay loam surface layer.---	Moderate: sticky surface layer; slope.-----	Moderate: sticky surface layer.
Moderate: seasonal perched water table; slow permeability; slope. Severe: slope; seasonal perched water table; slow permeability.	Moderate: seasonal perched water table.---	Slight.
Moderate to severe: seasonal perched water table; slow permeability; stoniness; slope. Severe: slope; seasonal perched water table; slow permeability; stoniness.	Moderate: seasonal perched water table; slope. Moderate: seasonal perched water table; slope. Severe: slope; seasonal perched water table.---	Slight. Moderate: stoniness. Moderate: stoniness; slope.
Moderate: bedrock at depth of 2 to 3½ feet; coarse fragments; slope. Severe: slope; bedrock at depth of 2 to 3½ feet; coarse fragments. Severe: slope; bedrock at depth of 2 to 3½ feet; coarse fragments. Severe: slope; bedrock at depth of 2 to 3½ feet; coarse fragments.	Slight.----- Moderate to severe: slope.----- Severe: slope.----- Severe: slope.-----	Slight. Slight to moderate: slope. Moderate to severe: slope. Severe: slope.
Moderate to severe: rippable bedrock at depth of 1 to 3½ feet; coarse fragments; slope. Severe: slope; rippable bedrock at depth of 1 to 3½ feet; coarse fragments. Severe: slope; rippable bedrock at depth of 1 to 3½ feet; coarse fragments. Severe: slope; rippable bedrock at depth of 1 to 3½ feet; coarse fragments.	Moderate: coarse fragments.----- Moderate to severe: coarse fragments; slope. Severe: slope; coarse fragments.----- Severe: slope; coarse fragments.-----	Moderate: coarse fragments. Moderate: coarse fragments; slope. Moderate to severe: coarse fragments; slope. Severe: slope; coarse fragments.
Severe: seasonal high water table; slow permeability; slope. Severe: seasonal high water table; slope; slow permeability. Severe: seasonal high water table; slope; slow permeability; stoniness.	Moderate: seasonal high water table.----- Moderate to severe: seasonal high water table; slope. Moderate to severe: seasonal high water table; slope.	Moderate: seasonal high water table. Moderate: seasonal high water table; slope. Moderate to severe: seasonal high water table; stoniness; slope.
Slight.-----	Slight.-----	Slight.
Moderate: slope.-----	Slight.-----	Slight.
Moderate to severe: seasonal perched water table; slow permeability; bedrock at depth of 3 to 4 feet; coarse fragments; slope. Severe: slope; seasonal perched water table; slow permeability; bedrock at depth of 3 to 4 feet; coarse fragments. Moderate to severe: seasonal perched water table; slow permeability; bedrock at depth of 3 to 4 feet; stoniness; slope. Severe: slope; seasonal perched water table; slow permeability; bedrock at depth of 3 to 4 feet; stoniness.	Moderate: seasonal perched water table.--- Moderate to severe: seasonal perched water table; slope. Moderate: seasonal perched water table.--- Moderate to severe: seasonal perched water table; slope.	Slight. Slight to moderate: slope. Moderate: stoniness. Moderate to severe: stoniness; slope.
Moderate to severe: bedrock at depth of 1½ to 3½ feet; coarse fragments; slope. Severe: slope; bedrock at depth of 1½ to 3½ feet; coarse fragments. Severe: slope; bedrock at depth of 1½ to 3½ feet; coarse fragments. Moderate to severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope. Severe: slope; bedrock at depth of 1½ to 3½ feet; stoniness.	Slight to moderate: slope.----- Moderate to severe: slope.----- Severe: slope.----- Slight to moderate: slope.----- Moderate to severe: slope.-----	Slight. Slight to moderate: slope. Severe: slope. Moderate: stoniness. Moderate: stoniness; slope.

TABLE 8.—*Soil limitations for*

Soil series and map symbols	Lawns, fairways, landscaping	Camp areas
Dekalb and Lelew: DIE, DIF.....	Severe: slope.....	Severe: slope.....
Edom:		
EdB2.....	Moderate: bedrock at depth of 2 to 3½ feet.	Slight.....
EdC2.....	Moderate: bedrock at depth of 2 to 3½ feet; slope.	Moderate: slope.....
EdD2.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....
EdE2, EeE3.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....
Elliber:		
EIA.....	Severe: cherty surface layer.....	Moderate: cherty surface layer.....
EIB2.....	Severe: cherty surface layer.....	Moderate: cherty surface layer; slope.....
EIC2.....	Severe: cherty surface layer; slope.....	Moderate to severe: cherty surface layer; slope.
EID.....	Severe: cherty surface layer; slope.....	Severe: slope.....
EmC.....	Severe: cherty surface layer; slope.....	Moderate to severe: cherty surface layer; stoniness; slope.
EmD, EmF.....	Severe: cherty surface layer; slope.....	Severe: slope.....
Ernest:		
ErA.....	Slight.....	Moderate: seasonal perched water table; moderately slow permeability.
ErB2.....	Slight.....	Moderate: seasonal perched water table; moderately slow permeability.
ErC2.....	Moderate: slope.....	Moderate: seasonal perched water table; moderately slow permeability; slope.
ErD2.....	Severe: slope.....	Severe: slope.....
Ernest-Landisburg:		
EuB..... Interpretations not made for Urban land part.	Slight.....	Moderate: seasonal perched water table; moderately slow to slow permeability.
EuD..... Interpretations not made for Urban land part.	Moderate to severe: slope.....	Moderate to severe: seasonal perched water table; moderately slow to slow permeability; slope.
Gilpin:		
GIB2.....	Moderate: bedrock at depth of 2 to 3½ feet.	Slight.....
GnB2.....	Moderate: bedrock at depth of 2 to 3½ feet.	Slight.....
GIC2, GnC2.....	Moderate to severe: bedrock at depth of 2 to 3½ feet; slope.	Moderate to severe: slope.....
GID2, GnD2.....	Severe: slope.....	Severe: slope.....
GnE.....	Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....
GsB.....	Moderate: bedrock at depth of 2 to 3½ feet; stoniness.	Moderate: stoniness.....
GsD.....	Moderate to severe: bedrock at depth of 2 to 3½ feet; stoniness; slope.	Moderate to severe: stoniness; slope.....
GuB..... Interpretations not made for Urban land part.	Moderate: bedrock at depth of 2 to 3½ feet; local stoniness.	Slight to moderate: stoniness.....
GuD..... Interpretations not made for Urban land part.	Moderate to severe: bedrock at depth of 2 to 3½ feet; local stoniness; slope.	Moderate to severe: local stoniness; slope.....
Gilpin and Weikert: GwF.....	Severe: slope.....	Severe: slope.....
Gravel pits: Gx. Too variable for valid interpretations.		
Hagerstown:		
HeC2.....	Moderate to severe: slope.....	Moderate to severe: slope.....
HeE2.....	Severe: slope.....	Severe: slope.....
Huntington:		
Hn.....	Moderate: hazard of flooding.....	Severe: hazard of flooding.....
HxA.....	Slight.....	Slight.....
HxB.....	Slight.....	Slight.....
HxC.....	Moderate: slope.....	Moderate: slope.....

specified recreational uses—Continued

Playgrounds	Picnic areas	Paths and trails
Severe: slope.....	Severe: slope.....	Severe: slope.
Moderate: bedrock at depth of 2 to 3½ feet; slope.	Slight.....	Slight.
Severe: slope; bedrock at depth of 2 to 3½ feet.	Moderate: slope.....	Slight.
Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....	Moderate: slope.
Severe: slope; bedrock at depth of 2 to 3½ feet.	Severe: slope.....	Severe: slope.
Severe: cherty surface layer; slope.....	Moderate: cherty surface layer.....	Moderate: cherty surface layer.
Severe: slope; cherty surface layer.....	Moderate: cherty surface layer; slope.....	Moderate: cherty surface layer.
Severe: slope; cherty surface layer.....	Moderate to severe: cherty surface layer; slope.	Moderate: cherty surface layer; slope.
Severe: slope; cherty surface layer.....	Severe: slope; cherty surface layer.....	Severe: slope; cherty surface layer.
Severe: cherty surface layer; stoniness; slope.....	Severe: slope; cherty surface layer.....	Severe: slope; cherty surface layer; stoniness.
Severe: cherty surface layer; stoniness; slope.....	Severe: slope; cherty surface layer.....	Severe: slope; cherty surface layer; stoniness.
Moderate: seasonal perched water table; moderately slow permeability.	Moderate: seasonal perched water table...	Slight.
Moderate: seasonal perched water table; moderately slow permeability; slope.	Moderate: seasonal perched water table...	Slight.
Severe: slope; seasonal perched water table; moderately slow permeability.	Moderate: seasonal perched water table; slope.	Slight.
Severe: slope; seasonal perched water table; moderately slow permeability.	Severe: slope; seasonal perched water table.	Moderate: slope.
Moderate: seasonal perched water table; moderately slow to slow permeability; slope.	Moderate: seasonal perched water table...	Slight.
Severe: slope; seasonal perched water table; moderately slow to slow permeability.	Moderate to severe: seasonal perched water table; slope.	Slight to moderate: slope.
Moderate to severe: bedrock at depth of 2 to 3½ feet; slope.	Slight.....	Slight.
Moderate to severe: bedrock at depth of 2 to 3½ feet; coarse fragments; slope.	Slight.....	Slight.
Severe: slope.....	Moderate to severe: slope.....	Slight to moderate: slope.
Severe: slope.....	Severe: slope.....	Moderate to severe: slope.
Severe: slope; bedrock at depth of 2 to 3½ feet; coarse fragments.	Severe: slope.....	Severe: slope.
Moderate to severe: bedrock at depth of 2 to 3½ feet; coarse fragments and stones; slope.	Slight.....	Moderate: stoniness.
Severe: slope; bedrock at depth of 2 to 3½ feet; stoniness.	Moderate to severe: slope.....	Moderate to severe: stoniness; slope.
Moderate to severe: bedrock at depth of 2 to 3½ feet; coarse fragments and stones; slope.	Slight.....	Slight to moderate: stoniness.
Severe: slope; bedrock at depth of 2 to 3½ feet; coarse fragments or stones.	Moderate to severe: slope.....	Slight to moderate: stoniness. Severe: slope.
Severe: slope.....	Severe: slope.....	Severe: slope.
Severe: slope.....	Moderate to severe: slope.....	Slight to moderate: slope.
Severe: slope.....	Severe: slope.....	Moderate to severe: slope.
Moderate: hazard of flooding.....	Moderate: hazard of flooding.....	Slight to moderate: hazard of flooding.
Slight.....	Slight.....	Slight.
Moderate: slope.....	Slight.....	Slight.
Severe: slope.....	Moderate: slope.....	Slight.

TABLE 8.—*Soil limitations for*

Soil series and map symbols	Lawns, fairways, landscaping	Camp areas
Laidig:		
LaB2.....	Moderate: gravelly surface layer.....	Moderate: moderately slow permeability; gravelly surface layer.
LaC2.....	Moderate: gravelly surface layer; slope.....	Moderate: moderately slow permeability; gravelly surface layer; slope.
LaD2.....	Severe: slope; gravelly surface layer.....	Severe: slope; moderately slow permeability; gravelly surface layer.
LbC.....	Moderate: stoniness; slope.....	Moderate: moderately slow to slow permeability; stoniness; slope.
LbD.....	Severe: slope; stoniness.....	Severe: slope; moderately slow permeability; stoniness.
Landisburg:		
LdA.....	Slight.....	Moderate: seasonal perched water table; slow permeability.
LdB2.....	Slight.....	Moderate: seasonal perched water table; slow permeability.
LdC2.....	Moderate: slope.....	Moderate: seasonal perched water table; slow permeability; slope.
LdD2.....	Severe: slope.....	Severe: slope; seasonally perched water table; slow permeability.
Leetonia: LgD.....	Moderate to severe: bedrock at depth of 1½ to 3½ feet; sandy surface layer; stoniness; slope.	Moderate to severe: stoniness; slope.....
Lehew:		
LhB2.....	Moderate: bedrock at depth of 1½ to 3½ feet.	Slight.....
LhC2.....	Moderate to severe: bedrock at depth of 1½ to 3½ feet; slope.	Moderate to severe: slope.....
LhE.....	Severe: slope.....	Severe: slope.....
LIB.....	Moderate: bedrock at depth of 1½ to 3½ feet; stoniness.	Moderate: stoniness.....
LID.....	Moderate to severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope.	Moderate to severe: stoniness; slope.....
Lickdale: Lm.....	Severe: high water table.....	Severe: high water table.....
Lindsay: Ln.....	Severe: hazard of flooding.....	Severe: hazard of flooding.....
Litz:		
LsB2.....	Moderate: bedrock at depth of 1½ to 3 feet.	Slight.....
LsC2.....	Moderate to severe: bedrock at depth of 1½ to 3 feet; slope.	Moderate to severe: slope.....
LsD2.....	Severe: slope; bedrock at depth of 1½ to 3 feet.	Severe: slope.....
LsE.....	Severe: slope; bedrock at depth of 1½ to 3 feet.	Severe: slope.....
Loysville: LyB.....	Severe: high water table.....	Severe: high water table.....
Meckesville:		
McB2.....	Slight.....	Moderate: moderately slow permeability.....
McC2.....	Moderate: slope.....	Moderate: moderately slow permeability; slope.
McD2.....	Severe: slope.....	Severe: slope; moderately slow permeability.
MdC.....	Moderate: stoniness; slope.....	Moderate: moderately slow permeability; stoniness; slope.
MdD.....	Severe: slope.....	Severe: slope; moderately slow permeability; stoniness.
Melvin: Me.....	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.

specified recreational uses—Continued

Playgrounds	Picnic areas	Paths and trails
Moderate: gravelly surface layer; slope.....	Slight.....	Slight.
Severe: slope; gravelly surface layer.....	Moderate: slope.....	Slight.
Severe: slope; gravelly surface layer.....	Severe: slope.....	Moderate: slope.
Moderate to severe: stoniness; slope.....	Slight to moderate: slope.....	Moderate: stoniness.
Severe: slope; stoniness.....	Severe: slope.....	Moderate: stoniness; slope.
Moderate: seasonal perched water table; slow permeability; cherty surface layer.	Moderate: seasonal perched water table...	Slight.
Moderate: seasonal perched water table; slow permeability; cherty surface layer; slope.	Moderate: seasonal perched water table...	Slight.
Severe: slope; seasonal perched water table; slow permeability; cherty surface layer.	Moderate: seasonal perched water table; slope.	Slight.
Severe: slope; seasonal perched water table; slow permeability; cherty surface layer.	Severe: slope.....	Moderate: slope.
Moderate to severe: bedrock at depth of 1½ to 3½ feet; stoniness; slope.	Slight to severe: slope.....	Moderate: stoniness; slope.
Moderate: bedrock at depth of 1½ to 3½ feet; coarse fragments; slope.	Slight.....	Slight.
Severe: slope; bedrock at depth of 1½ to 3½ feet; coarse fragments.	Moderate to severe: slope.....	Slight to moderate: slope.
Severe: slope; bedrock at depth of 1½ to 3½ feet; coarse fragments.	Severe: slope.....	Moderate to severe: slope.
Moderate: bedrock at depth of 1½ to 3½ feet; stoniness; slope.	Slight.....	Moderate: stoniness.
Severe: slope; bedrock at depth of 1½ to 3½ feet; stoniness.	Moderate to severe: slope.....	Moderate to severe: stoniness; slope.
Severe: high water table.....	Severe: high water table.....	Severe: high water table.
Moderate: seasonal high water table; hazard of flooding.	Moderate: seasonal high water table; hazard of flooding.	Moderate: hazard of flooding.
Moderate: bedrock at depth of 1½ to 3 feet; coarse fragments; slope.	Slight.....	Slight.
Severe: slope; bedrock at depth of 1½ to 3 feet; coarse fragments.	Moderate to severe: slope.....	Slight to moderate: slope.
Severe: slope; bedrock at depth of 1½ to 3 feet; coarse fragments.	Severe: slope.....	Moderate to severe: slope.
Severe: slope; bedrock at depth of 1½ to 3 feet; coarse fragments.	Severe: slope.....	Severe: slope.
Severe: high water table.....	Severe: high water table.....	Severe: high water table.
Moderate: moderately slow permeability; slope.	Slight.....	Slight.
Severe: slope.....	Moderate: slope.....	Slight.
Severe: slope.....	Severe: slope.....	Moderate: slope.
Moderate to severe: stoniness; slope.....	Slight to moderate: slope.....	Moderate: stoniness.
Severe: slope; stoniness.....	Severe: slope.....	Moderate: stoniness; slope.
Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.	Severe: high water table; hazard of flooding.

TABLE 8.—*Soil limitations for*

Soil series and map symbols	Lawns, fairways, landscaping	Camp areas
Monongahela:		
MhA.....	Slight.....	Moderate: seasonal perched water table; slow permeability.
MhB2.....	Slight.....	Moderate: seasonal perched water table; slow permeability.
MhC2.....	Moderate: slope.....	Moderate: seasonal perched water table; slow permeability; slope.
Nolo:		
NoA, NoB.....	Severe: high water table.....	Severe: high water table.....
NoC2, NsC.....	Severe: high water table; slope.....	Severe: high water table; slope.....
Opequon:		
OpB2.....	Severe: bedrock at depth of 1 to 1½ feet.....	Moderate: clay loam surface layer; flagstones.
OpC2.....	Severe: bedrock at depth of 1 to 1½ feet.....	Moderate: clay loam surface layer; flagstones; slope.
OpD2.....	Severe: bedrock at depth of 1 to 1½ feet; slope.....	Severe: slope; clay loam surface layer; flagstones.
OpE2.....	Severe: bedrock at depth of 1 to 1½ feet; slope.....	Severe: slope; clay loam surface layer; flagstones.
OuD.....	Severe: bedrock at depth of 1 to 1½ feet; slope.....	Moderate to severe: clay loam surface layer; stoniness; slope.
OuE.....	Severe: bedrock at depth of 1 to 1½ feet; slope.....	Severe: slope; clay loam surface layer; stoniness.
Philo: Ph.....	Severe: hazard of flooding.....	Severe: hazard of flooding.....
Pope: Pn, Ps.....	Moderate: hazard of flooding.....	Severe: hazard of flooding.....
Robertsville: RbB.....	Severe: high water table.....	Severe: high water table.....
Rock outcrop: Rc. Too variable for valid interpretations.		
Shelocta:		
ShB2.....	Slight.....	Slight.....
ShC2.....	Moderate: slope.....	Moderate: slope.....
ShD2.....	Severe: slope.....	Severe: slope.....
Stony land: SrC, SrF.....	Severe: extreme stoniness; slope.....	Severe: extreme stoniness; slope.....
Strip mines and Dumps: St. Too variable for valid interpretations.		
Tyler: TyA, TyB.....	Moderate: seasonal perched water table.....	Severe: seasonal perched water table.....
Weikert:		
WeB2, WIB..... Interpretations not made for Urban land part of WIB.	Severe: bedrock at depth of 1 to 1½ feet.....	Moderate: coarse fragments.....
WeC2, WIC..... Interpretations not made for Urban land part of WIC.	Severe: bedrock at depth of 1 to 1½ feet; slope.....	Moderate to severe: coarse fragments; slope.
WeE, WIE..... Interpretations not made for Urban land part of WIE.	Severe: bedrock at depth of 1 to 1½ feet; slope.....	Severe: slope; coarse fragments.....
WkD.....	Severe: bedrock at depth of 1 to 1½ feet; slope.....	Moderate to severe: stoniness; slope.....
Weikert and Gilpin: WnF.....	Severe: slope.....	Severe: slope.....
Westmoreland:		
WsB2.....	Slight.....	Slight.....
WsC2.....	Moderate to severe: slope.....	Moderate to severe: slope.....
WsD2.....	Severe: slope.....	Severe: slope.....
WsE.....	Severe: slope.....	Severe: slope.....

specified recreational uses—Continued

Playgrounds	Picnic areas	Paths and trails
Moderate: seasonal perched water table; slow permeability. Moderate: seasonal perched water table; slow permeability; slope. Severe: slope; seasonal perched water table; slow permeability.	Moderate: seasonal perched water table... Moderate: seasonal perched water table... Moderate: seasonal perched water table; slope.	Slight. Slight. Slight.
Severe: high water table..... Severe: high water table; slope.....	Severe: high water table..... Severe: high water table; slope.....	Severe: high water table. Severe: high water table.
Severe: bedrock at depth of 1 to 1½ feet... Severe: bedrock at depth of 1 to 1½ feet; slope. Severe: bedrock at depth of 1 to 1½ feet; slope. Severe: bedrock at depth of 1 to 1½ feet; slope. Severe: bedrock at depth of 1 to 1½ feet; slope. Severe: bedrock at depth of 1 to 1½ feet; slope.	Moderate: clay loam surface layer; flagstones. Moderate: clay loam surface layer; flagstones; slope. Severe: slope; clay loam surface layer; flagstones. Severe: slope; clay loam surface layer; flagstones. Moderate to severe: clay loam surface layer; slope. Severe: slope; clay loam surface layer.....	Moderate: clay loam surface layer; flagstones. Moderate: clay loam surface layer; flagstones. Moderate: clay loam surface layer; flagstones; slope. Severe: slope; clay loam surface layer; flagstones. Moderate: clay loam surface layer; stoniness; slope. Severe: slope; clay loam surface layer; stoniness.
Moderate: seasonal high water table; hazard of flooding.	Moderate: seasonal high water table; hazard of flooding.	Moderate: hazard of flooding.
Moderate: hazard of flooding.....	Moderate: hazard of flooding.....	Slight to moderate: hazard of flooding.
Severe: high water table.....	Severe: high water table.....	Severe: high water table.
Moderate: coarse fragments; slope..... Severe: slope; coarse fragments..... Severe: slope; coarse fragments.....	Slight..... Moderate: slope..... Severe: slope.....	Slight. Slight. Moderate: slope.
Severe: extreme stoniness; slope.....	Severe: extreme stoniness; slope.....	Severe: extreme stoniness; slope.
Severe: seasonal perched water table.....	Moderate: seasonal perched water table...	Moderate: seasonal perched water table.
Severe: bedrock at depth of 1 to 1½ feet...	Moderate: coarse fragments.....	Moderate: coarse fragments.
Severe: bedrock at depth of 1 to 1½ feet; slope.	Moderate to severe: coarse fragments; slope.	Moderate: coarse fragments; slope.
Severe: bedrock at depth of 1 to 1½ feet; slope.	Severe: slope; coarse fragments.....	Moderate to severe: coarse fragments; slope.
Severe: bedrock at depth of 1 to 1½ feet; slope.	Moderate to severe: coarse fragments; slope.	Moderate to severe: stoniness; slope.
Severe: slope.....	Severe: slope.....	Severe: slope.
Moderate to severe: slope.....	Slight.....	Slight.
Severe: slope.....	Moderate to severe: slope.....	Slight to moderate: slope.
Severe: slope.....	Severe: slope.....	Moderate to severe: slope.
Severe: slope.....	Severe: slope.....	Severe: slope.

Some of the alluvium in the county has not been in place long enough for well-defined horizons to form. Areas of this material are classified simply as Alluvial land. The named soil series that are on flood plains have weakly developed horizons, mostly for the same reason.

Morphology of the Soils

Most soils in the county have strongly differentiated horizons. Only weak horizonation is evident, however, in the young soils on flood plains.

The formation of soil horizons is the result of one or more processes. These are accumulation of organic matter; leaching of carbonates and other soluble compounds; chemical weathering, chiefly by hydrolysis, of the primary minerals of parent material into silicate clay minerals; translocation of silicate clay minerals, and probably some silt-sized particles, from one horizon to another; and chemical changes (oxidation, reduction, and hydration) and movement of iron.

In almost all soils of the county, several of these processes have been active in the development of horizons. For example, the interaction of the first, second, third, and fourth processes given in the previous paragraph is reflected in the strongly expressed horizons of the Hagerstown soils, and all five processes have been active in the development of the moderately well drained to somewhat poorly drained Albrights and Cavode soils. Only the first process has had any marked effect on the Huntington and Pope soils. In some soils that formed in transported and redeposited material, leaching of carbonates and other compounds probably took place before the soil materials were redeposited, and some of the other processes could have been active before deposition.

Some organic matter has accumulated in all the soils to form an A1 horizon. In many places, however, the A1 horizon has lost its identity as a result of tillage and is now part of an Ap horizon. The amount of organic matter varies in different soils. The Dekalb and Lehew soils, for example, have weak, thin A1 horizons that are low in organic matter, while at the other extreme the Lickdale soil has a prominent, thick A1 (or Ap) horizon that is high in content of organic matter.

Some studies of clay mineralogy of the soils in this part of Maryland have been made. Generally the soils contain a mixture of clay minerals, but no particular mineral strongly dominates. Thus, all the soils of the county except one are classified as having mixed mineralogy. The exception is the Leetonia soil, which is classified as siliceous. A likely possibility, however, is that the clay fraction in the Cavode soils is relatively high in kaolinite, and that the clay fraction in the Hagerstown, Edom, and Opequon soils is relatively high in illitic minerals.

The downward movement of clay minerals has contributed strongly to the development of horizons in many of the soils. These minerals have been partly removed from the A1 and A2 horizons and partly

immobilized in a Bt horizon. This is characteristic of the Albrights, Allegheny, Belmont, Brooke, Buchanan, Cavode, Chavies, Cookport, Edom, Ernest, Gilpin, Hagerstown, Laidig, Landisburg, Loysville, Meckesville, Monongahela, Nolo, Opequon, Robertsville, Shelcta, Tyler, and Westmoreland soils. Clay may also have moved downward in other soils of the county, but if so, the quantity has been insufficient to be clearly observable.

Under certain conditions in soils materials that are coarse textured and very acid, organic matter is removed from near the surface and redeposited in the subsoil, probably with some colloidal aluminum or iron compounds, to form a Bh horizon. This is characteristic of the Leetonia soils in Allegany County.

Reduction and transfer of iron has taken place to some degree in all soils that have impeded natural drainage. Only in the wettest soils, however, has this process, known as gleying, been of much significance. The Atkins, Lickdale, Loysville, Melvin, Nolo, Robertsville, and Tyler soils have been most strongly affected by gleying.

Iron that has been reduced in areas where the soil is poorly aerated generally becomes mobile and can be partly or completely removed from the soil. In the soils of this county, however, most of the iron has moved either within the horizon where it originated or to another nearby horizon. Part of this iron can become reoxidized and segregated to form the yellowish-red, yellowish-brown, or strong-brown mottles that indicate impeded drainage and are common in a gleyed horizon.

When silicate clay is produced by hydrolysis of primary minerals, some iron is generally freed as hydrated oxide. Depending upon the degree of hydration, these oxides are more or less red. Only a small amount of the oxide is required to give the subsoil a reddish color. In Allegany County the soils most strongly colored by iron oxide are those of the Hagerstown and Opequon series. The reddish colors in the Albrights, Calvin, Lehew, and Meckesville soils are mostly inherited from reddish geologic material, but the colors could have been augmented by iron oxide.

A profile that is representative of each soil series in the county is described in detail in the section "Descriptions of the Soils."

Classification of the Soils

Classification consists of an orderly grouping of soils according to a system designed to make it easier to remember soil characteristics and interrelationships. Classification is useful in organizing and applying the results of experience and research. Soils are placed in narrow classes for discussion in detailed soil surveys and for application of knowledge within farms and fields. The many thousands of narrow classes are then grouped into progressively fewer and broader classes in successively higher categories, so that information can be applied to large geographic areas.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (2) and revised later (4). The system currently used by the National Cooperative Soil Survey was developed in the early sixties and adopted in 1965. It is under continual study (3, 6).

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are observable or measurable, but the properties are selected so that soils of similar genesis are grouped together.

Ten soil orders are recognized in the present system. They are Entisols, Vertisols, Inceptisols, Aridisols, Spodosols, Mollisols, Alfisol, Ultisols, Oxisols, and Histosols. In contrast, more than 8,000 soil series have been mapped in the United States alone. Only six orders, Entisols, Inceptisols, Spodosols, Mollisols, Alfisols, and Ultisols, are represented in Allegany County.

Entisols are essentially recent or very young soils. They have been very slightly modified from the geologic material in which they formed. In Allegany County they are the poorly drained Atkins and Melvin soils on flood plains.

Inceptisols are mineral soils in which horizons have definitely started to develop but also are definitely weak. They are on young but not necessarily recent land surfaces. Examples are the Dekalb soils of the uplands and the Philo soils on flood plains.

Spodosols are mineral soils that have a subsoil horizon augmented by organic matter. The only soils representative of this order in Allegany County are in the Leetonia series.

Mollisols are soils that have "soft" surface layers. Such soils have very dark colored A horizons at least 10 inches thick, and the dark color is not inherited but is derived from organic matter. Mollisols also are high in bases, and they are generally no more than slightly acid.

Alfisols are soils that have a clay-enriched B horizon high in bases; that is, the base saturation is greater than 35 percent. As a result, these soils have a greater supply of basic plant nutrients than most other soils of the county.

Ultisols are mineral soils that have a clay-enriched B horizon in which base saturation is less than 35 percent.

In table 9 the soils of the county are classified according to both systems. The placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

Climate ⁵

Because of its position in the middle latitudes, where the general atmospheric flow is from west to east across the North American continent, Allegany

County has a continental type of climate with well-defined seasons. The county is in both the Ridge and the Valley and the Appalachian Plateau physiographic regions, where topography is varied and climate is quite variable, especially in areas that are between floors of valleys and summits of ridges.

No one point can be considered as representative for the total climate of the county; however, data in table 10 has been prepared for Cumberland, the main city, and in the following paragraphs reference is made to the significant variation in climate that exists in the whole county.

The average annual temperature ranges from 51° F at Frostburg to 54° F at Westernport. Occurrences of temperatures of 90° and higher range from 11 days a year at Frostburg to 26 days at Cumberland. Maryland's highest temperature, 109°, has been reached four times at weather stations in the county. The only other occurrences of this temperature in the State are in Washington County. The average number of days per year that have daily minimum temperatures of 32° and lower ranges from 115 days at Cumberland to 132 days at Frostburg. The lowest official temperature on record in the county is -22°, recorded at Frostburg on February 10, 1899.

Freeze data, including average dates of the last spring and first fall occurrences of minimum temperatures equal to or below specified threshold values, are given in table 11 for both Cumberland and Frostburg. The period between the last frost of 32° F temperature in the spring and the first in the fall, commonly defined as the growing season, averages 157 days at Frostburg and 168 days at Cumberland.

Allegany and Washington Counties are in the so-called "rain shadow" to the east of the Allegany Plateau, and they have the least rainfall of all of the Maryland counties. Elsewhere in the State, annual rainfall totals based on the years 1931 to 1960 are generally between 40 and 49 inches, but in Allegany County range from 35 to 41 inches. Snowfall over the county ranges from 30 to near 50 inches, and the heaviest totals are along the Allegany Plateau region.

Drought can occur in any month or season, but serious drought is more likely in the summer. Generally, the normal rainfall and the moisture stored in the soil are adequate to meet most needs.

Thunderstorms occur on an average of about 35 days per year and are most frequent from May through August. Prevailing winds are from west to northwest except during the warmer half of the year when they become more southerly; however, the character and orientation of the various valleys in the county can impose significant changes in windspeed and wind direction. The probability of a tornado is small. On the average only one to two per year are reported for the entire State. About once every three or four years, hurricanes or tropical storms approach near enough to affect the county. They generally produce moderate to heavy rainfall, but seldom have winds over 50 mi/h. The most notable of these was Hurricane Hazel, of October 15, 1954, which brought record one-day rainfall totals to the county.

⁵ By W. J. MOYER, climatologist for Maryland, National Weather Service, U.S. Department of Commerce.

TABLE 9.—*Soil series classified according to the current system and the 1938 system*

Series	Current system			1938 system
	Family	Subgroup	Order	Great soil group
Albrights.....	Fine-loamy, mixed, mesic.....	Aquic Fragiudalfs.....	Alfisols.....	(¹).
Allegheny.....	Fine-loamy, mixed, mesic.....	Typic Hapludults.....	Ultisols.....	Gray-Brown Podzolic soils.
Atkins.....	Fine-loamy, mixed, acid, mesic.....	Typic Fluvaquents.....	Entisols.....	Low-Humic Gley soils.
Belmont ²	Fine-loamy, mixed, mesic.....	Ultic Hapludalfs.....	Alfisols.....	Gray-Brown Podzolic soils.
Brooke ²	Fine, mixed, mesic.....	Mollic Hapludalfs.....	Alfisols.....	Gray-Brown Podzolic soils.
Buchanan.....	Fine-loamy, mixed, mesic.....	Aquic Fragiudults.....	Ultisols.....	Red-Yellow Podzolic soils.
Calvin.....	Loamy-skeletal, mixed, mesic.....	Typic Dystrochrepts.....	Inceptisols.....	Lithosols.
Cavode.....	Clayey, mixed, mesic.....	Aeric Ochraquults.....	Ultisols.....	Red-Yellow Podzolic soils.
Chavies.....	Coarse-loamy, mixed, mesic.....	Ultic Hapludalfs.....	Alfisols.....	(¹).
Cookport.....	Fine-loamy, mixed, mesic.....	Aquic Fragiudults.....	Ultisols.....	Gray-Brown Podzolic soils.
Dekalb.....	Loamy-skeletal, mixed, mesic.....	Typic Dystrochrepts.....	Inceptisols.....	Sols Bruns Acides.
Edom.....	Fine, illitic, mesic.....	Typic Hapludults.....	Alfisols.....	Gray-Brown Podzolic soils.
Elliber.....	Loamy-skeletal, mixed, mesic.....	Typic Hapludults.....	Ultisols.....	Gray-Brown Podzolic soils.
Ernest.....	Fine-loamy, mixed, mesic.....	Aquic Fragiudults.....	Ultisols.....	Red-Yellow Podzolic soils.
Gilpin.....	Fine-loamy, mixed, mesic.....	Typic Hapludults.....	Ultisols.....	Gray-Brown Podzolic soils.
Hagerstown ²	Fine, mixed, mesic.....	Typic Hapludalfs.....	Alfisols.....	Gray-Brown Podzolic soils.
Huntington.....	Fine-silty, mixed, mesic.....	Fluventic Hapludolls.....	Mollisols.....	Alluvial soils.
Laidig.....	Fine-loamy, mixed, mesic.....	Typic Fragiudults.....	Ultisols.....	Red-Yellow Podzolic soils.
Landisburg ²	Fine-loamy, mixed, mesic.....	Typic Fragiudults.....	Ultisols.....	Red-Yellow Podzolic soils.
Leetonia.....	Sandy-skeletal, siliceous, mesic.....	Entic Haplorthods.....	Spodosols.....	Podzols.
Lehew.....	Loamy-skeletal, mixed, mesic.....	Typic Dystrochrepts.....	Inceptisols.....	Sols Bruns Acides.
Lickdale ²	Fine-loamy, mixed, acid, mesic.....	Humic Haplaquents.....	Inceptisols.....	Humic Gley soils.
Lindside.....	Fine-silty, mixed, mesic.....	Fluvaquentic Eutrochrepts.	Inceptisols.....	Alluvial soils.
Litz.....	Loamy-skeletal, mixed, mesic.....	Ruptic-Ultic Dystrochrepts.	Inceptisols.....	Lithosols.
Loysville.....	Fine-loamy, mixed, mesic.....	Typic Fragiaqualfs.....	Alfisols.....	Planosols.
Meckesville.....	Fine-loamy, mixed, mesic.....	Typic Fragiudults.....	Ultisols.....	(¹).
Melvin.....	Fine-silty, mixed, nonacid, mesic.....	Typic Fluvaquents.....	Entisols.....	Low-Humic Gley soils.
Monongahela.....	Fine-loamy, mixed, mesic.....	Typic Fragiudults.....	Ultisols.....	Red-Yellow Podzolic soils.
Nolo.....	Fine-loamy, mixed, mesic.....	Typic Fragiaquults.....	Ultisols.....	Planosols.
Opequon.....	Clayey, mixed, mesic.....	Lithic Hapludalfs.....	Alfisols.....	(¹).
Philo.....	Coarse-loamy, mixed, mesic.....	Fluvaquentic Dystrochrepts.	Inceptisols.....	Alluvial soils.
Pope.....	Coarse-loamy, mixed, mesic.....	Fluventic Dystrochrepts.....	Inceptisols.....	Alluvial soils.
Robertsville.....	Fine-silty, mixed, mesic.....	Typic Fragiaqualfs.....	Alfisols.....	Planosols.
Shelocta.....	Fine-loamy, mixed, mesic.....	Typic Hapludults.....	Ultisols.....	Brown Podzolic soils.
Tyler.....	Fine-silty, mixed, mesic.....	Aeric Fragiaquults.....	Ultisols.....	Planosols.
Weikert.....	Loamy-skeletal, mixed, mesic.....	Lithic Dystrochrepts.....	Inceptisols.....	(¹).
Westmoreland.....	Fine-loamy, mixed, mesic.....	Ultic Hapludalfs.....	Alfisols.....	Gray-Brown Podzolic soils.

¹ Not classified.

² Taxadjuncts to their respective series. The soil mapped as Belmont has more clay than is normal for the series. The soil mapped as Brooke has a lighter colored surface horizon than is normal for the series; this may be due to the fact that all of the soil mapped as Brooke in the county is severely eroded. The soil mapped as Hagerstown has a somewhat thicker solum than is normal for the series. The soil mapped as Landisburg is less acid and higher in bases than is normal for the series. The soil mapped as Lickdale shows more evidence of clay accumulation in the B horizon than is normal for the series.

Literature Cited

- (1) American Association of State Highway Officials. 1961. Standard specifications for highway materials and methods of sampling and testing. Ed. 8, 2 v., illus.
- (2) Baldwin, M., Kellogg, C. E., and Thorp, James. 1938. Soil classification. U. S. Dept. Agr. Ybk., pp. 979-1001, illus.
- (3) Simonson, Roy W. 1962. Soil classification in the United States. Sci., v. 137, No. 3535, pp. 1027-1034.
- (4) Thorp, James, and Smith, Guy D. 1949. Higher categories of soil classification: order, suborder, and great soil group. Soil Sci. 67: 117-126.
- (5) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dept. Agr. Handbook 18, 503 pp., illus.
- (6) ————. 1960. Soil classification, a comprehensive system, 7th approximation. 265 pp., illus. (Supplement issued in March 1967.)
- (7) United States Department of Defense. 1968. Unified soil classification system for roads, airfields, embankments, and foundations. MIL-STD-619B, 30 pp., illus.

Glossary

- Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.
- Alluvium.** Soil material, such as sand, silt, or clay, that has been deposited on land by streams.
- Association, soil.** A group of soils geographically associated in a characteristic repeating pattern.
- Available water capacity** (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.
- Bedding.** Plowing, grading, or otherwise elevating the surface of a flat field into a series of broad beds, or "lands," so as to leave shallow surface drains between the beds.

TABLE 10.—*Temperature and precipitation*

[Data from Cumberland, Maryland, Station coordinates 39°39'N., 78°45'W. Elevation 900 Feet. Period of record July 1947–June 1960]

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 of 1 inch or more
			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	40.7	23.2	60	7	2.47	1.1	4.3	10	3
February	43.3	24.6	61	8	2.55	1.1	4.5	10	4
March	52.1	30.9	72	17	3.90	1.7	6.3	6	4
April	65.0	41.1	84	28	3.52	1.7	6.8	(¹)	3
May	75.3	49.4	87	37	3.59	.6	7.3		
June	83.3	57.2	94	47	3.77	1.3	7.2		
July	86.8	61.2	95	52	3.21	1.5	4.9		
August	85.1	60.1	95	50	3.35	1.1	5.6		
September	78.3	52.9	92	40	2.91	1.2	5.3		
October	68.2	42.8	83	30	2.41	.9	6.2	0	0
November	53.3	34.1	69	21	2.50	1.0	4.3	1	2
December	41.8	25.4	59	11	2.33	.5	4.4	8	3
Year	64.4	41.9	² 98	³ 1	36.51	28.2	44.1	35	3

¹ Less than half a day.
² Average annual highest temperature.
³ Average annual lowest temperature.

TABLE 11.—*Probabilities of last freezing temperatures in spring and first in fall*

[Data from Cumberland and Frostburg cooperative Weather Bureau Stations. Period of Record 1947–67]

Probability	Dates for given probability and temperature					
	32° F or lower		24° F or lower		16° F or lower	
	Cumberland	Frostburg	Cumberland	Frostburg	Cumberland	Frostburg
Spring:						
9 years in 10 later than	April 7	April 11	March 13	March 20	February 11	February 22
3 years in 4 later than	April 16	April 20	March 19	March 28	February 19	March 3
2 years in 3 later than	April 19	April 24	March 22	March 31	February 21	March 7
1 year in 2 later than	April 26	May 1	March 26	April 6	February 27	March 14
1 year in 3 later than	May 3	May 8	March 30	April 12	March 5	March 21
1 year in 4 later than	May 6	May 12	April 2	April 15	March 8	March 25
1 year in 10 later than	May 15	May 21	April 8	April 23	March 15	April 3
Fall:						
1 year in 10 earlier than	September 27	September 24	October 29	October 28	November 17	November 15
1 year in 4 earlier than	October 3	September 29	November 3	October 31	November 25	November 22
1 year in 3 earlier than	October 5	October 1	November 5	November 1	November 28	November 25
1 year in 2 earlier than	October 10	October 4	November 8	November 3	December 3	November 30
2 years in 3 earlier than	October 15	October 7	November 11	November 5	December 8	December 5
3 years in 4 earlier than	October 17	October 9	November 13	November 6	December 11	December 8
9 years in 10 earlier than	October 24	October 14	November 18	November 9	December 18	December 15

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.
Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.
Coarse fragments. Mineral or rock particles more than 2 millimeters in diameter.
Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, 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 when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grade.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

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.

Depth, soil. In this survey, the word descriptions and corresponding numerical ranges for depth are as follows:

Very shallow	-----	10 inches or less
Shallow	-----	10 to 20 inches
Moderately deep	-----	20 to 40 inches
Deep	-----	40 inches or more.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The base of a slope where there is a significant change in the grade or angle toward more nearly level land.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface. See also *Hardpan*.

Genesis, soil. The manner in which a soil originates. Refers especially to the processes initiated by climate and organisms that are responsible for the development of the solum, or true soil, from the unconsolidated parent material, as conditioned by relief and age of landform.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the lower horizons, as a result of waterlogging with poor aeration and drainage; expressed in the soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gleyed soil.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Green manure (agronomy). A crop grown for the purpose of being turned under in an early stage of maturity or soon after maturity for soil improvement.

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. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Interceptor. A drainage ditch or tile line, generally at or near the base of a slope, to protect areas downslope from the effects of seepage water.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by the height of the water table, either permanent or perched. Relative terms for expressing internal soil drainage are *none, very slow, slow, medium, rapid, and very rapid.*

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to relatively level plots surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops, or in orchards, to confine the flow of water to one direction.

Furrow.—Water is applied in small ditches made by cultivation implements used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Irrigation water, released at high points, flows onto the field without controlled distribution.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Loam. Soil having equal amounts of sand, silt, and clay.

Marine deposit. Material deposited in the waters of oceans and seas and exposed by the elevation of the land or the lowering of the water level.

Mechanical analysis of soil. The determination of the percentage of soil particles of all sizes—gravel, sand, silt, clay, and all their standard subdivisions, based on the mineral soil only, free of water and organic matter.

Miscellaneous land type. A mapping unit for areas of land that have little or no natural soil; or that are too nearly inaccessible for orderly examination; or that occur where, for other reasons, it is not feasible to classify the soil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineralogical, and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: abundance—*few, common, and many*; size—*fine, medium, and coarse*; and contrast—*faint, distinct, and prominent*. The size measurements are these: *fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil, and carbon, hydrogen, and oxygen obtained largely from the air and water, are plant nutrients.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as

follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid, and very rapid.*

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Poorly graded. Refers to a soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles in poorly graded soil material, density can be increased only slightly by compaction.

Productivity, soil. The present capability of a soil for producing a specified plant or sequence of plants under a specified system of management. It is measured in terms of output, or harvest, in relation to input of production for the specific kind of soil under a specified system of management.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH
Extremely acid -----	Below 4.5
Very strongly acid -----	4.5 to 5.0
Strongly acid -----	5.1 to 5.5
Medium acid -----	5.6 to 6.0
Slightly acid -----	6.1 to 6.5
Neutral -----	6.6 to 7.3
Mildly alkaline -----	7.4 to 7.8
Moderately alkaline -----	7.9 to 8.4
Strongly alkaline -----	8.5 to 9.0
Very strongly alkaline -----	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Runoff. The removal of water by flow over the surface of the soil.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils developed from a particular type of parent material and having genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

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 on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows. *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from ad-

- joining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).
- Subgrade** (engineering). The substratum, consisting of in-place material or fill material, that is prepared for highway construction; does not include stabilized base course or actual paving material.
- Subsoil**. Technically, the B horizon; roughly, the part of the solum below plow depth.
- Substratum**. Technically, the part of the soil below the solum.
- Surface soil**. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.
- Terrace**. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.
- Terrace** (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.
- Texture, soil**. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."
- Tilth, soil**. The condition of the soil in relation to the growth of plants, especially 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, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.
- 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.
- Weathering**. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.
- Well-graded soil**. A soil or soil material consisting of particles that are well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.
- Wilting point** (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which it belongs. In referring to a capability unit or a woodland suitability group, read the introduction to the section it is in for general information about management. Absence of an entry in a column means that the soil material is too variable to place that mapping unit in a capability unit or woodland suitability group. Two woodland suitability groups are indicated for a mapping unit if that particular soil has different tree growths on its north and south aspects. Other information is given in tables as follows:

Acreage and extent,
table 1, p. 7.

Estimated yields, table 2, p. 71.

Woodland, table 3, p. 74.

Wildlife, table 4, p. 82.

Engineering uses of the soils,
tables 5 and 6, pp. 88 through 105.

Town and country planning,
table 7, p. 108.

Recreation, table 8, p. 118.

Map symbol	Mapping unit	De-scribed on page	Capability unit		Woodland suitability group
			Symbol	Page	Number
AbB	Albrights silt loam, 0 to 8 percent slopes-----	9	IIe-13	60	3w1
AbC2	Albrights silt loam, 8 to 15 percent slopes, moderately eroded-----	9	IIIe-13	63	3w1
AgD	Albrights very stony silt loam, 3 to 25 percent slopes-----	9	VIIs-3	68	3w1
AhA	Allegheny fine sandy loam, 0 to 3 percent slopes-----	10	I-5	59	2o3
AhB2	Allegheny fine sandy loam, 3 to 8 percent slopes, moderately eroded-----	10	IIe-5	59	2o3
AhC2	Allegheny fine sandy loam, 8 to 15 percent slopes, moderately eroded-----	10	IIIe-5	62	2o3
A1A	Allegheny silt loam, 0 to 3 percent slopes-----	10	I-4	59	2o3
A1B2	Allegheny silt loam, 3 to 8 percent slopes, moderately eroded-----	10	IIe-4	59	2o3
A1C2	Allegheny silt loam, 8 to 15 percent slopes, moderately eroded-----	10	IIIe-4	62	2o3
A1D	Allegheny silt loam, 15 to 30 percent slopes-----	10	IVe-3	66	2r4
AnB	Allegheny-Urban land complex, 0 to 8 percent slopes--	10	-----	-----	-----
AnC	Allegheny-Urban land complex, 8 to 20 percent slopes-----	11	-----	-----	-----
Au	Alluvial land-----	11	VIW-1	68	1w9
Av	Alluvial land-Urban land complex-----	11	-----	-----	-----
Aw	Atkins silt loam-----	12	IIIW-7	65	1w9
BeE	Belmont very stony silty clay loam, 20 to 50 percent slopes-----	13	VIIIs-2	68	2r5 (north aspects) 3r5 (south aspects)
BkC3	Brooke silty clay loam, 8 to 15 percent slopes, severely eroded-----	14	IVe-1	66	4c2
BuB2	Buchanan gravelly loam, 0 to 8 percent slopes, moderately eroded-----	14	IIe-13	60	3o3
BuC2	Buchanan gravelly loam, 8 to 15 percent slopes, moderately eroded-----	15	IIIe-13	63	3o3
BvC	Buchanan very stony loam, 0 to 15 percent slopes-----	15	VIIs-3	68	3o3
BvD	Buchanan very stony loam, 15 to 25 percent slopes----	15	VIIs-3	68	3r4
CaB	Calvin channery silt loam, 0 to 10 percent slopes----	16	IIe-10	59	4f3
CaC	Calvin channery silt loam, 10 to 20 percent slopes---	16	IIIe-10	62	4f3
C1B2	Calvin shaly silt loam, 0 to 10 percent slopes, moderately eroded-----	16	IIe-10	59	4f3
C1C2	Calvin shaly silt loam, 10 to 20 percent slopes, moderately eroded-----	16	IIIe-10	62	4f3
C1D2	Calvin shaly silt loam, 20 to 30 percent slopes, moderately eroded-----	17	IVe-10	66	4f4 (north aspects) 5f3 (south aspects)

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	De-scribed on page	Capability unit		Woodland suitability group
			Symbol	Page	Number
C1E	Calvin shaly silt loam, 30 to 45 percent slopes-----	17	VIe-3	67	4f4 (north aspects) 5f3 (south aspects)
CnB2	Calvin-Weikert shaly silt loams, 0 to 10 percent slopes, moderately eroded-----	17	IIIe-10	62	4f3
CnC2	Calvin-Weikert shaly silt loams, 10 to 20 percent slopes, moderately eroded-----	17	IVe-10	66	4f3
CnD2	Calvin-Weikert shaly silt loams, 20 to 30 percent slopes, moderately eroded-----	17	VIe-3	67	4f4 (north aspects) 5f3 (south aspects)
CnE	Calvin-Weikert shaly silt loams, 30 to 50 percent slopes-----	17	VIIe-3	68	4f4 (north aspects) 5f3 (south aspects)
CoB2	Cavode silt loam, 0 to 10 percent slopes, moderately eroded-----	18	IIIw-5	64	2w6
CoC2	Cavode silt loam, 10 to 20 percent slopes, moderately eroded-----	18	IIIe-34	64	2w6
CrD	Cavode very stony silt loam, 0 to 30 percent slopes--	18	VIs-3	68	2w6
CsA	Chavies loam, 0 to 3 percent slopes-----	19	I-6	59	2o3
CsB	Chavies loam, 3 to 8 percent slopes-----	19	IIe-6	59	2o3
CtB2	Cookport silt loam, 0 to 10 percent slopes, moderately eroded-----	20	IIe-13	60	2w3
CtC2	Cookport silt loam, 10 to 20 percent slopes, moderately eroded-----	20	IIIe-13	63	2w3
CuB	Cookport very stony silt loam, 0 to 10 percent slopes-----	20	VIs-3	68	2w3
CuD	Cookport very stony silt loam, 10 to 30 percent slopes-----	20	VIs-3	68	2w3
Cv	Cut and fill land-----	20	-----	-----	-----
DeB2	Dekalb channery sandy loam, 0 to 12 percent slopes, moderately eroded-----	21	IIe-20	61	3f3
DeC2	Dekalb channery sandy loam, 12 to 25 percent slopes, moderately eroded-----	21	IIIe-20	63	3f3
DeD	Dekalb channery sandy loam, 25 to 45 percent slopes--	22	VIe-3	67	2f4 (north aspects) 3f4 (south aspects)
DkB	Dekalb very stony sandy loam, 0 to 12 percent slopes-----	22	VIs-4	68	3f3
DkC	Dekalb very stony sandy loam, 12 to 25 percent slopes-----	22	VIs-4	68	3f3
D1E	Dekalb and Lehigh very stony soils, 25 to 45 percent slopes-----	22	VIIIs-3	68	2f4 (north aspects) 3f4 (south aspects)
D1F	Dekalb and Lehigh very stony soils, 45 to 75 percent slopes-----	22	VIIIs-3	68	2f4 (north aspects) 3f5 (south aspects)
EdB2	Edom silt loam, 3 to 8 percent slopes, moderately eroded-----	23	IIe-11	60	2o3
EdC2	Edom silt loam, 8 to 15 percent slopes, moderately eroded-----	23	IIIe-11	63	2o3
Edd2	Edom silt loam, 15 to 25 percent slopes, moderately eroded-----	23	IVe-10	66	2r4
EdE2	Edom silt loam, 25 to 45 percent slopes, moderately eroded-----	23	VIe-3	67	2r5
EeE3	Edom silty clay loam, 25 to 45 percent slopes, severely eroded-----	23	VIIe-3	68	2r5
E1A	Elliber cherty silt loam, 0 to 5 percent slopes-----	24	IIIs-26	62	3f3
E1B2	Elliber cherty silt loam, 5 to 12 percent slopes, moderately eroded-----	24	IIe-26	61	3f3
E1C2	Elliber cherty silt loam, 12 to 25 percent slopes, moderately eroded-----	24	IIIe-26	64	3f3

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	De-scribed on page	Capability unit		Woodland suitability group
			Symbol	Page	Number
E1D	Elliber cherty silt loam, 25 to 45 percent slopes----	24	VIe-3	67	2f4 (north aspects) 3f4 (south aspects)
EmC	Elliber very stony silt loam, 0 to 25 percent slopes-----	24	VIIs-2	68	3f3
EmD	Elliber very stony silt loam, 25 to 45 percent slopes-----	24	VIIIs-2	68	2f4 (north aspects) 3f4 (south aspects)
EmF	Elliber very stony silt loam, 45 to 75 percent slopes-----	25	VIIIs-2	68	2f4 (north aspects) 3f5 (south aspects)
ErA	Ernest silt loam, 0 to 3 percent slopes-----	26	IIW-3	61	3w1
ErB2	Ernest silt loam, 3 to 8 percent slopes, moderately eroded-----	26	IIe-13	60	3w1
ErC2	Ernest silt loam, 8 to 15 percent slopes, moderately eroded-----	26	IIIe-13	63	3w1
ErD2	Ernest silt loam, 15 to 25 percent slopes, moderately eroded-----	26	IVe-9	66	3w1
EuB	Ernest-Landisburg-Urban land complex, 0 to 8 percent slopes-----	26	-----	-----	-----
EuD	Ernest-Landisburg-Urban land complex, 8 to 25 percent slopes-----	27	-----	-----	-----
G1B2	Gilpin silt loam, 0 to 10 percent slopes, moderately eroded-----	28	IIe-10	59	3o3
G1C2	Gilpin silt loam, 10 to 20 percent slopes, moderately eroded-----	28	IIIe-10	62	3o3
G1D2	Gilpin silt loam, 20 to 30 percent slopes, moderately eroded-----	28	IVe-10	66	2r4 (north aspects) 3r4 (south aspects)
GnB2	Gilpin channery silt loam, 0 to 10 percent slopes, moderately eroded-----	28	IIe-10	59	3o3
GnC2	Gilpin channery silt loam, 10 to 20 percent slopes, moderately eroded-----	29	IIIe-10	62	3o3
GnD2	Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded-----	29	IVe-10	66	2r4 (north aspects) 3r4 (south aspects)
GnE	Gilpin channery silt loam, 30 to 45 percent slopes---	29	VIe-3	67	2r5 (north aspects) 3r5 (south aspects)
GsB	Gilpin very stony silt loam, 0 to 10 percent slopes--	29	VIIs-3	68	3o3
GsD	Gilpin very stony silt loam, 10 to 30 percent slopes-----	29	VIIs-3	68	2r4 (north aspects) 3r4 (south aspects)
GuB	Gilpin-Urban land complex, 0 to 10 percent slopes---	29	-----	-----	-----
GuD	Gilpin-Urban land complex, 10 to 30 percent slopes---	29	-----	-----	-----
GwF	Gilpin and Weikert very stony silt loams, 30 to 65 percent slopes-----	30	VIIIs-3	68	2r5 (north aspects) 3r5 (south aspects)
Gx	Gravel pits-----	30	VIIIIs-4	69	-----
HeC2	Hagerstown silt loam, 8 to 20 percent slopes, moderately eroded-----	31	IIIe-1	62	1c3
HeE2	Hagerstown silt loam, 20 to 40 percent slopes, moderately eroded-----	31	IVe-1	66	1c4
Hn	Huntington silt loam-----	31	I-6	59	1o3
HxA	Huntington silt loam, local alluvium, 0 to 3 percent slopes-----	31	I-6	59	1o3
HxB	Huntington silt loam, local alluvium, 3 to 8 percent slopes-----	32	IIe-6	59	1o3
HxC	Huntington silt loam, local alluvium, 8 to 15 percent slopes-----	32	IIIe-6	62	1o3
LaB2	Laidig gravelly loam, 0 to 8 percent slopes, moderately eroded-----	33	IIe-4	59	3o3

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	De-scribed on page	Capability unit		Woodland suitability group
			Symbol	Page	Number
LaC2	Laidig gravelly loam, 8 to 15 percent slopes, moderately eroded-----	33	IIIe-4	62	3o3
LaD2	Laidig gravelly loam, 15 to 25 percent slopes, moderately eroded-----	33	IVe-3	66	3r4
LbC	Laidig very stony loam, 3 to 15 percent slopes-----	33	VIIs-3	68	3o3
LbD	Laidig very stony loam, 15 to 25 percent slopes-----	33	VIIs-3	68	3r4
LdA	Landisburg cherty silt loam, 0 to 3 percent slopes---	34	IIw-2	61	3w1
LdB2	Landisburg cherty silt loam, 3 to 8 percent slopes, moderately eroded-----	34	IIe-14	61	3w1
LdC2	Landisburg cherty silt loam, 8 to 15 percent slopes, moderately eroded-----	34	IIIe-14	63	3w1
LdD2	Landisburg cherty silt loam, 15 to 25 percent slopes, moderately eroded-----	34	IVe-9	66	3w1
LgD	Leetonia very stony sandy loam, 0 to 25 percent slopes-----	35	VIIs-4	68	5f3
LhB2	Lehew channery loam, 3 to 10 percent slopes, moderately eroded-----	36	IIe-10	59	4f3
LhC2	Lehew channery loam, 10 to 20 percent slopes, moderately eroded-----	36	IIIe-10	62	4f3
LhE	Lehew channery loam, 20 to 45 percent slopes-----	36	VIe-3	67	3f4 (north aspects) 5f3 (south aspects)
LlB	Lehew very stony loam, 0 to 10 percent slopes-----	36	VIIs-4	68	4f3
LlD	Lehew very stony loam, 10 to 30 percent slopes-----	36	VIIs-4	68	3f4 (north aspects) 5f3 (south aspects)
Lm	Lickdale silt loam-----	37	IVw-2	66	1w9
Ln	Lindside silt loam-----	37	IIw-7	61	1w1
LsB2	Litz shaly silt loam, 3 to 10 percent slopes, moderately eroded-----	39	IIe-11	60	5f3
LsC2	Litz shaly silt loam, 10 to 20 percent slopes, moderately eroded-----	39	IIIe-11	63	5f3
LsD2	Litz shaly silt loam, 20 to 30 percent slopes, moderately eroded-----	39	IVe-10	66	5f3
LsE	Litz shaly silt loam, 30 to 45 percent slopes-----	39	VIIe-3	68	5f3
LyB	Loysville cherty silt loam, 0 to 8 percent slopes----	40	IIIw-1	64	2w6
McB2	Meckesville silt loam, 0 to 8 percent slopes, moderately eroded-----	41	IIe-4	59	2o3
McC2	Meckesville silt loam, 8 to 15 percent slopes, moderately eroded-----	41	IIIe-4	62	2o3
McD2	Meckesville silt loam, 15 to 25 percent slopes, moderately eroded-----	41	IVe-3	66	2r4
MdC	Meckesville very stony silt loam, 0 to 15 percent slopes-----	41	VIIs-3	68	2o3
MdD	Meckesville very stony silt loam, 15 to 25 percent slopes-----	41	VIIs-3	68	2r4
Me	Melvin silt loam-----	42	IIIw-3	64	1w9
MhA	Monongahela silt loam, 0 to 3 percent slopes-----	44	IIw-3	61	4w1
MhB2	Monongahela silt loam, 3 to 8 percent slopes, moderately eroded-----	44	IIe-13	60	4w1
MhC2	Monongahela silt loam, 8 to 15 percent slopes, moderately eroded-----	44	IIIe-13	63	4w1
NoA	Nolo silt loam, 0 to 3 percent slopes-----	45	IVw-2	66	3w9
NoB	Nolo silt loam, 3 to 10 percent slopes-----	45	IVw-2	66	3w9
NoC2	Nolo silt loam, 10 to 20 percent slopes, moderately eroded-----	45	IVw-2	66	3w9
NsC	Nolo very stony silt loam, 0 to 20 percent slopes----	46	VIIIs-4	69	3w9
OpB2	Opequon flaggy clay loam, 3 to 8 percent slopes, moderately eroded-----	46	IIIe-30	64	3c1
OpC2	Opequon flaggy clay loam, 8 to 15 percent slopes, moderately eroded-----	46	IVe-1	66	3c1

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	De-scribed on page	Capability unit		Woodland suitability group
			Symbol	Page	Number
OpD2	Opequon flaggy clay loam, 15 to 25 percent slopes, moderately eroded-----	47	VIe-1	67	3c4 (north aspects) 4c4 (south aspects)
OpE2	Opequon flaggy clay loam, 25 to 50 percent slopes, moderately eroded-----	47	VIIe-1	68	3c4 (north aspects) 4c4 (south aspects)
OuD	Opequon very stony clay loam, 3 to 25 percent slopes-----	47	VIIs-2	68	3c4 (north aspects) 4c4 (south aspects)
OuE	Opequon very stony clay loam, 25 to 50 percent slopes-----	48	VIIIs-2	68	3c4 (north aspects) 4c4 (south aspects)
Ph	Philo silt loam-----	48	IIW-7	61	1w1
Pn	Pope fine sandy loam-----	49	I-6	59	2o1
Ps	Pope silt loam-----	49	I-6	59	2o1
RbB	Robertsville silt loam, 0 to 8 percent slopes-----	50	IVW-2	66	1w9
Rc	Rock outcrop-----	50	VIIIs-1	69	-----
ShB2	Shelocta shaly silt loam, 0 to 8 percent slopes, moderately eroded-----	51	IIe-4	59	1o3
ShC2	Shelocta shaly silt loam, 8 to 15 percent slopes, moderately eroded-----	51	IIIe-4	62	1o3
ShD2	Shelocta shaly silt loam, 15 to 25 percent slopes, moderately eroded-----	51	IVe-3	66	1r4
SrC	Stony land, rolling-----	51	VIIIs-3	68	4x5 (north aspects) 5x5 (south aspects)
SrF	Stony land, steep-----	51	VIIIs-1	69	5x5 (north aspects) 6x5 (south aspects)
St	Strip mines and Dumps-----	52	VIIIs-5	69	-----
TyA	Tyler silt loam, 0 to 3 percent slopes-----	54	IIIW-9	65	2w6
TyB	Tyler silt loam, 3 to 8 percent slopes-----	54	IIIW-9	65	2w6
WeB2	Weikert shaly silt loam, 0 to 10 percent slopes, moderately eroded-----	55	IIIIs-10	65	5d3
WeC2	Weikert shaly silt loam, 10 to 20 percent slopes, moderately eroded-----	55	IVe-10	66	5d3
WeE	Weikert shaly silt loam, 20 to 45 percent slopes-----	55	VIIe-3	68	5d3 (north aspects) 6d4 (south aspects)
WkD	Weikert very stony silt loam, 0 to 30 percent slopes-----	55	VIIIs-3	68	5d3 (north aspects) 6d4 (south aspects)
W1B	Weikert-Urban land complex, 0 to 10 percent slopes---	56	-----	----	-----
W1C	Weikert-Urban land complex, 10 to 20 percent slopes--	56	-----	----	-----
W1E	Weikert-Urban land complex, 20 to 45 percent slopes--	56	-----	----	-----
WnF	Weikert and Gilpin channery silt loams, 45 to 65 percent slopes-----	56	VIIe-3	68	5d3 (north aspects) 6d4 (south aspects)
WsB2	Westmoreland silt loam, 3 to 10 percent slopes, moderately eroded-----	57	IIe-11	60	2o3
WsC2	Westmoreland silt loam, 10 to 20 percent slopes, moderately eroded-----	57	IIIe-11	63	2o3
WsD2	Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded-----	57	IVe-10	66	2r4 (north aspects) 3r4 (south aspects)
WsE	Westmoreland silt loam, 30 to 45 percent slopes-----	58	VIe-3	67	2r5 (north aspects) 3r5 (south aspects)

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at <http://offices.sc.egov.usda.gov/locator/app>.

Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (<http://directives.sc.egov.usda.gov/33081.wba>) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (<http://directives.sc.egov.usda.gov/33085.wba>).

All Other Inquiries

For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (<http://directives.sc.egov.usda.gov/33086.wba>).